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John GRIVAS

PSYCHOLOGY

VCE UNITS 1 AND 2

EIGHTH EDITION

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PREFACE

The eighth edition of *Psychology for the VCE Student Units 1 and 2* addresses the VCE Psychology Units 1 and 2 content accredited by VCAA for the period 1 January 2016 to 31 December 2020 and specified in the study design (updated June 2017).

This edition is a major revision which incorporates changes reflecting the VCAA Psychology Advice for Teachers (published after the seventh edition), particularly to the mental health and research methods chapters. Updates include the integration of the 4P Factor model, advantages and limitations of all theories and research methods, more neurological content underpinning relevant Unit 3 content, more recent research and data on social media influences on behaviour, strengthening of links with the study design through more explicit referencing, and revision of end-of-chapter tests to better accord with the sample examination for Units 3 & 4 (also published after the seventh edition).

This edition also addresses teacher feedback through the inclusion of the end-of-chapter revision features contained in *VCE Psychology Units 3 and 4 sixth edition,* more variety in learning activities, review of learning activity answers in the eGuide, closer links with relevant Units 3 & 4 content, and the reinstatement of some content from previous editions such as ways of combating prejudice.

Beyond changes to the content, a new design gives the text a distinctive and even more engaging look. Specifically, the learning pathway is improved through more prominent headers, more distinctive sub-headers that are also organised hierarchically, and more distinctive colours for key features.

The new study design incorporates the biopsychosocial approach as an underlying theme in all units and to give greater emphasis to practical work and application of psychological concepts. It contains new content, modified content and relocated content, as well as optional content that can be explored through student-directed investigations. In Units 1 and 2, teachers have far greater choice and flexibility with regard to specific content to be covered, the breadth and depth of coverage, and the number and types of SACs that need to be satisfactorily completed by individual students.

As with all previous editions, the primary goal of this new edition was to ensure all the compulsory key knowledge and skills specified in the study design are thoroughly covered so that all outcomes can be achieved in accordance with VCAA requirements. In revising the previous edition, I have been mindful of the diverse interests and capabilities of students who undertake Units 1 and 2, most of whom are studying Psychology for the first time and most of whom will also study Units 3 and 4 Psychology.

In particular, I have endeavoured to ensure the text is accessible to all students, regardless of specific needs, interests, abilities and sociocultural backgrounds, but without compromising the required Units 1 and 2 standards. It was also considered important to ensure the links between the content and study design specifications are more explicit than ever before, and that all content is as interesting and engaging as it can possibly be.

All learning activities and chapter tests have been reviewed, revised and enhanced where required. Their answers have also been clarified or updated where required. Digital resources continue to be available through the eBookPLUS (for students) and eGuidePLUS (for teachers) that accompany and interface with the text. All digital resources have been reviewed and included based on a criterion of quality rather than quantity. However, this has not precluded identification of additional digital resources for the eighth edition.

The eighth edition also provides Units 1 and 2 students with knowledge and skills that will thoroughly prepare them to successfully undertake Units 3 and 4 Psychology, particularly research methods, neurological and mental health content. Most of the learning activities have been successfully trialled with year 11 students over many years. Teachers of Psychology continue to make suggestions and these have been included where appropriate. I hope both teachers and students continue to enjoy working with this new edition of the text as they do with previous editions.

Using the book

I have made every effort to ensure this edition continues to be an all-inclusive textbook that is suitable for independent student use and from which students can fulfil all requirements of the study design without needing to refer to other resources, apart from resources for their self-directed investigations on optional topics, the current *VCE Psychology Study Design* and the relevant assessment memoranda and notices in the *VCAA Bulletin* and at the *VCAA website.*

Research methods and other key science skills

The text systematically and comprehensively addresses all the areas of study, key knowledge and key science skills specified in the study design. It provides a theoretical framework that addresses outcomes, with a diverse range of everyday examples and applications to elucidate theories and concepts. As students work through the text, they will find that it follows the study design very explicitly both in the use of terminology and in the sequencing of material. However, in some instances the order in which information is presented varies from the study design in order to maintain a logical learning framework. This is most apparent in chapter 2, which covers the key science skills. Some of these skills are also covered in chapter 1, which outlines the nature and scope of contemporary psychology.

Although research methods content is primarily organised in a discrete chapter, it is not intended to promote the study of all research methods as a 'block', in isolation from relevant psychological contexts. Best practice teaching and learning suggests that research methods should be 'broken up' and integrated at appropriate points throughout the course. For example, questionnaires and rating scales may be studied in detail in the context of learning about attitudes as these self-report techniques are commonly used by researchers for studies on attitudes.

Key knowledge and skills

Each chapter maintains a similar format, as in the previous editions. Key knowledge and skills are presented in the *central text*, which provides a clear pathway to achieving the relevant outcomes specified in the study design. Additional high-interest information or relevant research punctuates each chapter in the forms of *boxes*, *tables*, *cartoons*, *colour photographs*, *charts* and other *graphic material*. These features are intended to complement the central text by providing a more detailed elucidation or exploration of aspects of particular topics, and to show the many different and interesting ways in which psychology can affect students' lives.

Learning activities

In addition, the text is rich in suggestions for *learning activities*, which are abundantly and strategically located throughout each chapter. The learning activities support a variety of relevant and worthwhile ways of learning about psychology. They also provide suitable opportunities to challenge students to apply their understanding of concepts. The popular *chapter summary* based on a graphic organiser has been retained. This is complemented with a list of *key terms* and a *self-assessment checklist* at the end of each chapter that may be completed before and/or after attempting the chapter test.

Chapter tests and answers

Many *chapter tests* have been expanded, particularly with short-answer questions and extended-answer questions where appropriate. These tests are generally like a 'mini VCE exam'. The chapter test for the research methods chapter has been revised to accord with the sample Units 3 and 4 end-of-year exam (published April 2017). The examination no longer includes a Section C, now comprising only two sections (but incorporating section C extended-answer type questions, including one without multiple parts that is worth 10 marks). The text also includes numerous learning activities requiring analysis and evaluation of research and data. These options also enable practice for extended-answer type questions that assess key science skills.

All *answers* for multiple-choice questions are published at the end of the text and user-friendly marking guides for all other questions are published in both the student eBookPLUS and the teacher eGuidePLUS. The questions and marking guides are based on VCAA assessment models.

eBookPLUS and eGuidePLUS icons

As in the previous edition, eBookPLUS and eGuidePLUS icons throughout the text flag a variety of options for additional ideas for learning activities, as well as digital resources that are accessed online at the JacPLUS website. The eGuidePLUS includes new, fully customisable exams and marking guides for Units 1 and 2.

Glossary

The extended *glossary* of key terms, which are identified in bold in the central text, has been retained. This can be used to reinforce students' understanding of key knowledge and to assist in their preparation for tests.

References

The comprehensive list of *references* used in preparing the text is also retained. This provides numerous examples of APA conventions for referencing different types of source materials. Although APA conventions do not have to be used in VCE Psychology, many teachers prefer access to a variety of examples.

John Grivas
July 2017

Overview of VCE Psychology

Course outline

Psychology in the Victorian Certificate of Education is offered as a science study. Consequently, there is an emphasis on key science skills and scientific research methodologies in all units.

VCE Psychology is made up of four units. Each unit deals with specific content (including skills) contained in areas of study and is designed to enable students to achieve the outcomes for that unit. Each outcome is described in terms of key knowledge.

Key science skills have also been specified as a core component of all units and apply across all areas of study. These skills include research methodologies and ethical principles. The science skills may be taught separately and/or integrated in the areas of study.

This textbook aims to cover Victorian Curriculum and Assessment Authority specifications for Units 1 and 2. The areas of study of these two units are:

Unit 1: How are behaviour and mental processes shaped?

1. How does the brain function?
2. What influences psychological development?
3. Student-directed research investigation

Unit 2: How do external factors influence behaviour and mental processes?

1. What influences a person's perception of the world?
2. How are people influenced to behave in particular ways?
3. Student-directed practical investigation

The areas of study in each unit can be taught in any order. Similarly, within each area of study, the content, including key science skills, can be covered in any order.

Assessment

Each unit has a set of outcomes that students are required to achieve in order to satisfactorily complete the unit. Each outcome is described in terms of key knowledge, complemented by key science skills. Unit 1 and Unit 2 each have three outcomes.

An outcome is a statement of what a student should know and be able to do on completion of a unit. Students complete various learning activities throughout each unit to develop the key knowledge and key science skills to achieve each outcome.

Procedures for the assessment of levels of achievement in Units 1 and 2 are a matter for school decision. Assessment of levels of achievement for these units will not be reported to the VCAA. Schools may choose to report levels of achievement using grades, descriptive statements or other indicators.

UNIT 1: How are behaviour and mental processes shaped?

<table>
<tr><th>Outcomes</th><th>Assessment tasks</th></tr>
<tr><td>Outcome 1
Describe how understanding of brain structure and function has changed over time, explain how different areas of the brain coordinate different functions, and explain how brain plasticity and brain damage can change psychological functioning.</td><td rowspan="2">Suitable tasks for Outcomes 1 and 2 may be selected from:
• a report of a practical activity involving the collection of primary data
• a research investigation involving the collection of secondary data
• a brain structure modelling activity
• a logbook of practical activities
• analysis of data/results including generalisations/conclusions
• media analysis/response
• problem solving involving psychological concepts, skills and/or issues
• a test comprising multiple choice and/or short answer and/or extended response
• a reflective learning journal/blog related to selected activities or in response to an issue</td></tr>
<tr><td>Outcome 2
Identify the varying influences of nature and nurture on a person’s psychological development, and explain different factors that may lead to typical or atypical psychological development.</td></tr>
<tr><td>Outcome 3
Investigate and communicate a substantiated response to a question related to brain function and/or development, including reference to at least two contemporary psychological studies and/or research techniques.</td><td>Suitable task for Outcome 3:
• a report of an investigation into brain function and/or development that can be presented in various formats, for example digital presentation, oral presentation, or written report.</td></tr>
</table>

UNIT 2: How do external factors influence behaviour and mental processes?

<table>
<tr><th>Outcomes</th><th>Assessment tasks</th></tr>
<tr><td>Outcome 1
Compare the sensations and perceptions of vision and taste, and analyse factors that may lead to the occurrence of perceptual distortions.</td><td rowspan="2">Suitable tasks for Outcomes 1 and 2 may be selected from:
• a report of a practical activity involving the collection of primary data
• a research investigation involving the collection of secondary data
• a logbook of practical activities
• analysis of data/results including generalisations/conclusions
• media analysis/response
• problem solving involving psychological concepts, skills and/or issues
• a test comprising multiple choice and/or short answer and/or extended response
• a reflective learning journal/blog related to selected activities or in response to an issue</td></tr>
<tr><td>Outcome 2
Identify factors that influence individuals to behave in specific ways, and analyse ways in which others can influence individuals to behave differently.</td></tr>
<tr><td>Outcome 3
Design and undertake a practical investigation related to external influences on behaviour, and draw conclusions based on evidence from collected data.</td><td>Suitable task for Outcome 3:
• a report of an investigation into internal and/or external influences on behaviour that can be presented in various formats, for example digital presentation, oral presentation, scientific poster or written report.</td></tr>
</table>

The VCE Psychology Study Design (2016–2021) is available on the VCAA website at www.vcaa.vic.edu.au. Teachers are advised to check the ***VCAA Bulletin*** for updates.

CONTENTS MATRIX

Chapter coverage of the study design

Units 1 & 2: Key science skills

CHAPTER 1 **Introduction to psychology** **CHAPTER 2** **Research methods in psychology**	*Develop aims and questions, formulate hypotheses and make predictions* • determine aims, research hypotheses, questions and predictions that can be tested • identify and operationalise independent and dependent variables *Plan and undertake investigations* • determine appropriate type of investigation: experiments (including use of control and experimental groups); case studies; observational studies; self-reports; questionnaires; interviews; rating scales; access secondary data, including data sourced through the internet that would otherwise be difficult to source as raw or primary data through fieldwork, a laboratory or a classroom • use an appropriate experimental research design including independent groups, matched participants, repeated measures and cross-sectional studies • select and use equipment, materials and procedures appropriate to the investigation • minimise confounding and extraneous variables by considering type of sampling procedures, type of experiment, counterbalancing, single and double blind procedures, placebos, and standardised instructions and procedures • select appropriate sampling procedures for selection and allocation of participants including random sampling, stratified sampling, convenience sampling and random allocation of participants to groups *Comply with safety and ethical guidelines* • understand the role of ethics committees in approving research • apply ethical principles when undertaking and reporting investigations, including consideration of the role of the experimenter, protection and security of participants' information, confidentiality, voluntary participation, withdrawal rights, informed consent procedures, use of deception in research, debriefing and use of animals in research • apply relevant occupational health and safety guidelines while undertaking practical investigations *Conduct investigations to collect and record data* • work independently and collaboratively as appropriate and within identified research constraints • systematically generate, collect, record and summarise both qualitative and quantitative data *Analyse and evaluate data, methods and scientific models* • process quantitative data using appropriate mathematical relationships and units • organise, present and interpret data using tables, bar charts, line graphs, percentages, calculations of mean as a measure of central tendency and understanding of standard deviation as a measure of variation around the mean • recognise the difference between statistics that describe a specific sample and the use of statistics to make inferences about the population from which the data were drawn • use basic principles of reliability and validity in evaluating research investigations undertaken • explain the merit of replicating procedures and the effects of sample sizes in obtaining reliable data • evaluate investigative procedures and possible sources of bias, and suggest improvements, with reference to identification of potential extraneous and confounding variables including individual participant differences, nonstandardised instructions and procedures, order effects, experimenter effect and placebo effects • explain how models are used to organise and understand observed phenomena and concepts related to psychology, identifying limitations of the models • distinguish between scientific and non-scientific ideas

Units 1 & 2: Key science skills *(continued)*

CHAPTER 1 **Introduction to psychology** **CHAPTER 2** **Research methods in psychology**	*Draw evidence-based conclusions* • determine to what extent evidence from an investigation supports the purpose of the investigation, and make recommendations, as appropriate, for modifying or extending the investigation • draw conclusions consistent with evidence and relevant to the question under investigation • identify, describe and explain the limitations of conclusions, including identification of further evidence required • critically evaluate various types of information related to psychology from journal articles, mass media and opinions presented in the public domain • discuss the implications of research findings and proposals *Communicate and explain scientific ideas* • use appropriate psychological terminology, representations and conventions for reporting research, including standard abbreviations, graphing conventions and the components of a scientific report with reference to inclusion of an abstract, an introduction and sections for method, results and discussion • discuss relevant psychological information, ideas, concepts, theories and models and the connections between them • identify and explain formal psychological terminology about investigations and concepts • use clear, coherent and concise expression • acknowledge sources of information and use standard scientific referencing conventions

Source: © VCAA, VCE Psychology Study Design (June 2017 update).

Unit 1: Key knowledge

CHAPTER 3 **Role of the brain in mental processes and behaviour**	• the influence of different approaches over time to understanding the role of the brain, including the brain vs heart debate, mind-body problem, phrenology, first brain experiments and neuroimaging techniques • the basic structure and function of the central and peripheral nervous systems as communication systems between the body's internal cells and organs and the external world • the role of the neuron (dendrites, axon, myelin and axon terminals) as the primary functional unit of the nervous system, including the role of glial cells in supporting neuronal function • the basic structure and function of the hindbrain (cerebellum, medulla), midbrain (reticular formation) and forebrain (hypothalamus, thalamus, cerebrum) • the role of the cerebral cortex in the processing of complex sensory information, the initiation of voluntary movements, language, symbolic thinking and the regulation of emotion, including localisation of function.
CHAPTER 4 **Brain plasticity and brain damage**	• infancy and adolescence as periods of rapid development and changes in brain structure and function, including development of myelin, synaptic pruning and frontal lobe development • the impact of injury to the cerebral cortex on a person's biological, psychological and social functioning and the ability of the brain to undergo adaptive plasticity, illustrated by rehabilitation of people with brain injuries • the use of animal studies and neuroimaging techniques to develop understanding of human neurological disorders including Parkinson's disease.
CHAPTER 5 **The complexity of psychological development**	• the interactive nature of hereditary and environmental factors on a person's psychological development, illustrated through twin and adoption studies • the role of critical and sensitive periods in a person's psychological development • the importance of attachment on an individual's emotional development: genetics; temperament and early life experiences (with reference to the work of Harlow & Ainsworth) • the development of cognitive abilities from concrete to symbolic thinking (with reference to the work of Piaget) • psychosocial development across the lifespan as an influence on the development of an individual's personality (with reference to the work of Erikson).
CHAPTER 6 **Atypical psychological development**	• the conceptualisation of normality including typical and atypical behaviours; adaptive and maladaptive behaviours; and mental health and mental disorder as a continuum • mental health as a product of internal and external factors which assist individuals to cope with change and challenge • major categories of psychological disorder: addiction disorders; anxiety disorders; mood disorders; personality disorders; and psychotic disorders • the 'two-hit' hypothesis as an explanation for the development of particular psychological disorders, illustrated by schizophrenia.

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Unit 2: Key knowledge

CHAPTER 7 **Sensation and perception**	• sensation and perception as two complementary but distinct roles in the reception, processing and interpretation of sensory information • taste and vision as two examples of human sensory systems, including the roles of sensory receptors and receptive fields, transmission of sensory information to the brain, and representation of sensory information in the cerebral cortex • the influence of biological, psychological and social factors on visual perception, including depth cues, visual perception principles and perceptual set • the influence of biological, psychological and social factors on gustatory perception, including age, genetics, perceptual set (including food packaging and appearance) and culture.
CHAPTER 8 **Distortions of perception**	• the fallibility of visual and gustatory perception systems, demonstrated by visual illusions and the judgment of flavours (influence of perceptual set, colour intensity and texture) • distortions of perception of taste and vision in healthy, intact brains as providing insight into brain function related to perception, illustrated by synaesthesia.
CHAPTER 9 **Social cognition**	• the role of person perception, attributions, attitudes and stereotypes in interpreting, analysing, remembering and using information about the social world • the applications and limitations of the tri-component model of attitudes • attitudes and stereotypes that may lead to prejudice and discrimination.
CHAPTER 10 **Social influences on behaviour**	• the influence of status and social power within groups, and obedience and conformity on individual behaviour, with reference to theorists including Asch, Milgram and Zimbardo • the influences on helping behaviour (or reluctance to help) including personal, situational and social factors • factors that influence bullying (including cyberbullying) behaviour and the effects of bullying behaviour on an individual's psychological functioning • positive and negative influences of media on individual and group behaviour, illustrated by advertising, television, video games and social media.

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Originally appeared in Hess, *Das Zwischenhirn*, which was published in 1949, The Functional Organ; **199**/'Recovery of cognitive function soon after stroke: a study of visual neglect, attention span and verbal recall', Wade, Wood and Hewer, *Journal of Neurology, Neurosurgery and Psychiatry*, 1988, 51, 10–13; **203** (a), **203** (b), **203** (c), **203** (d)/'Constraint-induced movement therapy after stroke', *The Lancet Neurology*, Elsevier, Gert Kwakkel, Janne M. Veerbeek, Erwin E. H. van Wegen, Steven L. Wolf, 3684590711956; **497**/Duke Downey/*San Francisco Chronicle*; **519**/Reprinted from *Journal of Experimental Social Psychology*, Vol. 10, No. 1, Levinger et al., 'The Ringelmann effect: Studies of group size and group performance', p. 374, © 1974 Academic Press with permission from Elsevier • Copyright Creators Syndicate distributed by Auspac Media: **80** • Creative Commons: **131**/Library of Congress, Prints and Photographs; **193**, **196**/U.S. National Library of Medicine; **318**/© The Victorian Responsible Gambling Foundation 2015; **377** (left b)/Federal Highway Administration — MUTCD; **380** (right)/*My Wife and My Mother-In-Law*, by the cartoonist W. E. 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Alcorn, N., Buchanan, L., Smith, J. & Gregory, L. 2015. *Media Consumer Survey 2015: Australian media and digital preferences 4th ed.* Deloitte Australia report. https://www2.deloitte.com/content/dam/Deloitte/au/Documents/technology-media- • Department of Health: **306** • Elsevier: **148**/Scan of brain and spinal cord from *Gray's Anatomy* 35th edition c 1973 p. 807; **239**/From *Genie: A Psycholinguistic study of a modern-day wild child* • Feinstein Institute for Medical Research: **210**/Greenberg and Adams, *Neuroimaging: A companion to Adams and Victors principles of neurology*, NY: McGraw-Hill, 1995 • Getty Images Australia: **8** (c)/Wiro.Klyngz/Shutterstock.com; **13** (b)/BSIP/Contributor; **13** (c)/Tetra Images; **37** (a)/Stockbyte; **66**/Olimpik/Shutterstock.com; **66**/Kyodo News; **70**/Milos Bicanski/Stringer; **71**/James L. 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Asch, 'Opinions and Social Pressure', *Scientific American*, November 1955, vol. 193, no. 5,/Solomon E. Asch, 'Opinions and Social Pressure', Scientific American, November 1955, vol. 193, no. 5; **514** (b), **514** (c) • Patricia M. Crittenden, Ph.D.: **246** • Pearson Education: **501**/ZIMBARDO, PHILIP G., *Psychology and Life*, 14th Edition, © 1996. Adapted by permission of Pearson Education, Inc., New York, New York. • Philip G. 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Psychology — introduction and research methods

What is the nature of psychology as a science?

CHAPTER 1 Introduction to psychology

What research methods and key science skills are used in VCE Psychology?

CHAPTER 2 Research methods in psychology

1 INTRODUCTION TO PSYCHOLOGY

CHAPTER CONTENT

How do psychologists research topics of interest? What ethical principles do they have to follow? What factors influence how we think, feel and behave? Why are we alike yet so different from one another? What role do genetics and our everyday environment and experiences play? What is the connection between our brain and behaviour? How much of our brain is active when we do something? Which parts of our brains do what? Why do young children view the world in self-centred ways? How does our thinking change over time? How do we make sense of what we see or taste? Why do individuals experience the world differently? What is normal behaviour? What is abnormal behaviour? What thoughts, feelings and behaviours are associated with different types of mental disorder? How can the presence of others influence our behaviour? When are we more likely to help someone in distress? Why do some people bully others? Why do we hold the attitudes we do? Why are some people racially prejudiced? What factors influence how other people perceive us? Questions such as these will form the basis of your study of psychology this year. You will also have the opportunity to ask your own questions and design investigations to seek answers.

DEFINING PSYCHOLOGY AND ITS SUBJECT MATTER

The term psychology originates from two Greek words — *psyche*, meaning mind, and *logos*, which loosely translated means study or knowledge. Psychology was therefore originally defined as the study of the mind. Over time, this definition has broadened to include behaviour. **Psychology** is now commonly defined as the scientific study of human thoughts, feelings and behaviour. This is consistent with the definition used in the VCE Psychology study design.

The terms *thoughts* and *feelings* refer to mental processes that cannot be directly observed. What you think about, your choice of words in a conversation, how you interpret incoming sensory information, the attitudes you hold towards asylum seekers, what motivates you to study or party, dreaming, learning, remembering, being in love, and feeling anxious, sad or happy are all examples of mental processes. They are private, internal experiences which cannot be seen by anyone in the way that we can see actions such as smiling, hugging and bike riding. Mental processes, however, underlie most of our behaviours.

The term *behaviour* refers to any externally expressed action made by a living person (or animal) that can be directly observed. It includes activities such as walking, talking, laughing, texting, watching television, interacting with others, and so on. All these involve actions that can be seen as they occur, unlike mental processes that cannot be seen as they take place.

Because mental processes cannot be directly observed, psychologists draw conclusions about them on the basis of observable behaviour. For example, a person who is observed chanting anti-war statements at an anti-war rally may be reasonably assumed to have a negative attitude towards war. Similarly, rapid eye movements observed in a sleeping person indicate that they are likely to be dreaming.

Although psychologists distinguish between behaviour and mental processes, and often study ('investigate') them separately, in reality, behaviour and mental processes are closely interrelated and influence each other continuously. For example, *feeling* angry about the way someone has treated you may affect what you *think* about the person and the way you *behave* towards them when you next meet them. Similarly, *thinking* you have not adequately prepared for an exam may cause you to *feel* anxious which may result in *behaviour* such as a faster heart rate, pacing the corridor and talking quickly.

People are the main subject matter of psychology. However, animals may also be used in psychological research. This is mainly done when suitable people are not available for a study of research interest or when human research participants cannot be used because of the risk of psychological or physical harm.

Figure 1.1 Psychology is the scientific study of human thoughts, feelings and behaviour. For example, what thoughts and feelings underlie this risk-taking behaviour on a train?

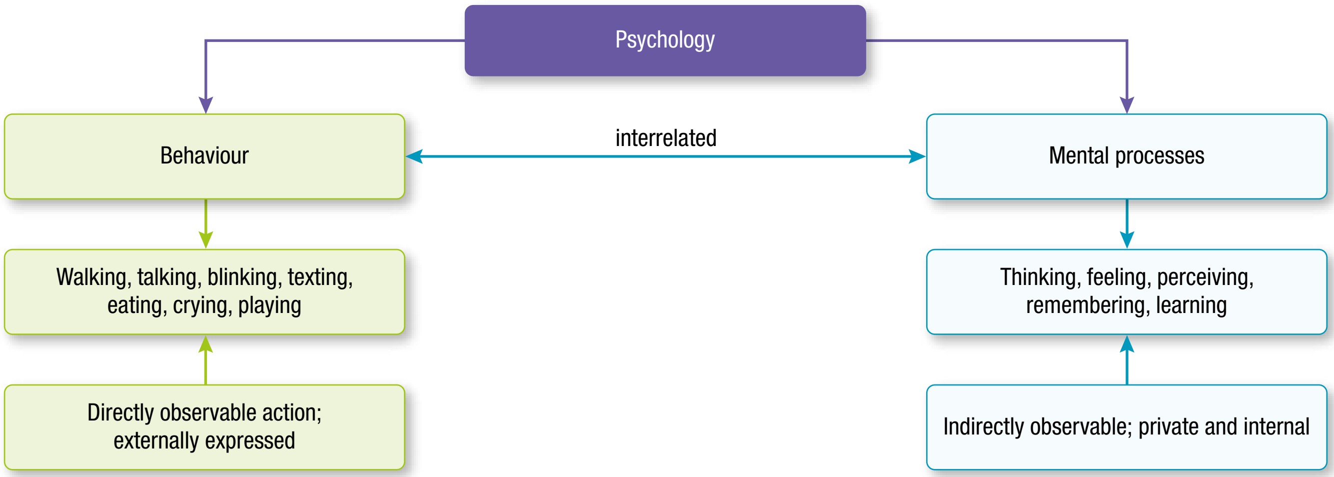

Figure 1.2 Behaviour and mental processes are different but interrelated.

LEARNING ACTIVITY 1.1

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Distinguishing between behaviour and mental processes

1. Consider each activity listed in the left-hand column in the table. For each activity, tick (✓) the appropriate column to indicate whether you think it is a behaviour or a mental process. Give a reason for each answer.
2. Which of the activities were the most difficult to classify as either a behaviour or a mental process? Explain why.
3. Explain the relationship between behaviour and mental processes with reference to one of the activities in the table.

Activity	Behaviour	Mental process	Reason
whistling aloud			
deciding whether to shoot for a goal or pass to a team mate			
starting to feel excited about going to a party			
looking at yourself in a mirror			
experiencing a toothache			
singing a song ‘in your head’			
experiencing a nosebleed			
worrying about giving a speech			
planning an excuse to get out of a date			
watching a movie alone at home			
posting a photo on Facebook			
adding numbers			
experiencing ‘butterflies in the stomach’			
scratching an itch			
looking at the time on your watch			

SCIENTIFIC NATURE OF PSYCHOLOGY

Should you change an answer to a question on a multiple-choice test? In answering multiple-choice questions, many people rely on common sense or what they have heard from others about the accuracy of a first answer. Popular belief suggests that 'Your first instinct is usually right'. If you relied on this information, you would never change a test answer, regardless of how certain you were that your first answer was incorrect.

Many students are surprised at the results of scientific research studies which have found that when students change their answers in a test, they are more likely to change an incorrect answer to a correct answer than they are to change a correct answer to an incorrect answer (Kruger, Wirtz & Miller, 2005).

In everyday life we often use common sense in trying to understand our own behaviour and that of others. We draw on our life experiences, particularly our observations of how we and others do things, to develop opinions on matters such as the best way to teach children to read, what causes phobias, why people bully others, how stress affects exam performance, what makes people attractive to others, whether we are born with our personality or intelligence, and why we dream.

'Common sense psychology', whereby people collect information about behaviour informally or non-scientifically, often leads to inaccurate conclusions. There are several possible reasons for this. For example, the source of the information may not be dependable, observations may be incorrectly interpreted and conclusions may be based on faulty or insufficient 'evidence'. In addition, many people do not critically evaluate their beliefs and change them if conflicting information is presented. Research studies have found evidence that people tend to collect information which supports their beliefs and ignore evidence which suggests that their beliefs may not be true (Nickerson, 1998; Risen & Gilovich, 2007). This is called 'confirmation bias'.

How do psychologists study questions about behaviour and mental processes? Typically they do so in a scientific way. *Scientific research* involves using an appropriate research method to collect data (information) relating to a question or problem of interest, then summarising the data and drawing justifiable conclusions about it. Importantly, the research is based on scientific assumptions, attitudes and procedures, and is planned, conducted and reported in accordance with scientific standards. This overall approach is commonly referred to as the *scientific method*.

If, for example, a psychologist wanted to find out whether it is true that 'you can't judge a book by its cover', or, more specifically, whether or not you can judge someone's personality from their physical appearance, they would conduct scientific research and collect relevant data in order to test the accuracy of this adage ('saying').

They might call for volunteer males and females to be participants in their research study and ask one half to be photographed, then the other half to look at the photos and describe the personality of each person in a photo. The psychologist may then give a personality test to each person who was photographed to generate personality profiles which could then be compared with the descriptions provided by the research participants.

Figure 1.3 You check your answer to a multiple-choice question and think it may be wrong. Should you change the answer?

If the descriptions closely matched the profiles and stood up to statistical tests for checking the results, then the psychologist may conclude that the adage is incorrect based on the results obtained from their research. Alternatively, if the descriptions differed considerably from the profiles, the psychologist may conclude that the adage is correct based on the results obtained. Thus, the use of scientific method helps ensure that the data collected are accurate and reliable and that the conclusions drawn from the data are justifiable and can be trusted.

Scientific research, however, is not completely free from error. Like all people, psychologists who conduct research can make

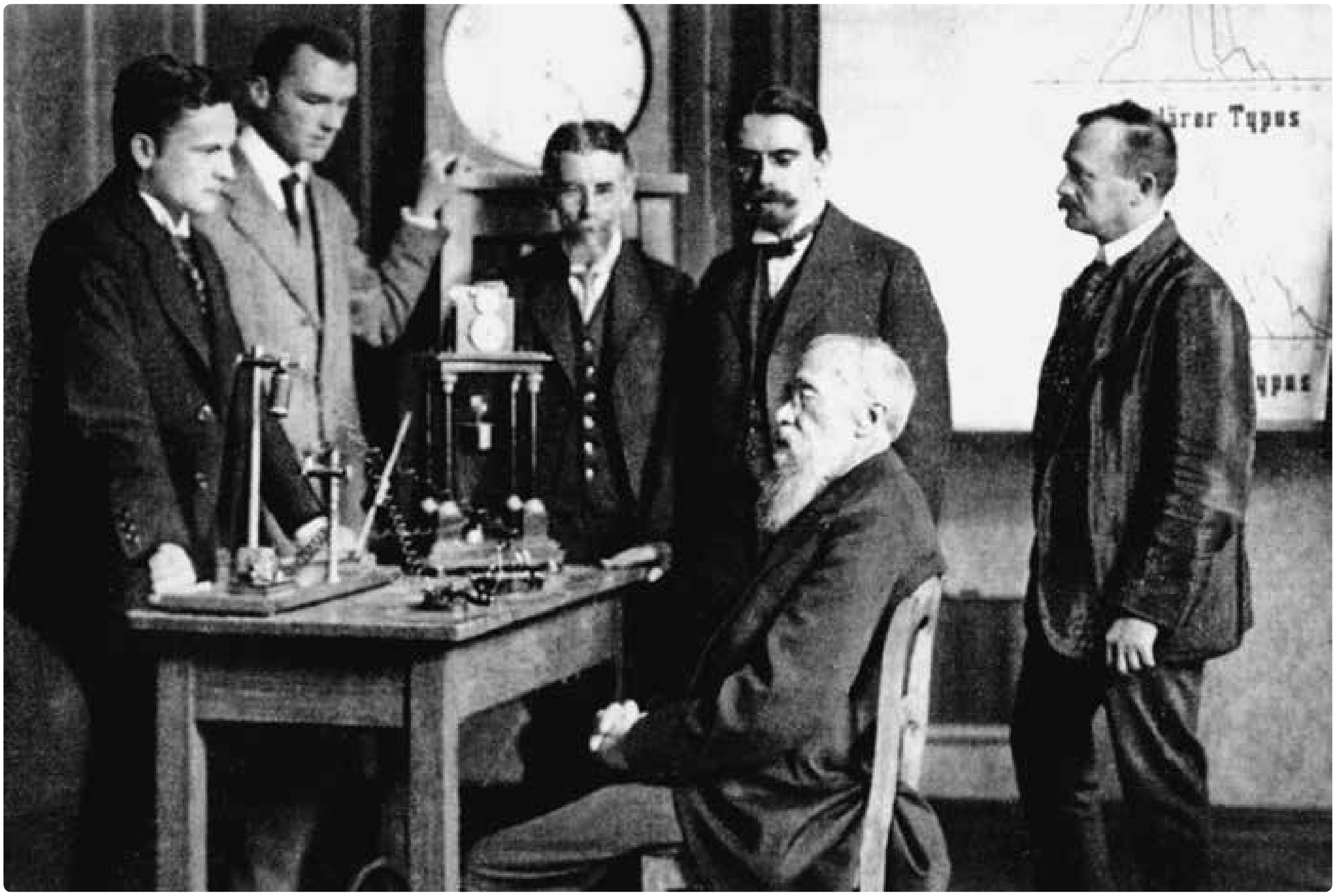

Figure 1.4 The year 1879 marks the beginning of psychology as a science. This is when Wilhelm Wundt established the first psychology research laboratory at the University of Leipzig in Germany. Wundt (seated) is widely regarded as the 'father of psychology'. He is shown with colleagues and an apparatus used for one of his experiments on perceptual processes. For example, participants were exposed to a stimulus (such as a sound) generated by the apparatus and asked to report their sensations, or their reaction time was recorded to measure the speed of their perception.

mistakes or not properly control all things that can influence the results. It is important therefore in any science that a research study can be repeated to test the results for accuracy or find out if they can be applied to other people and other similar situations.

In relation to research, **replication** involves conducting a study again to establish whether the results obtained can be reproduced and are therefore reliable. A researcher may also replicate a study if the results can be applied to other people across a range of situations and settings. For example, replicating the study on personality and physical appearance using participants and observers from a different age group, cultural background, sex and so on may provide similar results to the original study, thus reinforcing the finding.

Alternatively, if replication of the study using participants with different backgrounds produces markedly different results from those obtained in the original study, the conclusion made about personality and appearance may need to be refined so that it is applied only to the actual participants in the study and the larger group from which they were selected.

SCIENTIFIC VS NON-SCIENTIFIC EXPLANATIONS

There are many ways of explaining human thoughts, feelings and behaviour that are not based on science. Some of these approaches claim to be scientific but are not. Some have scientific-sounding names and use very elaborate systems to explain how we think, feel or behave. Consequently, they seem to be based on science. Among these non-scientific explanations are astrology, numerology, graphology and palmistry.

Astrology describes the belief that the movement and positions of the stars and planets influences a person's personality, moods, behaviour, events in their life and so on.

Numerology involves examining significant numbers in a person's life, such as birth date, house address or phone number, to predict future events or describe influences on their life.

Graphology involves interpreting handwriting to judge a person's personality and identify significant issues in their life.

Palmistry involves examining the lines on the palm of a person's hand and using these to describe aspects of their thoughts, feelings and behaviour, as well as to predict future events in their life.

These kinds of alternative approaches are often called pseudosciences. 'Pseudo' is a prefix used to indicate that something is fake or falsely imitates something else. Consequently, **pseudoscience** means fake or false science.

Psychologists and other scientists generally believe that the methods and results, and, therefore, the claims, of pseudoscientists are often inaccurate as they are not based on true science. The non-scientist is likely to draw inaccurate conclusions about human thoughts, feelings and behaviours (and other events) because the conclusions are based on faulty or insufficient evidence resulting from unsystematic study (if any). Typically, 'supportive evidence' that may be supplied lacks independent review, especially by scholars with expertise on the topics (called 'peer review'). Psychologists and other scientists also hold a view that common sense, faith or personal beliefs cannot be used as the sole basis of explaining human thoughts, feelings and behaviour, or determining whether or not something is true.

Figure 1.5 Some of the more popular non-scientific approaches to explain human thoughts, feelings and behaviours

BOX 1.1 Scientists versus non-scientists: some key differences

Approach and method	Scientist	Non-scientist
Develops hypotheses ('predictions') that can be tested through empirical research (e.g. a carefully controlled experiment)	✓	✗
Uses research procedures that minimise the influence of personal biases	✓	✗
Relies on systematic data collection	✓	✗
Considers the effects of sample size in obtaining reliable data and making generalisations (e.g. when applying the results from the sample to the bigger group from which it was drawn)	✓	✗
Assesses claims on the basis of supporting evidence or reasons (e.g. does not make exaggerated claims or over-rely on anecdotes)	✓	✗
Openly considers other interpretations of results obtained	✓	✗
Reports to others how ideas were obtained, how they were tested and what the results were	✓	✗
Replicates studies to test results or apply results to different situations	✓	✗
Identifies and defines what is being studied in clear, precise, concrete, testable, measurable terms	✓	✗
Challenges existing beliefs	✓	✗
Does not fully accept a conclusion unless there is supportive evidence	✓	✗
Looks for and considers explanations or evidence that contradict own findings or beliefs	✓	✗
Does not withhold information that does not support the claims made	✓	✗
Seeks criticism from others with expertise in the area (e.g. 'peer review')	✓	✗
Avoids emotional reasoning and relies on logic	✓	✗

BOX 1.2 How scientific is astrology?

Astrology is a system for explaining and predicting how we think, feel and behave on the basis of the positions of the planets and the stars at the time of a person's birth. It uses scientific-looking astronomical charts and technical terms and is often confused with the real science of astronomy.

Astrology has been practised in different cultures for many centuries, with astrological beliefs going back at least 2500 years. In more recent times, particularly given the regular inclusion of horoscopes in the print media, and production of horoscope apps, the public's exposure to astrology and astrological predictions has increased. Astrology and its horoscopes currently enjoy wide appeal and many people read their horoscopes, even if they don't believe them or take them seriously.

Psychologists have conducted numerous scientific research studies to test astrology. These studies have repeatedly found that astrology is non-scientific and lacking in valid evidence to support its claims.

Statements in horoscopes are usually vague (such as 'mistakes could cost you time and money', 'you can only discuss plans or argue points so much' and 'if you're patient you should be able to achieve a great deal') and highly applicable to most people, irrespective of their birth sign, as evident in the statements in Figure 1.6 on page 10.

Furthermore, systematic procedures used by psychologists to check astrological predictions have repeatedly found that the predictions are usually wrong. The small percentage found to be correct tend to be very general; for example, statements such as 'you will meet someone new in the next 12 months' and 'there will be a political crisis in Australia during this year'. These statements describe events that are more likely to happen than not happen under the ordinary circumstances of everyday life.

Studies have also found that many astrological descriptions of personality and behaviour tend to be made up of desirable, flattering statements. This increases the tendency to accept the description because people are less likely to accept negative and undesirable statements about themselves, such as 'you are insensitive, uncaring, unfriendly and hard to get along with'.

Our willingness to accept the descriptions of ourselves made by astrologers, palm readers, tarot card readers and the like has been called the *Barnum effect*, named after the American circus showman Phineas T. Barnum

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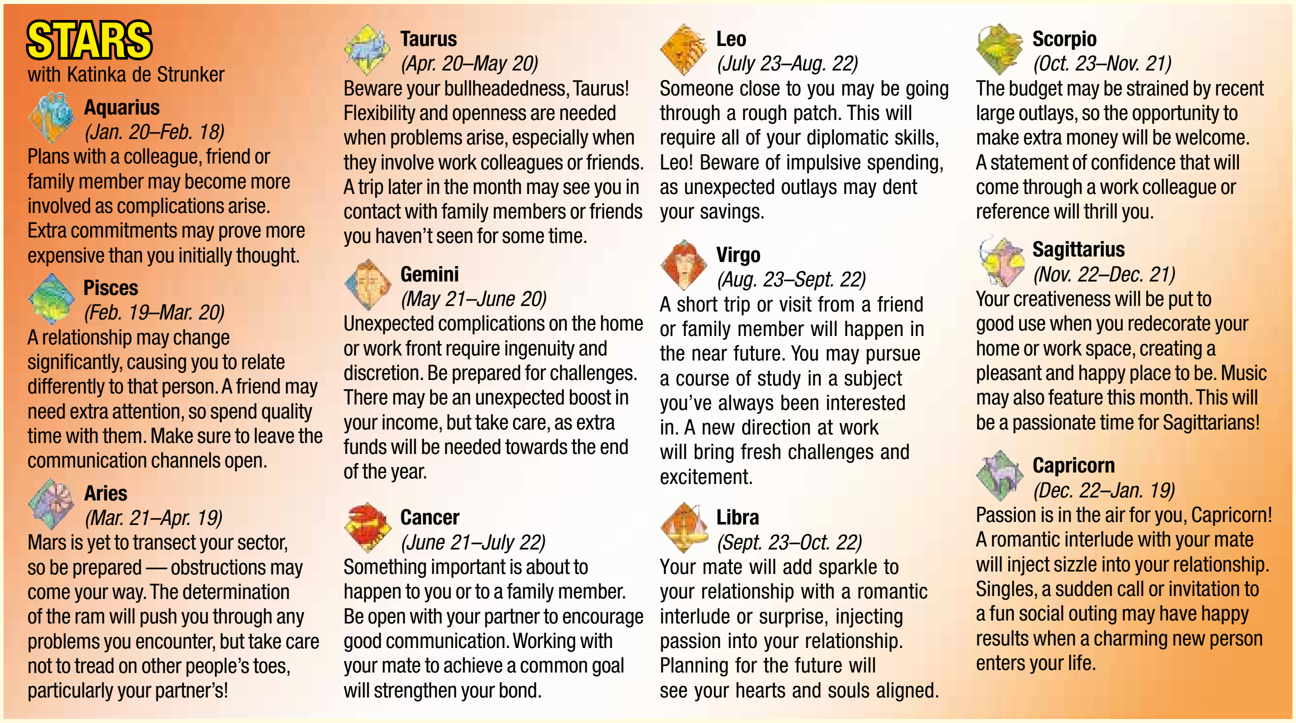
(1810–91), whose success and fame was reportedly built around the principle ‘Always have a little something for everybody’. The Barnum effect has been viewed by some psychologists to refer to the tendency to believe that a personality description or a prediction about the future is accurate if it is stated in a vague or very general way.

Many people also believe in astrology because others do. For example, ‘A lot of people I know believe in astrology so there’s got to be something in it’. This influence is called the *bandwagon fallacy* — an error of assuming that a claim is correct just because many people believe it. Of course, popular opinion is not a dependable guide to the accuracy of an assertion.



STARS
with Katinka de Strunker

Aquarius
(Jan. 20–Feb. 18)
Plans with a colleague, friend or family member may become more involved as complications arise. Extra commitments may prove more expensive than you initially thought.

Pisces
(Feb. 19–Mar. 20)
A relationship may change significantly, causing you to relate differently to that person. A friend may need extra attention, so spend quality time with them. Make sure to leave the communication channels open.

Aries
(Mar. 21–Apr. 19)
Mars is yet to transect your sector, so be prepared — obstructions may come your way. The determination of the ram will push you through any problems you encounter, but take care not to tread on other people’s toes, particularly your partner’s!

Taurus
(Apr. 20–May 20)
Beware your bullheadedness, Taurus! Flexibility and openness are needed when problems arise, especially when they involve work colleagues or friends. A trip later in the month may see you in contact with family members or friends you haven’t seen for some time.

Gemini
(May 21–June 20)
Unexpected complications on the home or work front require ingenuity and discretion. Be prepared for challenges. There may be an unexpected boost in your income, but take care, as extra funds will be needed towards the end of the year.

Cancer
(June 21–July 22)
Something important is about to happen to you or to a family member. Be open with your partner to encourage good communication. Working with your mate to achieve a common goal will strengthen your bond.

Leo
(July 23–Aug. 22)
Someone close to you may be going through a rough patch. This will require all of your diplomatic skills, Leo! Beware of impulsive spending, as unexpected outlays may dent your savings.

Virgo
(Aug. 23–Sept. 22)
A short trip or visit from a friend or family member will happen in the near future. You may pursue a course of study in a subject you’ve always been interested in. A new direction at work will bring fresh challenges and excitement.

Libra
(Sept. 23–Oct. 22)
Your mate will add sparkle to your relationship with a romantic interlude or surprise, injecting passion into your relationship. Planning for the future will see your hearts and souls aligned.

Scorpio
(Oct. 23–Nov. 21)
The budget may be strained by recent large outlays, so the opportunity to make extra money will be welcome. A statement of confidence that will come through a work colleague or reference will thrill you.

Sagittarius
(Nov. 22–Dec. 21)
Your creativeness will be put to good use when you redecorate your home or work space, creating a pleasant and happy place to be. Music may also feature this month. This will be a passionate time for Sagittarians!

Capricorn
(Dec. 22–Jan. 19)
Passion is in the air for you, Capricorn! A romantic interlude with your mate will inject sizzle into your relationship. Singles, a sudden call or invitation to a fun social outing may have happy results when a charming new person enters your life.

Figure 1.6 An example of a horoscope

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Practical activity — how scientific is astrology?

LEARNING ACTIVITY 1.2

Is ‘common sense’ good psychology?

Psychologists using scientific research have studied the accuracy of each of the statements below. On the basis of ‘common sense’, decide whether each statement is true or false.

1. A fully qualified hypnotist can hypnotise anybody. T/F
2. Brain activity stops during sleep. T/F
3. Out of the 7.5 billion or so people on Earth, there is probably someone else who is exactly like you. T/F
4. People with schizophrenia have two or more distinct personalities. T/F
5. Having someone read study material to you while you are asleep results in better recall of the material when you awaken. T/F
6. In an emergency, your chances of getting help from someone increases as the number of bystanders increases. T/F
7. You can tell quite accurately what emotion a person is experiencing by observing the expression on their face. T/F
8. Most people have one psychic ability. T/F
9. You can’t fool a lie detector. T/F
10. Only humans are capable of self-recognition when looking at their reflection in a mirror. T/F

Answers

Scientific research findings indicate that each statement is false.

CLASSIC AND CONTEMPORARY PERSPECTIVES IN PSYCHOLOGY

Throughout the history of psychology there have been different perspectives, or 'viewpoints', on how to best study, describe and explain human behaviour and mental processes. Some of the more prominent perspectives and what they focused on or emphasised are:

- *Structuralism* (late 1800s) — the structure of human consciousness ('awareness'), particularly the basic parts or building blocks that make up consciousness, how the parts are organised and how they are interrelated
- *Psychoanalysis/Psychodynamic* (early 1900s to present) — the roles of conflicts, childhood memories, drives and motives existing beneath the level of conscious awareness
- *Gestalt* (early 1900s to 1950s) — the importance of the whole experience of a person rather than the individual parts
- *Behaviourism* (early 1900s to 1960s) — how observable behaviour is learned and changed by experience, particularly rewards and punishments
- *Humanism* (1950s to present) — the uniqueness of individuals and their positive potential to fulfil their lives
- *Biological* (1950s to present) — bodily structures and processes underlying thoughts, feelings and behaviour
- *Cognitive* (1950s to present) — how we acquire, process, remember and use information about ourselves and the world
- *Socio-cultural* (1960s to present) — social and cultural influences on thoughts, feelings and behaviour.

The *biopsychosocial approach*, which emerged in the late 1970s, is probably the most widely adopted perspective in contemporary psychology. Its viewpoint is that human behaviour and mental processes originate, develop and function due to the complex interaction of biological, psychological and social factors. This approach is used in VCE Psychology and therefore throughout this text.

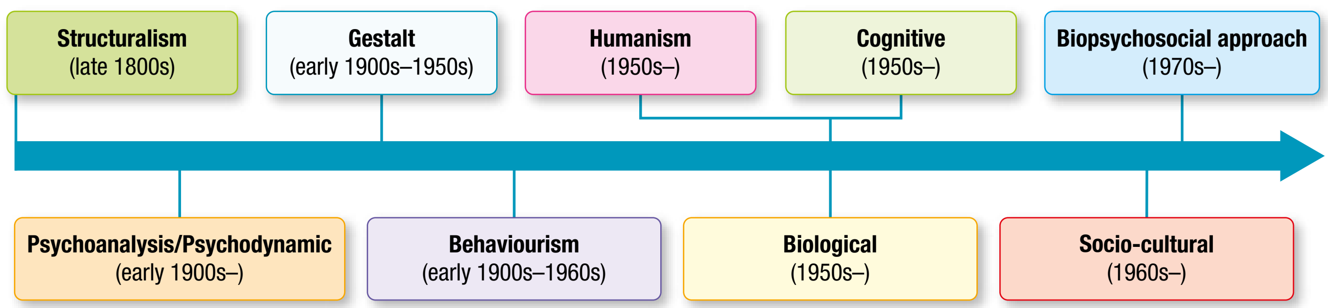

Figure 1.7 The discipline of psychology since its early establishment has moved its perspective from a study of the structure of consciousness under Wilhelm Wundt to one that focuses on the interaction of biological, psychological and social factors in influencing how we think, feel and behave.

CAREERS AND AREAS OF SPECIALISATION IN PSYCHOLOGY

The study of psychology can lead to opportunities in a range of careers that involve working with individuals, couples, families, large groups, organisations or even communities. For example, opportunities exist in industry, community mental health services, within government departments in the public service, in schools, courts, prisons, the defence forces, emergency services, with sports teams or in a university as a lecturer and/or researcher.

Some psychologists work by themselves; for example, in a private practice. Others choose to work as part of a team in a bigger organisation. What a psychologist does on a daily basis depends on their area of specialisation, as is the case with doctors who specialise in an area such as psychiatry, surgery or dermatology. Many apply their expertise in a combination of work settings.

The Psychology Board of Australia (2017a), which regulates the practice of psychology in Australia, has identified the following specialist areas of practice in psychology for registered psychologists.

Clinical neuropsychology: assessment and treatment of changes in behaviour and mental abilities that may arise from brain damage or irregularities in brain function; for example, due to head injury, stroke, disease or drug abuse

Clinical psychology: assessment, diagnosis, and treatment of mental health problems and disorders across the lifespan

Community psychology: assisting communities in developing programs to improve the wellbeing of all their members, such as addressing homelessness and supporting bushfire recovery

Counselling psychology: assisting people of all ages to deal effectively with personal and relationship problems that impact on their mental health and wellbeing; problems tend to be less serious than those dealt with by clinical psychologists (i.e. not life-threatening)

Educational and developmental psychology: assessment, intervention and counselling services for learning and development problems arising at any time in the lifespan

Forensic psychology: applying expertise in legal and justice settings

Health psychology: assisting individuals, groups and communities to promote positive mental health behaviours and minimise harmful health behaviours

Organisational psychology: assisting organisations such as private companies and government departments to become more effective and productive in one or more areas while promoting employee wellbeing

Sport and exercise psychology: assisting elite-level, professional and recreational athletes to enhance performance, personal development and wellbeing from participation in sport and exercise.

There are also specialist areas of psychology which tend to be more focused on research or working with psychology students rather than working directly with clients. These include:

Academic psychology: planning and conducting research in areas of interest, often combining with lecturing of undergraduate psychology students and supervising students' research projects

Biological psychology: studies bodily structures, systems and activities associated with behaviour and mental processes

Cognitive psychology: studies how people acquire, process and use information; for example, how we perceive, learn, remember, think and use language

Developmental psychology: studies development of behaviour and mental processes across the lifespan

Environmental psychology: studies how people affect and are affected by the physical environment

Personality psychology: studies people's characteristic ways of thinking, feeling and behaving that collectively make up their unique personality; for example, components of personality, factors influencing personality development

Social psychology: studies how people's thoughts, feelings and behaviour can change in different social situations and through exposure to different social influences.

Figure 1.8 There are many different areas of specialisation within psychology. These include (a) sport and exercise psychology, (b) educational and development psychology, (c) clinical psychology and (d) forensic psychology.

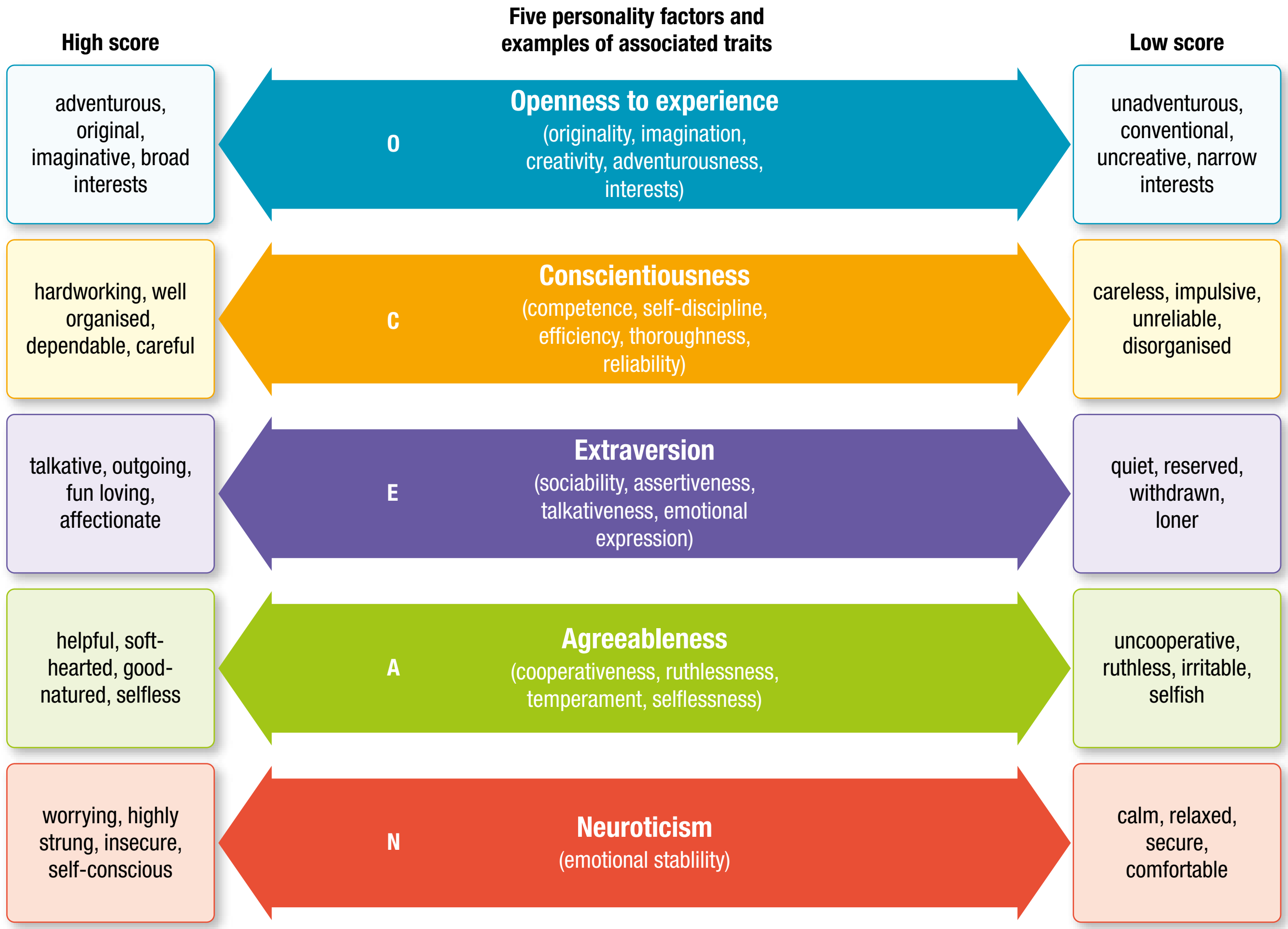

Figure 1.9 Personality psychology focuses on patterns of thoughts, feelings and behaviours that make each individual unique. Contemporary models and theories tend to focus on identifying broad personality traits — patterns of characteristics that are relatively stable over time and across different situations. The *Five Factor Model* shown above is supported by considerable research evidence that there are five personality 'factors' that capture the variations in personality observed between individuals. Each 'factor' is very broad and comprises a large number of more specific personality traits that we are said to each have in varying amounts. The factors can be measured and scores assigned on the basis of test results. Individuals may achieve different combinations of high and low scores for each of the 'Big Five' as the factors are sometimes called.

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Weblinks

- Psychology Board of Australia: descriptions of specialist areas
- Australian Psychological Society: descriptions of specialist areas

BOX 1.3 What is the difference between a psychologist and psychiatrist?

Many people confuse the differences between psychiatrists and psychologists because both work in mental health and often work together in providing mental health services.

A person can work as a psychologist and use the title *psychologist* only if they are registered as a psychologist by the Psychology Board of Australia. Registration helps ensure that people have the required qualifications and skills to provide psychological services safely (Psychology Board of Australia, 2017b).

Generally, the minimum requirement for registration as a psychologist involves six years full-time education and training (or equivalent parttime). The six years must include an approved four-year psychology course (such as a Bachelor of Arts or Science at a university with Honours in psychology or a post-graduate diploma of psychology) followed by two years of practical experience (or 'internship') as a 'provisional psychologist' under the supervision of a fully qualified psychologist.

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There are also training pathways for the specialist areas such as clinical psychology and forensic psychology described earlier. Generally, these involve completion of a higher degree such as a two-year Masters degree (e.g. Master of Clinical Psychology) or a three or four year Doctorate (PhD) in Psychology. In addition to the completion of an approved qualification, the Psychology Board requires an applicant to pass the National Psychology Examination (unless an exemption applies) in order to gain general registration.

A *psychiatrist* is a qualified medical doctor who has obtained additional qualifications to become a specialist in the diagnosis and treatment of mental illnesses. In all, this involves at least 13 years of study in medicine, surgery and psychiatry. Just as cardiologists are doctors who specialise in diseases of the heart, and oncologists are doctors who specialise in treating cancer, psychiatrists are doctors who specialise in mental health (Royal Australian & New Zealand College of Psychiatrists [RANZCP], 2017a).

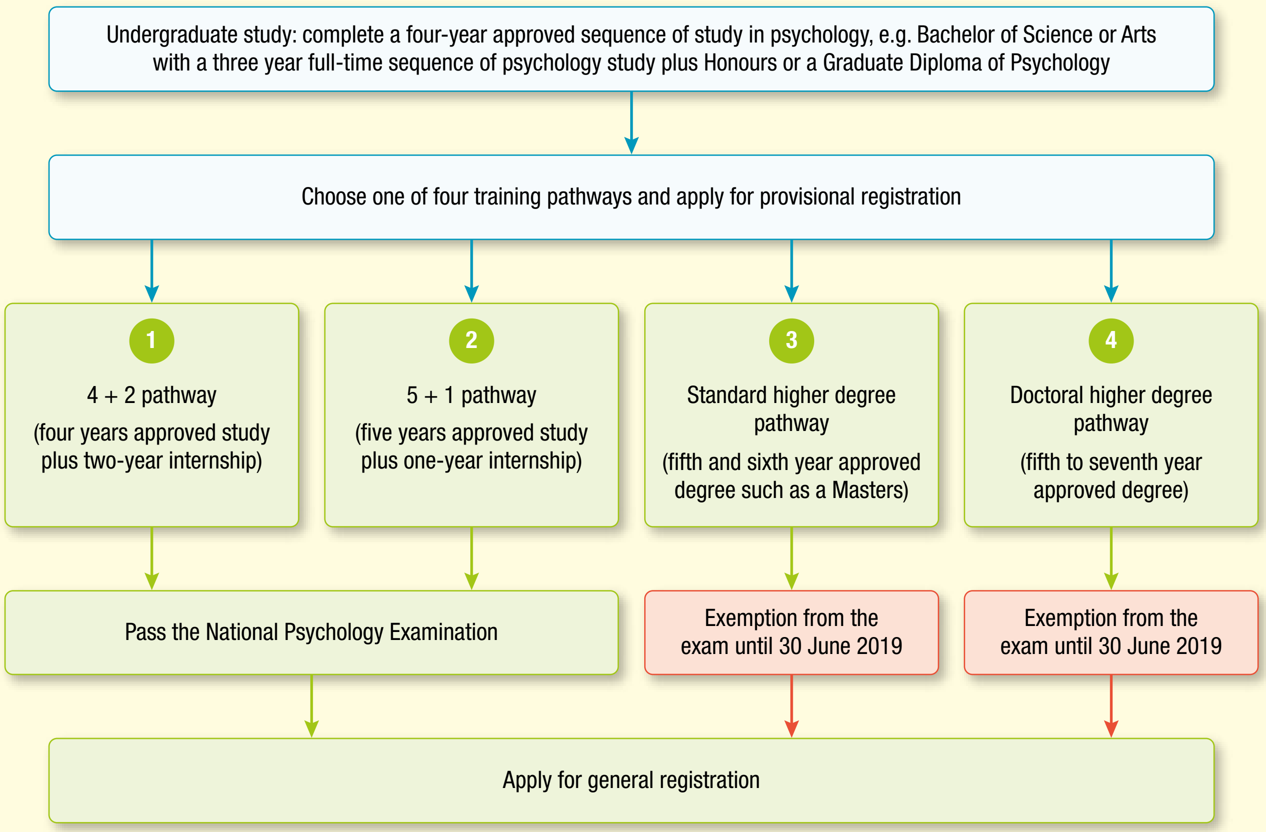

Figure 1.10 Training pathways to general registration by the Psychology Board of Australia for people with psychological qualifications completed in Australia. All psychologists with general registration meet a minimum standard of education and training and have been assessed as a suitable person to hold general registration in the profession.

Source: Based on Psychology Board of Australia (2017). *Training pathways to general registration*. Retrieved from http://www.psychologyboard.gov.au/Registration/General.aspx

Having qualified as a medical doctor, a psychiatrist is able to provide a wider range of treatments. In addition to psychotherapy ('talking treatments'), a psychiatrist can perform medical procedures and prescribe medications to treat symptoms of mental disorders such as schizophrenia and depression. Because psychologists do *not* have medical qualifications or training, they rely on psychotherapy and other strategies to assist their clients.

As psychiatrists are qualified medical specialists, Medicare reimburses (rebates) part or all of their fee for a consultation, depending on how much is charged for the consultation. Medicare also reimburses the fees of registered psychologists for a range of specified psychology services for people with certain conditions, but only the fees of psychologists who are endorsed by Medicare *and* if the client has been referred by a GP, psychiatrist or paediatrician.

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Additional information about psychologist and psychiatrist qualifications:

- Psychology Board of Australia
- Royal Australian & New Zealand College of Psychiatrists
- Australian Psychological Society

BOX 1.4 The Australian Psychological Society

The Australian Psychological Society (APS) is a national organisation that represents, advances and promotes the interests of the psychology profession and psychologists. It was first formed in 1944 and currently has over 22 000 members. Membership of the APS is not compulsory, but it is highly regarded and often required by employers.

There are different categories of APS membership. Generally, to become a full member of the APS it is necessary to be eligible for registration as a psychologist (see Box 1.3). It is possible to join the APS as a student while gaining qualifications. However, full membership is not granted to individuals who are not fully qualified. Secondary school teachers of years 10–12 psychology may also join as a Teacher Affiliate.

Psychologists who are members of the APS can be recognised by the letters MAPS (Member of the APS), FAPS (Fellow of the APS) or Hon FAPS (Honorary Fellow of the APS) after their names.

All members of the APS are required to observe the society's *Code of Ethics*. The code describes ethical standards and guidelines for the professional conduct of psychologists in order to safeguard the welfare of anyone who uses psychological services or are participants in research.

APS Australian Psychological Society

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APS home page

OVERVIEW OF VCE PSYCHOLOGY

VCE Psychology is made up of four units, each with different content. Units 1 and 2 can be studied in any order and are not prerequisites for Units 3 or 4.

As a science study, there is an emphasis on the development of key science skills in all four units. These skills are described on pages 11–12 of the Psychology Study Design and covered in chapter 2.

There are three areas of study in each unit. These are described in a way that reflects the inquiry nature of VCE Psychology.

Course outline

The Units 1 and 2 areas of study are:

Unit 1: How are behaviour and mental processes shaped?

Area of Study 1 *How does the brain function?*
- Role of the brain in mental processes and behaviour
- Brain plasticity and brain damage

Area of Study 2 *What influences psychological development?*
- The complexity of psychological development
- Atypical psychological development

Area of Study 3 *Student-directed research investigation*
- Collect secondary data to investigate a question related to brain function and/or psychological development. The question may be from a list of options in the study design or one of your own developed in conjunction with your teacher.

Unit 2: How do external factors influence behaviour and mental processes?

Area of Study 1 *What influences a person's perception of the world?*
- Sensation and perception
- Distortions of perception

Area of Study 2 *How are people influenced to behave in particular ways?*
- Social cognition
- Social influences on behaviour

Area of Study 3 *Student-directed practical investigation*
- Design and conduct your own investigation to collect primary data related to external influences on behaviour.

Assessment

Each unit has a set of three learning outcomes, one for each area of study, that students are required to achieve in order to satisfactorily complete the unit.

All assessments for Units 1 and 2 are school-based using a variety of assessment tasks. The study design has a list of assessment tasks from which the teacher may select.

The assessment tasks available for Outcomes 1 and 2 are:
- a report of a practical activity involving the collection of primary data
- a research investigation involving the collection of secondary data
- a brain structure modelling activity (Unit 1 only)
- a logbook of practical activities
- analysis of data/results including generalisations/conclusions
- media analysis/response

- problem solving involving psychological concepts, skills and/or issues
- a test comprising multiple choice and/or short answer and/or extended response
- reflective learning journal/blog related to selected activities or in response to an issue.

A report of the student-directed investigation is required for Outcome 3 in both Units 1 and 2.

The student's level of achievement (e.g. grade) for each unit is determined by the school but this is not reported to the Victorian Curriculum Assessment Authority (VCAA).

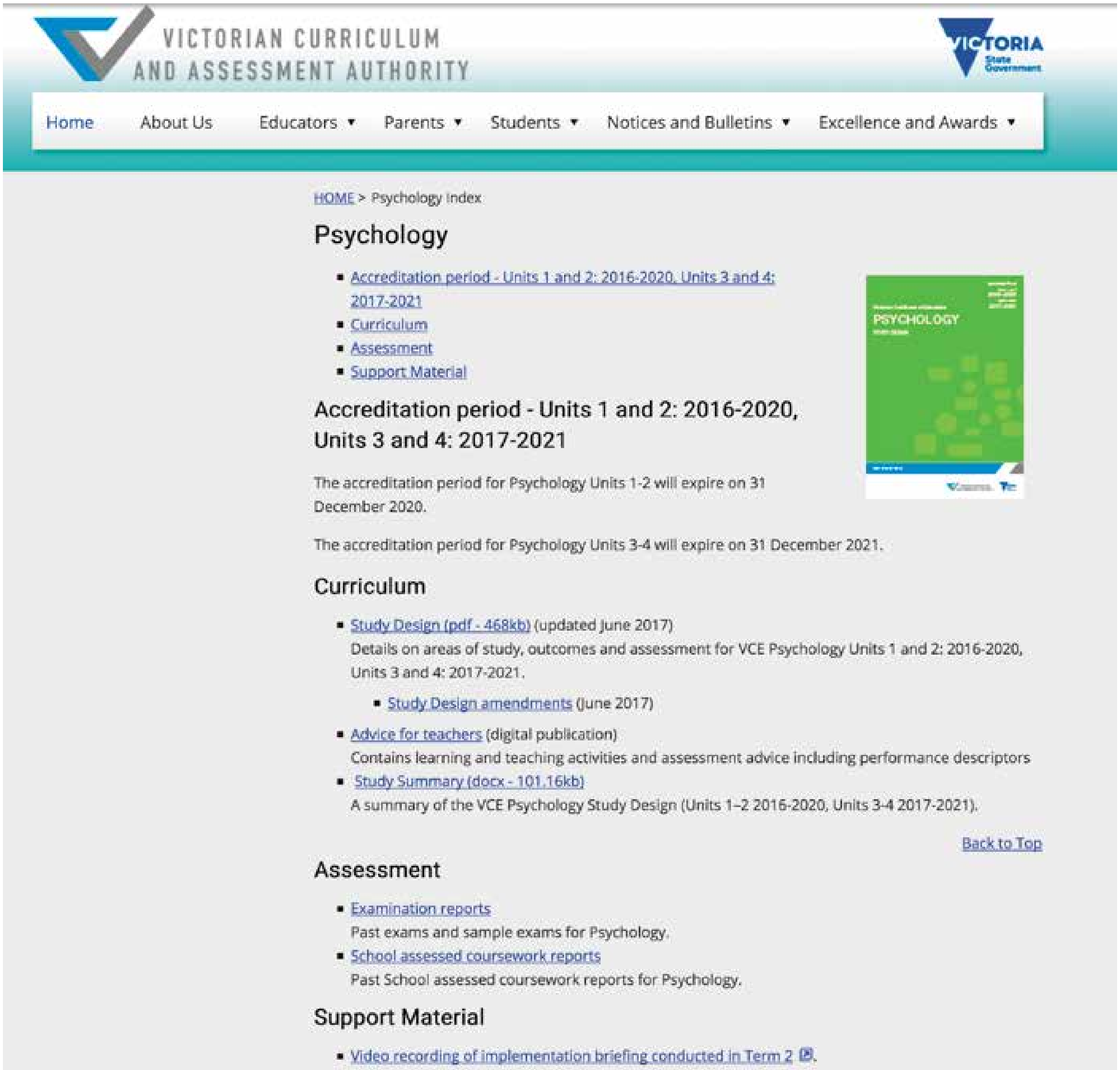

Figure 1.11 Information about VCE Psychology available at the VCAA website at June 2017

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VCE Psychology study design

CHAPTER SUMMARY

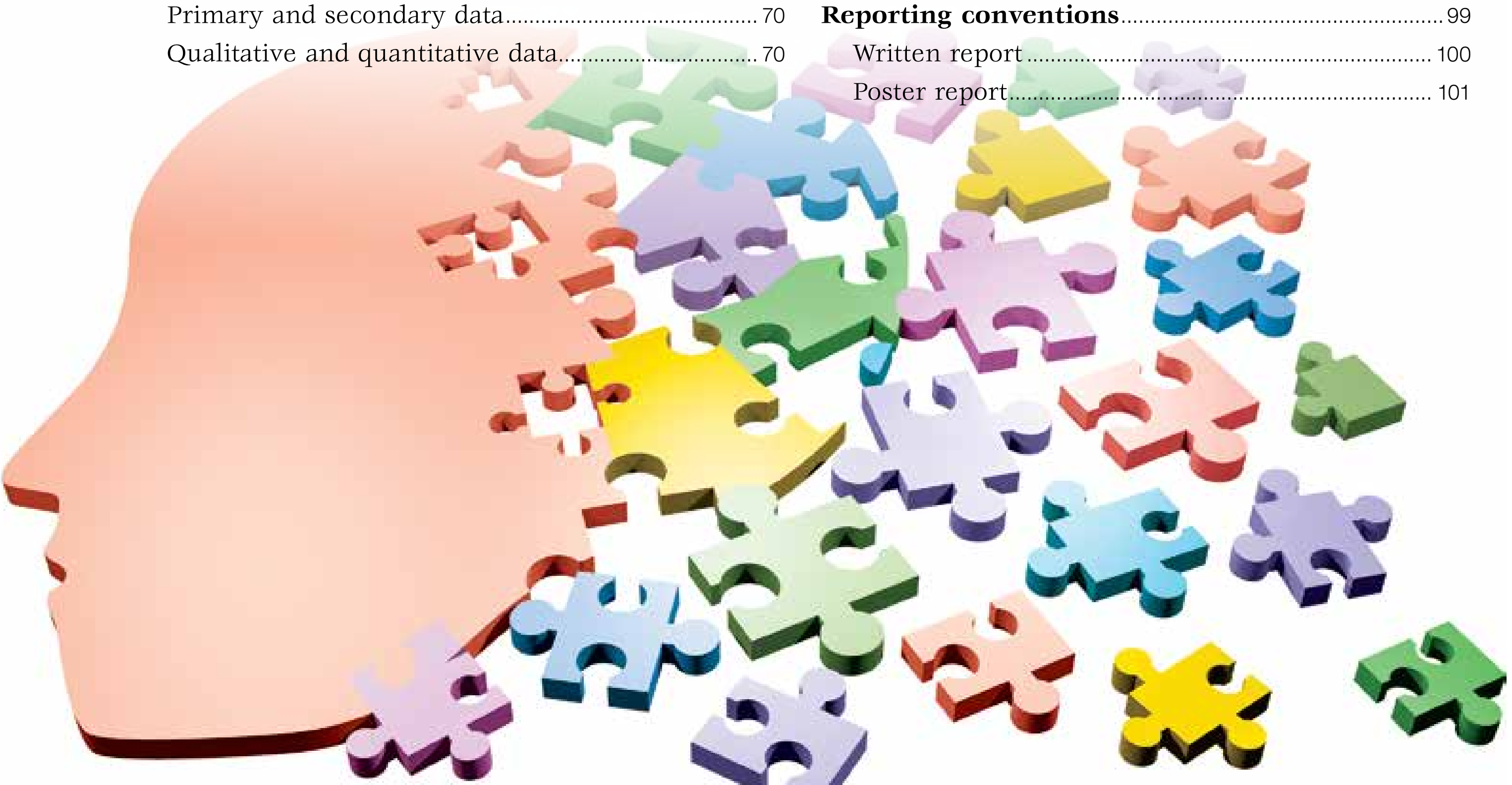
- **INTRODUCTION TO PSYCHOLOGY**
  - Defining psychology and its subject matter
  - Scientific nature of psychology
  - Scientific vs non-scientific explanations
  - Classic and contemporary perspectives in psychology
  - Careers and areas of specialisation in psychology
  - Overview of VCE Psychology
    - Course outline
    - Assessment

2 RESEARCH METHODS IN PSYCHOLOGY

KEY SCIENCE SKILLS

- develop aims and questions, formulate hypotheses and make predictions
- plan and undertake investigations
- comply with safety and ethical guidelines
- conduct investigations to collect and record data
- analyse and evaluate data, methods and scientific models
- draw evidence-based conclusions
- communicate and explain scientific ideas

CHAPTER CONTENT



The development of key science skills is a core component of the study of VCE Psychology and applies across Units 1 to 4 in all areas of study. These skills are used when planning and conducting your own research, as well as when analysing or evaluating the research of others (VCE Psychology Study Design June 2017 update, p. 11). All skills are evident in the different research methods commonly used by psychologists.

A **research method** is a particular way of conducting a research study ('investigation') to collect accurate and reliable data on a specific topic (question or problem) of interest. For example, experiments and self-reports are different types of research methods.

In an experiment, the researcher manipulates and controls a research participant's experiences in some way to find out whether this causes a particular response. For example, a researcher may conduct an experiment to find out whether learning a list of previously unseen words by repeating the words and their definitions aloud three times improves performance on a test of those words. This could be compared with learning the words and their definitions by writing them down three times.

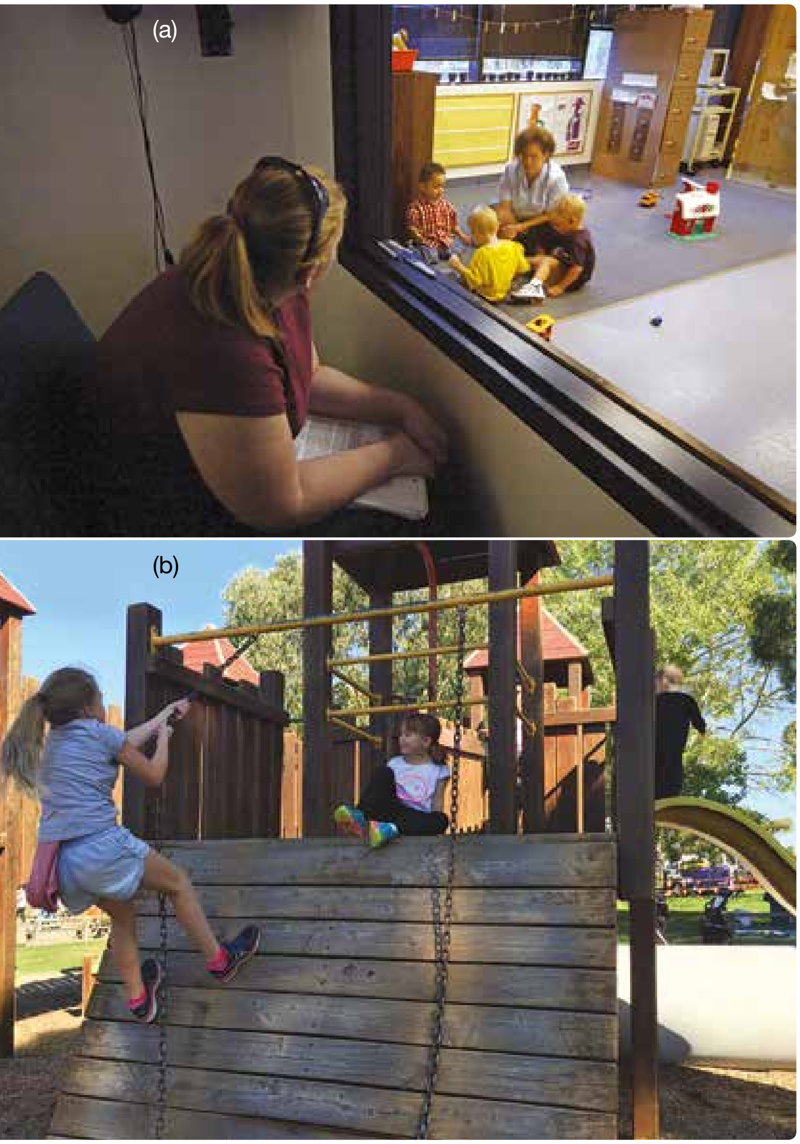


Figure 2.1 Experiments in psychology can be conducted in both laboratory and field settings. (a) In a laboratory setting, social behaviour may be observed in a controlled situation established by the researcher. (b) In a field setting, social behaviour may be observed in a real-world situation, but less control of conditions is possible.

For some research topics, the most appropriate way of collecting data may be to ask participants about their thoughts, feelings or behaviour. This is when a self-report method such as a questionnaire or interview could be used. For example, participants may be asked questions about their attitudes towards school and the reasons for their attendance and absences. The questions may be presented in a questionnaire for which participants respond to a written set of questions, or by interviewing participants and recording their verbal answers in writing or electronically.

In some cases it is appropriate to use a combination of research methods to collect data. For example, a researcher conducting an experiment on different learning techniques used by students when studying for an exam may also interview the students to find out what motivates them to study for an exam, when they study and how much time they spend.

These are just some of the many research methods available to psychologists. Other methods include cross-sectional studies, case studies and observational studies.

In this chapter we examine the research methods and key science research skills prescribed in VCE Psychology. We start with an overview of the steps involved in conducting scientific research in psychology.

STEPS IN PSYCHOLOGICAL RESEARCH

Most of what psychologists know about behaviour and mental processes is based on empirical evidence. *Empirical evidence* is data collected through systematic observations and/or carefully controlled experiments. This type of evidence allows psychologists to draw accurate conclusions which are more likely to be valid and free from personal biases, as compared to our 'common sense' conclusions based on everyday observations of behaviour.

Because psychological research involves the collection of empirical evidence using scientific attitudes and practices, it is often called *empirical research*. Generally, a systematic step-by-step procedure is followed. There are variations of the steps and they do not guarantee that accurate and justifiable conclusions will be reached. However, the steps help ensure empirical evidence is collected and minimise the chance for bias, errors, faulty conclusions and results that cannot be tested through replication.

Step 1: Identify the research topic

The first step in conducting psychological research is to identify the specific topic of research interest. This is often called the research 'question' or 'problem'. For example, a researcher might be interested in ways of reducing the number of accidents caused by red P-plate drivers.

To do this, they may conduct a *literature review*. This involves searching major psychological journals to find and review published reports of research studies that have already been undertaken on this topic. For example, they may consider research that has been conducted on defensive driving programs such as the Smith System.

The Smith System involves five rules to train the eyes to identify what is important when driving. As shown in Figure 2.3, the rules are:

1. Aim your vision high (to steer accurately and anticipate problems).
2. Keep your eyes moving (avoid staring and stay alert).
3. Look at the total driving picture (don't focus your eyes on one area of the road).
4. Leave yourself a 'way out'.
5. Look for a position on the road that ensures other drivers can see you.

Conducting a literature review enables the researcher to become more familiar with their topic of research interest. It also enables them to refine their ideas and propose a relevant research question that will be the aim and therefore help focus their research activities; for example, 'Does training red P-plate drivers with the Smith System help to reduce the number of accidents they cause?'

Figure 2.2 Psychological research may be conducted on ways of reducing the number of accidents caused by red P-plate drivers.

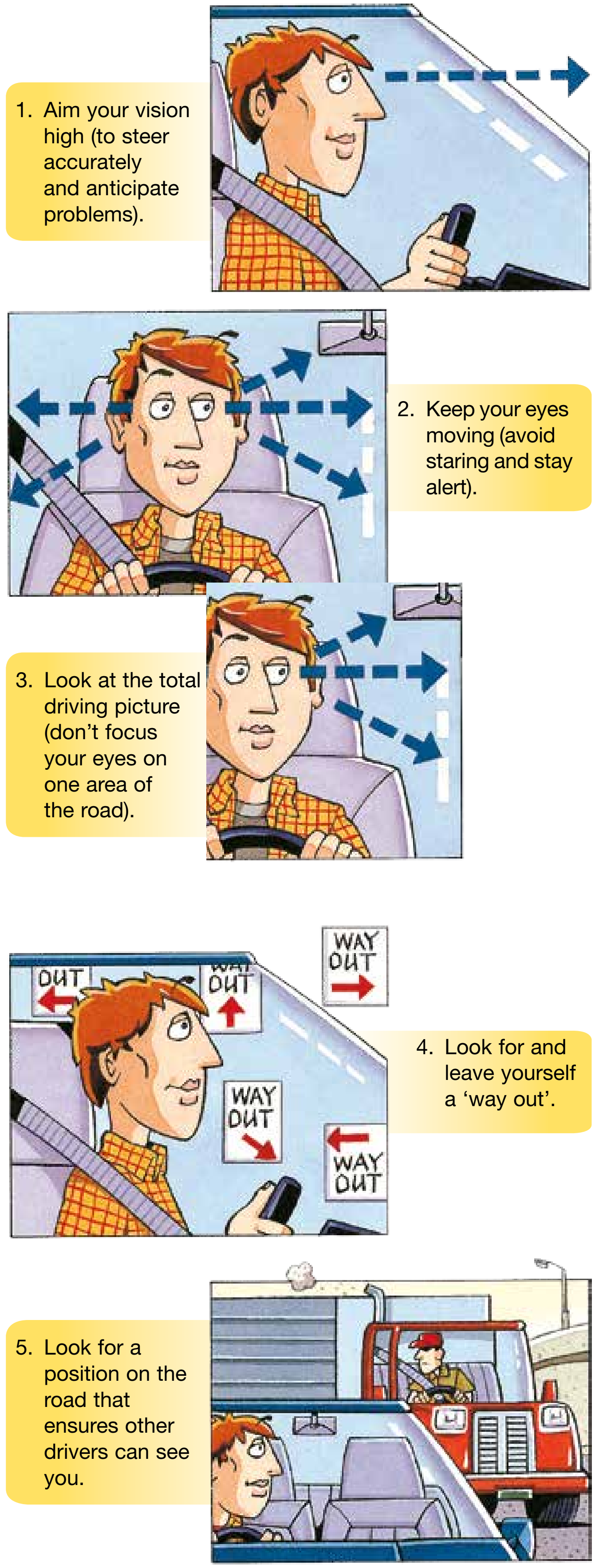


Figure 2.3 The Smith System involves five rules to identify what is important when driving.

Step 2: Formulate the research hypothesis

When the topic has been identified and refined, the next step is to formulate or construct a hypothesis for the research. This is essentially a thoughtful prediction about the results that will be obtained when the hypothesis is tested.

An example of a research hypothesis for the driver study is 'Red P-plate drivers who receive defensive driving training will make fewer driving errors than red P-plate drivers who have not received the training'.

The research hypothesis is formulated before the research study is conducted. Although there are various ways in which it can be expressed, it must be testable and written as a very specific statement.

The testability of the hypothesis for the Smith System study is reflected by the way in which it is stated. For example, 'number of accidents' is defined more specifically as 'driving errors' and driving errors will be measured through a practical driving test in a driving simulator. There are several other important characteristics of the research hypothesis. These are described on page 26.

Step 3: Design the research

The third step is to select the research method(s) and design the most appropriate procedures to collect the data required to test the hypothesis (but this is also considered when the hypothesis is being formulated). Generally this involves selecting a specific research method (such as a particular type of experiment) and modifying its various features to collect data that enables the hypothesis to be tested.

When designing the research, the researcher must consider the hypothesis, decide which participants will be studied, how many there will be, and how they will be selected and allocated to different groups that may be used in the study. The participants' responses provide the data that become the results for the research.

It is vital that relevant ethical standards and guidelines are followed to ensure the rights and wellbeing of all participants are protected. These apply to all stages of the research (including the report) and are described in the section starting on page 90.

There are also organisational matters to attend to; for example, ensuring there is access to a driving simulator, preparation of materials such as consent forms and instructions for participants and submitting the research for review and approval by an ethics committee.

Each type of research method that may be used to test a hypothesis has its advantages and limitations. Some are more suited to particular research hypotheses and data collection than others.

In the driver study, the researcher may decide to conduct an experiment using two separate groups (i.e. an independent groups design). Ten male and 10 female red P-plate drivers with a similar amount of driving experience in city and regional areas as participants in the study could be used. Half the participants would be in one group and receive a defensive driving training session using the Smith System. The other half would be another group and not receive the training so that the potential benefits of the training could be compared. It would be important to randomly allocate all participants to the different groups to help ensure other participant characteristics that could have an effect on the results are evenly distributed across both groups. For example, some participants may have much more driving experience than others.

Alternatively, the researcher may decide to give questionnaires to a number of driving instructors who have taught young people, with and without the Smith System, to obtain information based on their experience as to which of the two methods resulted in better driving skills. Another option would be to conduct an experiment *and* interview the research participants.

Step 4: Collect the data

The fourth step involves actually collecting the required data in order to determine the results and conclusions that can be drawn.

Based on their plan and research design, the participants and materials are organised and the study is conducted.

Data may be *primary* or *secondary* and *quantitative* or *qualitative*. In the defensive driving experiment, the data will be primary as they are collected directly by the researcher through their experiment (rather than another source) and quantitative as they will be numerical (i.e. number of driving errors). These different types of data are more fully described in the section starting on page 70.

Step 5: Analyse the data

When the data have been collected they are in a 'raw' format because they have not been processed or analysed. The next step in psychological research is therefore to summarise, organise and represent the raw data in a logical and useful way to help determine whether the hypothesis is supported and to draw other conclusions.

This usually involves 'breaking down' a large set of numbers into smaller sets (e.g. raw data summarised as percentages in a table or graph) or even a single number or two (e.g. a mean score or standard deviation). *Descriptive statistics* are used to support this process. The researcher is then better able to consider the data when determining whether the hypothesis is supported based on the results obtained. Examples of descriptive statistics relevant to VCE Psychology are in the section starting on page 74.

Step 6: Interpret and evaluate the results

When the data have been analysed, they need to be interpreted and critically evaluated. This includes drawing conclusions about what the results mean and identifying, describing and explaining limitations of the research and its results. The data may be considered as evidence and all conclusions must be considered as evidence-based. In much the same way as a crime investigator evaluates evidence, the researcher must consider the strengths and potential limitations of their evidence to help ensure their conclusions are consistent with the evidence and ultimately both valid ('accurate') and reliable ('stable').

One type of conclusion relates directly to the research hypothesis. The focus of this conclusion is on whether the results will support the hypothesis. The researcher may also consider how widely the results of the research can be applied. *Inferential statistics* may be used by the researcher to help decide what the results mean and what conclusion(s) can legitimately be made. Examples of inferential statistics relevant to VCE Psychology are described in the section starting on page 84.

A researcher usually studies a relatively small number of participants who are selected from the bigger group of interest; for example, 10 male and 10 female red P-plate drivers aged between 18–21 years, rather than all red P-plate drivers. Of particular interest to the researcher

Figure 2.4 Steps commonly followed when planning and conducting psychological research. There are variations of these steps, but all are based on scientific attitudes and practices.

is whether the results obtained from a relatively small number of cases (the red P-plate drivers in the study) can be extended to apply to the bigger group of red P-plate drivers from which the smaller group was selected, to the entire group of red P-plate drivers, to green P-plate drivers or even all drivers.

With reference to the driving study, if the results for the experiment indicated that the red P-plate drivers who were trained with the Smith System made significantly fewer errors than the drivers who did not receive the training, then the researcher would interpret the results as providing support for the hypothesis. They would conclude that using the Smith System to teach defensive driving techniques to drivers reduces the likelihood of red P-plate drivers having an accident. On the basis of this conclusion, the researcher may also tentatively ('cautiously') conclude that the finding may apply to the bigger group of red P-plate drivers targeted for research or even all red P-plate drivers.

When drawing conclusions, the researcher bases their judgments strictly on what the results show. All conclusions must be consistent with the 'evidence' and relevant to the hypothesis that was tested.

They would seek to identify, comment on and take account of any limitations of their study, and its conclusions, particularly research procedures or unexpected events that may have influenced their results in an unwanted way.

They would also seek to identify further evidence that may be required, including how this could be obtained if the study were to be replicated.

Step 7: Report the research and findings

The final step of psychological research involves preparation of a report for others who may be interested in the research, its results and findings. Typically, psychological researchers prepare a detailed written report which they seek to get published in a professional journal. Each of these journals has reviewers who critically evaluate the research report and it is only on the basis of peer reviews that the research may be accepted for publication. In addition, a poster report may also be prepared for display and discussion at conferences or meetings with other researchers.

The report prepared for publication follows a strict format and describes in detail all aspects of the research, including relevant background information, how the research was conducted, the results and findings, implications of the findings, limitations which may have impacted on the results, recommendations, as appropriate, for modifying or extending the study, and a list of references used in preparing for the study and writing the report. A poster report has a format more suited to display and is far less detailed.

Reporting the research and its findings is a very important part of the research process. It is the way other researchers find out about research which has been conducted and the way scientific progress is achieved. It also enables the general public to benefit from the findings of research.

Importantly, the reporting process places the specific study and its research procedures under the critical eye of other psychologists and researchers; for example, to check the accuracy of the findings and to consider limitations and alternative conclusions that may be valid. It also enables replication by other researchers — to repeat or reproduce the study in order to test the accuracy of the results or to test the relevance of the study or results to other groups or situations.

Figure 2.5 One of the Australian journals in which psychologists may publish their research reports

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View examples of journal articles

RESEARCH METHODS

Research methods are the means or 'tools' for observing, measuring, manipulating or controlling what takes place in psychological investigations. Each method has its specific purposes, procedures, advantages and limitations.

The choice of research method depends on which is most appropriate for the specific topic of research interest and hypothesis being tested. This is not unlike the choice made by a motor mechanic when selecting tools to repair a car engine. Their selection will depend on the specific engine problem in need of repair and the work that needs to be done to fix it. Each tool will have a specific use and way of being used. Similarly, each research method has a particular logic underlying its use and how it is used.

Sample selection and formulation of a research hypothesis are common to all psychological investigations requiring participants and are undertaken early in the research process. We consider each of these important procedures before examining the research methods prescribed in VCE Psychology and the specific features that distinguish them from each other.

Sample and population

Psychologists mostly conduct research studies with people and, in some cases, animals. The participants (or 'subjects') being studied are called the sample.

A **sample** is a subset or group that is part of a larger group chosen to be studied for research purposes. For example, suppose that a researcher is interested in conducting an experiment to find out whether children who attended a childcare centre during their preschool years have better language skills than children who did not attend a child care centre. It would be impractical to test every child who attended a child care centre and every preschool child who did not. Researchers would therefore select a sample with whom they conduct their investigation.

A sample is always smaller than the population. Therefore, an important feature of sample selection is that, whenever possible, the sample accurately reflect, or be representative of, the entire population of research interest. If this is achieved, the results obtained for the sample can be more confidently applied ('generalised') to the population from which it was drawn or even other groups or situations (assuming the results are valid and reliable).

In scientific research, the population does not necessarily refer to all people (or animals) in the world, in a country, or even in a particular city or area. The term **population** refers to the entire group of research interest from which a sample is drawn and to which the researcher will seek to apply (generalise) the results of their investigation. A population of interest may be all preschool children, all blonde-haired females, all VCE Psychology students, all female VCE Psychology students, all Catholic school educated boys, or all male chimpanzees born in captivity.

Furthermore, a population used for research does not always refer to living things. A population could also be measurable things such as all community health centres in the Goulburn Valley region, all admissions at the Royal Melbourne Hospital, all VCE exam results in English in 2017, all days of school missed by year 9 students, all brands of sports shoes, all calls to the Kids Helpline telephone number, or any other specific source of data.

Figure 2.6 This sample is a subset of the population of all staff who work for a multinational corporation.

LEARNING ACTIVITY 2.1

Review questions

1. Define the terms sample and population as they are used in research.
2. Draw a diagram to show the relationship between a sample and a population.
3. For the following research samples, identify two different populations from which each sample could be drawn.
   (a) 20 year 10 girls and 20 year 10 boys
   (b) 40 teachers who have been teaching for more than 10 years
   (c) 100 employees on leave from work because of stress-related reasons
   (d) 30 adults diagnosed as having an anxiety disorder
4. For the following research questions, identify a sample that might be used to conduct the research and a population from which the sample could be drawn.
   (a) Are people who wear uniforms at school or work more likely to be obedient to an authority figure?
   (b) How can people with a fear of flying be assisted to overcome their fear?
   (c) Are children born to mothers aged over 40 years at greater risk of developing a mental disorder?
   (d) Is it easier for men or women to give up smoking?

Research hypothesis

In psychology as in other sciences, different research methods are used to test one or more hypotheses relevant to the question or problem a researcher aims to study. A **research hypothesis** is a testable prediction of the relationship between two or more variables (events or characteristics). For example, it may be a prediction about the relationship between:

- attending a revision lecture (one event) and the score achieved for a psychology test (another event)
- biological sex (one characteristic) and finger dexterity (another characteristic)
- reading (one event) and brain wave activity (one characteristic).

The research hypothesis formulated for an investigation is essentially an educated or thoughtful guess about what the results will be. It is usually based on knowledge of other research findings or theories on the topic being studied. This is why it is often referred to as an 'educated' guess.

The research hypothesis is formulated before the study is conducted and guides the research. A useful research hypothesis typically has the following characteristics:

- refers to events or characteristics that can be observed and measured and is therefore testable (e.g. attendance at a revision lecture and what is learned are measurable and therefore data can be collected for hypothesis testing).
- states the existence of a relationship between two or more variables (e.g. a relationship between revision lecture attendance and scores on a psychology test)
- states the expected relationship between the variables, sometimes referred to as the 'direction of the relationship' (e.g. how revision lecture attendance will influence test scores)
- states a possible explanation of the results (e.g. higher psychology test scores will be attributable to revision lecture attendance)
- based on observations, a theory, model or research findings
- prepared as a carefully worded written statement (rather than a question)
- expressed clearly and precisely (rather than vaguely and generally)
- written as a single sentence.

In some cases, the research hypothesis may also refer to the population from which the sample was drawn and therefore the larger group about which the researcher intends to draw conclusions. The population, however, is most commonly described in the introduction to the report on the investigation.

Research hypotheses for the examples given earlier could be:

- Psychology students who attend a revision lecture before a test will achieve a better score on the test than students who do not.
- Females have better finger dexterity than males.
- Beta brain waves are predominant when reading.

There is no preferred writing style for a research hypothesis (nor is there a mandated style for VCE Psychology). Different writing styles can be equally valid. For example, some hypotheses use an 'if-then' style, such as '*if* a certain event occurs, *then* it will cause a certain response'. In relation to the revision lecture attendance and test score 'events' (or variables), an if-then hypothesis may be stated as: 'If students attend a revision lecture, then they will achieve better test scores'. A more generally stated prediction such as 'Revision lecture attendance improves test results' would also be an appropriate alternative.

It is not always possible to be entirely certain about the accuracy of a prediction within a hypothesis. This is mainly because the researcher does not necessarily know or can control the influence of the many different variables that can affect the behaviour or mental process being studied. Nonetheless, many researchers would consider it pointless to conduct a study when the outcome is certain.

Research hypothesis versus theory and model

A research hypothesis is different from a theory and model. A research hypothesis is a specific prediction that guides the collection, analysis, interpretation and evaluation of data that has been collected to test it. In contrast, a **theory** or **model** is a general explanation of a set of observations about behaviour and/or mental processes which seem to be related.

The term model is used interchangeably with theory, however, many models in psychology tend to focus more on representing *how* some behaviour and/or mental process(es) could, should or does occur. For example, a model is often supported with or presented in the form of a diagram with boxes and arrows to organise and show relationships between different concepts. Figure 2.8 shows an example of a model used to represent and explain human memory in terms of inter-related sub-systems involving different types of memory called sensory memory, short-term memory and long-term memory. This model is also commonly referred to as a theory of memory.

Theories and models vary in scope, complexity and detail. All have one or more limitations. Some are essentially a hypothesis that has been restated. Others explain many interrelated research findings and ideas. Along with explaining existing results, a useful theory or model generates new hypotheses and guides further research.

Many theories or models of child development, personality, learning, remembering, forgetting and so on, are the products of psychological research and have generated valuable new research. In addition, some theories have generated new models and some models have generated new theories.

Whatever their scope — from tiny to vast — theories and models serve a gap-filling function. They explain how findings and ideas fit together in an organised way and what they mean, thereby making psychology a discipline that does more than report isolated facts.

Psychologists prefer testable theories and models because they can be confirmed, revised or rejected by further scientific research. Therefore, theories and models tend to not be judged in terms of their accuracy but rather in terms of their *usefulness*. This means that a theory or model tends not to be considered as right or wrong. Instead, it is simply regarded as more or less useful.

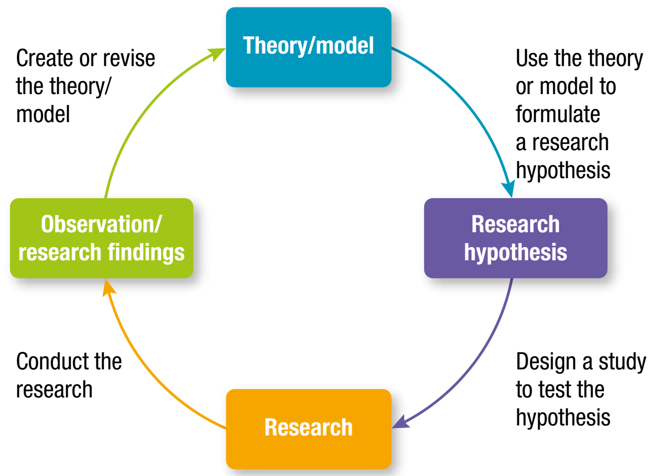


Figure 2.7 Theories and models are revised and expanded to reflect relevant research findings. New or revised theories and models lead to new observations or questions that stimulate new research.

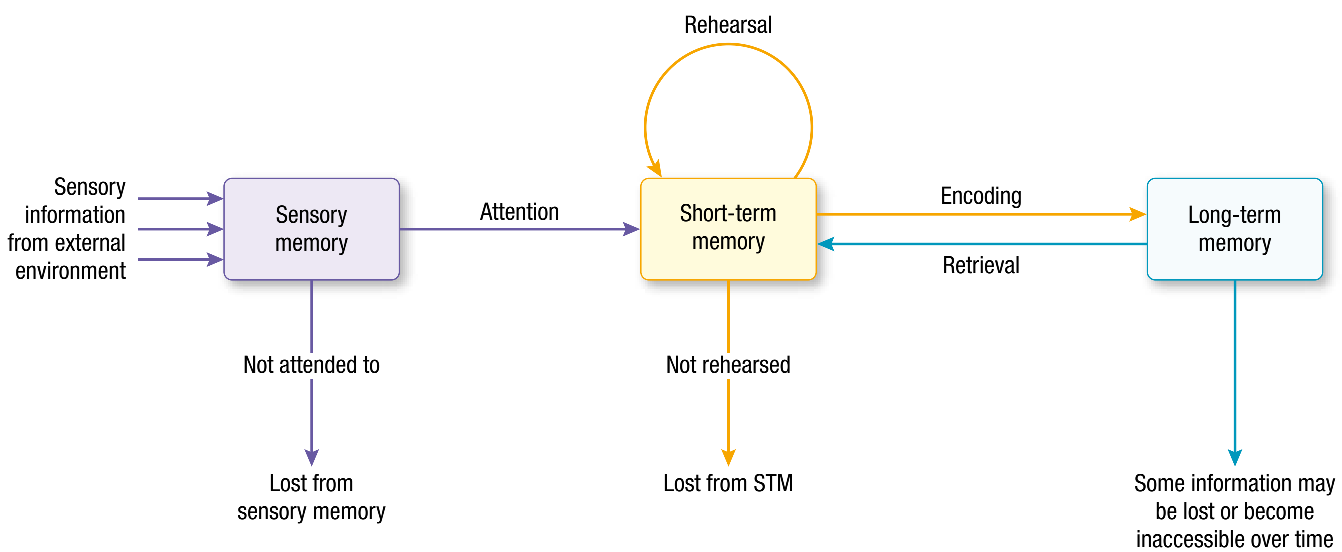


Figure 2.8 A contemporary model of human memory, representing it as a multi-storage system through which information flows

LEARNING ACTIVITY 2.2

Review questions

1. (a) Explain the meaning of hypothesis when used in a research study.
   (b) Distinguish between a research hypothesis, a theory and a model.
2. When is the research hypothesis formulated?
3. (a) List six characteristics of a well-constructed research hypothesis.
   (b) Which four are crucial?
4. Explain two possible limitations of the following question if it were to be used as a research hypothesis:
   Does excessive use of a mobile phone cause sleep loss?
5. Rewrite the question above as a testable research hypothesis.
6. Consider the following list of questions that could be the subject of research.
   (a) Does use of good study techniques bring about an improvement in grades?
   (b) Does amount of sleep the night before an exam affect exam performance?
   (c) Does the number of 'peer passengers' in a car driven by a red P-plate driver affect driver performance?
   (d) Does exercise reduce stress?
   (e) Do tatoos affect success in a job interview?
   (f) Are males more likely to help a female or a male in need of assistance?
   (g) Does the presence of other people affect how well someone performs a task for the first time?
   Choose four questions and formulate a research hypothesis for each one. Ensure your hypotheses have key characteristics referred to in the text.

Experimental research

One of the most scientifically demanding and controlled research methods in psychology is the experiment. An **experiment** is used to test a cause–effect relationship between variables under controlled conditions; for example, to test whether talking on a hand-held mobile phone while driving (one variable) causes or influences a change in driver reaction time (another variable), or whether access to a reward (one variable) has an effect on exam performance (another variable).

Essentially, an experiment enables the researcher ('experimenter') to investigate whether there is a *causal* relationship between two or more variables; for example, if talking on a hand-held mobile phone while driving *causes* drivers to react more slowly (and therefore increases the likelihood of an accident), or, whether access to a reward for a good exam result *causes* improved performance on the exam (by increasing motivation for exam study and therefore behaviours that influence performance).

There are different types of experimental designs that vary in terms of their specific procedures and complexity. All experiments, however, have a number of common features. We consider the essential features of an experiment and why this particular research method can be used to investigate causes of behaviour and links between behaviour and mental processes.

Independent and dependent variables

In a research study, a **variable** is something that can change ('vary') in amount or type and is measurable. For example, the time that it takes for a newborn infant to distinguish between different shapes is a variable that changes in amount (time) and type (square or circle). How long it takes to distinguish between the different shapes can also be measured.

Although personal characteristics, such as biological sex, blood type and racial or ethnic background are all inborn and therefore 'fixed' and ordinarily unchanging within an individual, in psychological research they are still considered to be variables because they can be of different types and are measurable. For example, 'male' and 'female' are two types of biological sex and 'O', 'A', 'B' and 'AB' are four different blood types. Similarly, a group of people may vary in ethnic background and have different cultures, family backgrounds, religions, native languages and so on. Consequently, there is a virtually endless list of variables that may be studied in psychology, such as intelligence (e.g. variations in IQ score), personality (e.g. variations in type), age (e.g. chronological years), exercise (e.g. variations in type), memory (e.g. variations in recall ability), reaction time, social media use, sleep habits, colour preferences, dietary preferences, and so on.

If the experiment involves testing whether a particular anger management technique reduced the incidence of road rage in people who had previously been convicted of road rage, the two variables being tested would be (1) the anger management technique and (2) the incidence of road rage. These are two different types of variables called independent and dependent.

Independent variable

Every experiment has at least one independent variable and one dependent variable. In a simple experiment, one of these variables is manipulated or changed by the researcher to observe whether it affects another variable and what those effects are. The variable that is manipulated in order to measure its effects on the dependent variable is called the **independent variable (IV)**. It is sometimes referred to as the 'treatment' variable to which participants may be exposed (or not exposed).

In terms of cause and effect, the IV is viewed as the *cause* of any change that may result in the dependent variable. For example, in the road rage experiment, the IV would be the anger management technique. The researcher would have control over and can therefore 'manipulate' which participants would learn the anger management technique and which participants would

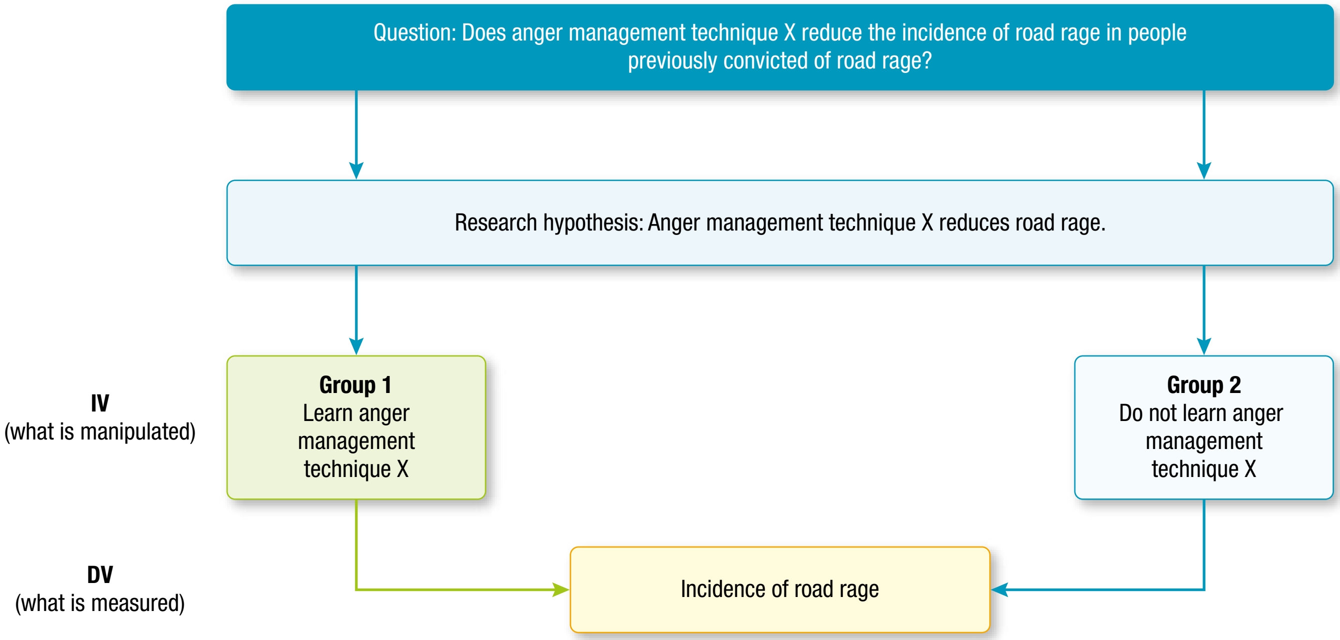


Figure 2.9 The independent and dependent variables in experimental research designed to investigate a technique that may reduce the incidence of road rage

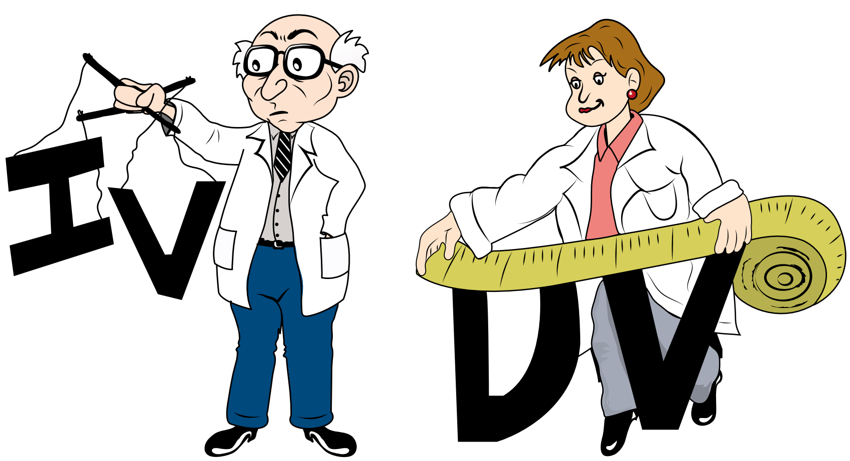
not, in order to test the effect(s) of the technique on the incidence or extent of road rage-related behaviour; that is, the dependent variable.

Selecting which participants are exposed or not exposed to an IV is one way of manipulating the IV. In this case, the IV is said to have two values (or levels) — exposure or non-exposure to the IV (or presence or absence of the IV). If the IV is biological sex, then the IV may be manipulated 'qualitatively' by varying its 'type' and male and female would be the two IV values. If test difficulty is the IV, then it may have the three qualitative values of 'easy', 'medium' and 'hard'. In addition, a researcher may manipulate an IV 'quantitatively' by varying the 'amount' of the IV to which participants are exposed. For example, an experiment testing the effects of a new medication for treating anxiety disorders may vary the dosage for different groups of participants and use an IV with the two or more quantitative values such as 5 mg, 10 mg and so on. Similarly, a researcher may use sleep deprivation or exercise as an IV with different values involving amount of sleep loss or exercise for different groups of participants.

Dependent variable

The variable that is used to observe and measure the effects of the IV is called the **dependent variable (DV)**. It is the aspect of a participant's behaviour or experience that is assumed and expected to change as a result of the manipulation of the IV. The dependent variable is often the responses made by the participants and it usually has a numerical (quantitative) value. It is called the dependent variable because whether or not it changes and the way in which it changes 'depends' on the effects of the independent variable.

In terms of a cause–effect relationship, the DV is viewed as the *effect(s)* caused by manipulation of the IV, such as, exposure or non-exposure to the IV. In the road rage example, the DV is the measured change in the amount of road rage behaviour displayed by participants as a result of using or not using the anger management technique — the IV.



The experimenter 'manipulates' the IV to determine its causal effect on the DV.

The experimenter 'measures' the DV, which 'depends' on the IV.

Figure 2.10 Distinguishing between the independent and dependent variables

LEARNING ACTIVITY 2.3

Identifying independent and dependent variables

1. Explain the difference between the independent variable (IV) and the dependent variable (DV) in an experiment.

2. Identify the IV and DV in each of the following examples.

(a) Listening to a radio broadcast of a sports event while studying for a test decreases performance on the test.

(b) Thinking positively when goal shooting improves accuracy in a match.

(c) Smoking cigarettes while driving a car increases driver alertness.

(d) People will behave differently in a crowd from the way they behave when alone.

(e) Reaction time to a visual stimulus is quicker than reaction time to a sound stimulus.

(f) Daydreaming occurs more often when a person is engaged in a simple task than when they are performing a complex task.

(g) Marijuana use impairs performance on a memory task.

(h) Drinking red cordial increases hyperactivity in children.

(i) Too much stress causes stomach ulcers.

(j) Brain wave activity changes during voluntary movement.

Operationalising independent and dependent variables

Operationalising the IV and DV involves defining them in terms of the specific procedures or actions ('operations') used to measure them. Stating *how* the IV and DV will be defined and measured in a particular study is an important step because many of the behaviours and mental processes psychologists investigate can have different meanings and can therefore be defined and measured in more than one way.

Figure 2.11 Does noise affect problem-solving ability?

For example, suppose that a researcher wants to find out whether noise has an effect on problem-solving ability. What is meant by 'noise' (the IV) and 'problem-solving ability' (the DV), and how will these variables be defined and measured? Will the 'noise' be music? If so, will it be classical music, rock music or some other type of music? Will the noise be people talking, whales communicating, an engine revving, the sound of a plane flying overhead or a combination of different types of noises? Will the noise be loud, medium or soft? Will the noise be heard continuously or irregularly?

Similarly, consider 'problem-solving ability'. What type of problem? Will it be a personal problem, a problem involving someone else or an intellectual problem? Will the problem be simple or complex? Will the problem be presented orally, in writing or audiovisually? Will the problem have one solution or several solutions? Furthermore, precisely how will 'ability' to solve the problem be measured? Getting the problem right or wrong? Solving it quickly or slowly? Both accuracy and speed?

When the IV and DV have been operationalised, they may be stated this way in the hypothesis (but this is not essential). In the study on noise and problem-solving ability, the operationalised variables could be stated in the research hypothesis as follows:

'Units 1 and 2 VCE students who listen to loud rock music when solving previously unseen written problems will solve fewer problems than students who do not listen to loud rock music'.

Note how the IV and DV have been operationalised:

- IV: continuously listening to loud rock music throughout a one hour session
- DV: the number of problems that are correctly solved.

Note too that the research hypothesis above is also stating the population from which the sample is drawn and therefore the larger group about which the researcher intends to apply the results.

However, as stated previously, reference to a specific population is not a requirement for any research hypothesis.

Operationalising the IV(s) and DV(s) ensures that these variables are also precisely defined and the researcher (and everyone else) is absolutely clear about how they will be used in the study. The resulting definitions are sometimes referred to as *operational definitions*.

There are several important benefits of variables being defined precisely through operationalisation. These include:

- It helps ensure the independent and dependent variables are testable and therefore that the research hypothesis is testable.
- All researchers involved in conducting the experiment know exactly what is being observed and measured and how this will occur, which helps avoid experimenter biases and differences that can affect the results.
- When the variables are defined in a very precise way, another researcher interested in the results, or perhaps even doubting them, will be able to repeat the experiment in order to test ('check') the results obtained for accuracy or for relevance to other groups or situations.

When a study is replicated using a similar sample and similar results are obtained, there is greater confidence in the validity and reliablility of the results.

Figure 2.12 Do facial piercing and tattoos make a person more or less attractive? The answer depends on how you operationalise 'facial piercing', 'tattoos' and 'attractive'.

Table 2.1 Ways in which IVs and DVs can be operationalised

Research question of interest	IV example	DV example
Do students learn more effectively in early morning or late afternoon classroom lessons?	• time of lesson	• score on a test of recall (amount of information remembered)
If a teacher ignores a student's attention-seeking behaviour in class, will this strategy reduce the student's attention-seeking behaviour?	• teacher not paying attention to attention-seeking behaviours	• frequency of attention-seeking behaviours
Does playing violent video games cause aggressive behaviour?	• a video game classified by the Commonwealth Government censors as violent	• number of presses of a button that administers a shock to another student
Does allowing a child to sleep in the same bed as their parents result in the child being overly attached to the parents?	• child sharing bed with both parents over a specified period of time	• frequency of separation anxiety behaviours when either or both parents leave the child alone with a stranger
What types of jokes are funny to people of different cultural backgrounds?	• different types of jokes	• number of audible laughs detected by an audiometer and number of smiles detected by an electromyograph (measures facial muscle contractions)

LEARNING ACTIVITY 2.4

Review questions

1. Explain the meaning of the phrase 'operationalising the IV and DV' with reference to an example.
2. What are three benefits of operationalising the variables relevant to research hypothesis?
3. Suggest how three of the following variables of research interest could be operationalised.
   (a) memory
   (b) happiness
   (c) attraction
   (d) intelligence
4. Suggest operationalised IVs and DVs for three of the following research topics:
   (a) Does regular exercise improve psychological wellbeing?
   (b) Do people drive less safely when feeling stressed?
   (c) Do people talk more after they have eaten than they do when they are hungry?
   (d) Does perception of time change when in a relaxed state?

Experimental and control groups

In a relatively simple experiment, the participants are allocated to one of two groups. One group of participants, called the **experimental group**, is exposed to the independent variable (i.e. the 'treatment'). This group is said to be in the *experimental condition*. A second group of participants, called the **control group**, is not exposed to the IV. This group is said to be in the *control condition*.

For example, consider an experiment to investigate whether alcohol consumption affects driving ability. In this experiment, the IV which the researcher will 'manipulate' is the amount of alcohol consumed by research participants and the DV will be the number of driving errors made. The experimental group would be tested on their driving skills in a driving simulator after having consumed an alcoholic drink (the experimental condition) and the control group would be tested on their driving ability in the driving simulator after having consumed a non-alcoholic drink (the control condition).

The control group provides a 'baseline' or standard against which the researcher can compare the performance of the experimental group in order to determine the effect of the IV on the DV. If the driving performance of the experimental group is significantly worse than the driving performance of the control group, the researcher will seek to conclude that the IV (consumption of alcohol) affected the DV (driving errors). A flow chart summary of this experiment is shown in Figure 2.13.

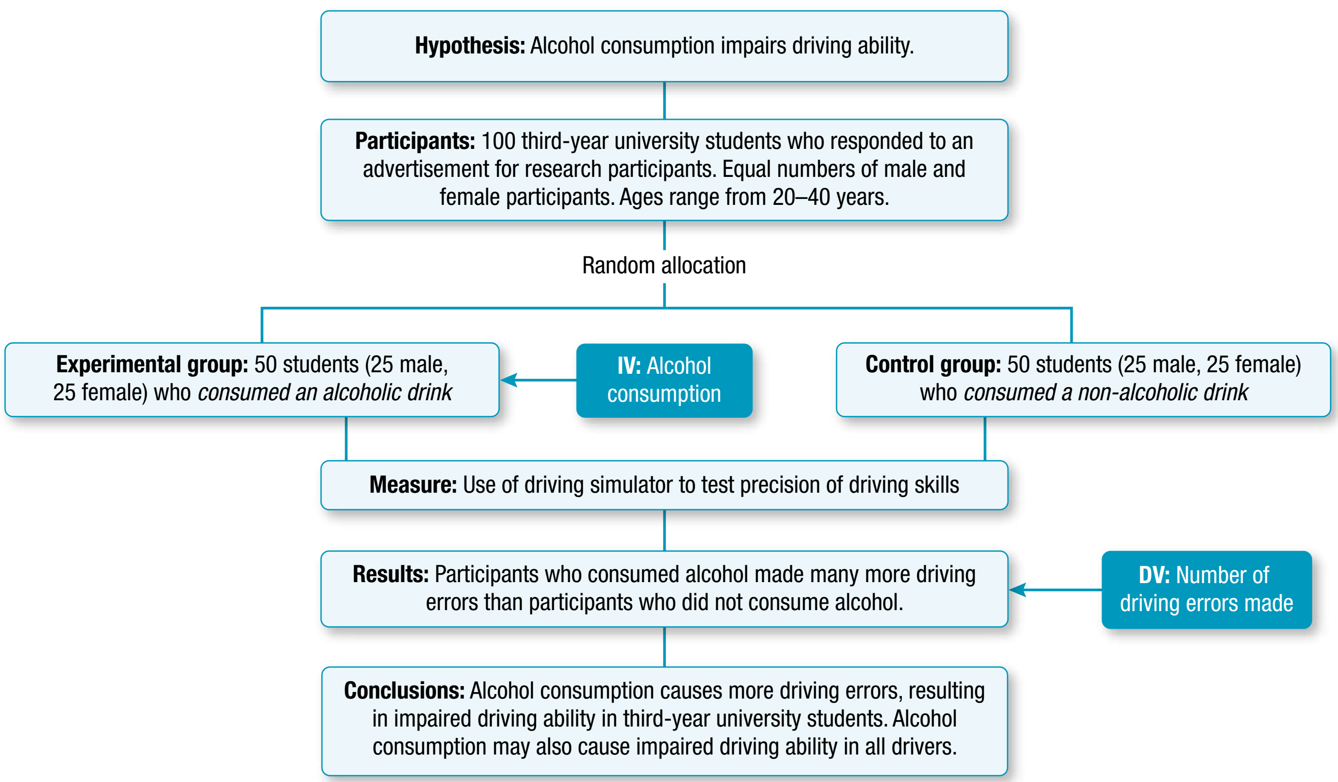


Figure 2.13 A flow chart of the experiment testing the effect of alcohol consumption on driving ability

The experimental group and the control group need to be as similar as possible in the spread of personal characteristics of participants that can cause a change in the DV. For example, one group should not have significantly more participants who are more experienced ('better') drivers so that this does not become a possible reason for differences in the number of driving errors between the groups that may be recorded. It is also important that both groups are treated the same, except for the time when the experimental group is exposed to the IV. Both of these conditions are necessary so that if the predicted change in performance occurs in the experimental group and does not occur in the control group, the researcher can be more confident in concluding that it was the IV that probably caused the greater number of driving errors.

Sometimes the experimental condition and control condition are collectively called *experimental conditions*, which literally means 'all the conditions of the experiment'. When this expression is used, the condition in which the IV is present may be referred to as the 'treatment condition' because the IV is the 'treatment' to which the participants are exposed or not exposed.

LEARNING ACTIVITY 2.5

Review questions

1. (a) What is an experiment?
(b) What are two key features that distinguish an experiment from other research methods?

2. (a) What are two different ways in which an experimenter can manipulate an IV?
(b) Give an example of how each of the following variables could be varied to have different levels or values.
(i) psychotherapy
(ii) height
(iii) religion
(iv) birth order

3. (a) Distinguish between an experimental group and a control group in relation to the IV.
(b) Why is it important for the experimental and control groups to be as similar as possible in personal characteristics that may affect the DV?
(c) In what other way must the experimental and control groups be alike?

4. What is the purpose of using a control group in an experiment?

Extraneous variables

In an experiment that was conducted to test whether sleep deprivation causes headaches, the IV is the amount of sleep obtained and the DV is how often a headache is reported. As shown in Table 2.2, data collected for this research suggest that the frequency of headaches is likely to increase if people experience six or fewer hours of sleep.

Table 2.2 Frequency of headaches reported and amount of sleep

	Frequency of headaches reported		
Hours of sleep	Never	Sometimes	Often
≥8	40	18	2
7	38	20	6
≤6	15	35	7

However, what would happen if participants who had eight or more hours of sleep also took 'sleeping pills' which reduced the likelihood of headaches occurring? Or participants who had six or less hours of sleep were also experiencing considerable stress in their lives or were prone to getting headaches? Or participants had different perceptions of what a headache is and what was reported by one participant as a headache was not reported as a headache by another?

There are variables other than the IV that might influence the DV and therefore the results of an experiment. Researchers try to predict what these might be when planning their experiment. Then, they design the experiment to control or minimise the influence of other, 'extra' variables; that is, extraneous variables.

In an experiment, an **extraneous variable** is any variable other than the IV that can cause a change in the DV and therefore affect the results in an unwanted way. An extraneous variable is not intentionally studied nor does the researcher wish to study this type of variable. However, when one or more extraneous variables are present in an experiment, they can make it difficult to conclude with confidence that any change in the DV was caused solely by the presence of the IV and not because of some other variable. This is why they are 'unwanted'.

In the sleep study described previously, extraneous variables that may have caused or contributed to headaches developing or not developing can include:

- the amount of stress in the person's life
- illness (such as a virus)
- eye strain
- excessive alcohol consumption or use of particular medication.

Therefore, in the group who had six or less hours of sleep, the greater likelihood of experiencing a headache may not have been a result of insufficient sleep if one or more relevant extraneous variables were present. In order to conclude that the frequency of headaches will increase as a result of a reduction in the amount of sleep obtained, variables other than the IV that can impact on the DV must be controlled or eliminated.

Potential extraneous variables are often identified prior to the research. Sometimes, however, the researcher does not become aware of relevant extraneous variables until after the experiment has commenced; for example, during the experiment or when evaluating the experiment after it has been conducted. In some cases, the researcher remains unaware of relevant extraneous variables until another researcher points them out after reading the report on the experiment.

There are potentially many extraneous variables that may affect the DV of an experiment and it can be difficult for the researcher to predict and control all of them. Consequently, researchers tend to focus on controlling those variables that are likely to have a significant effect on the DV. For example, in an experiment to determine the softest noise a person can hear, it would be very important to control background noise. However, in an experiment to test the effect of caffeine on performance of some physical task, background noise may not be so critical.

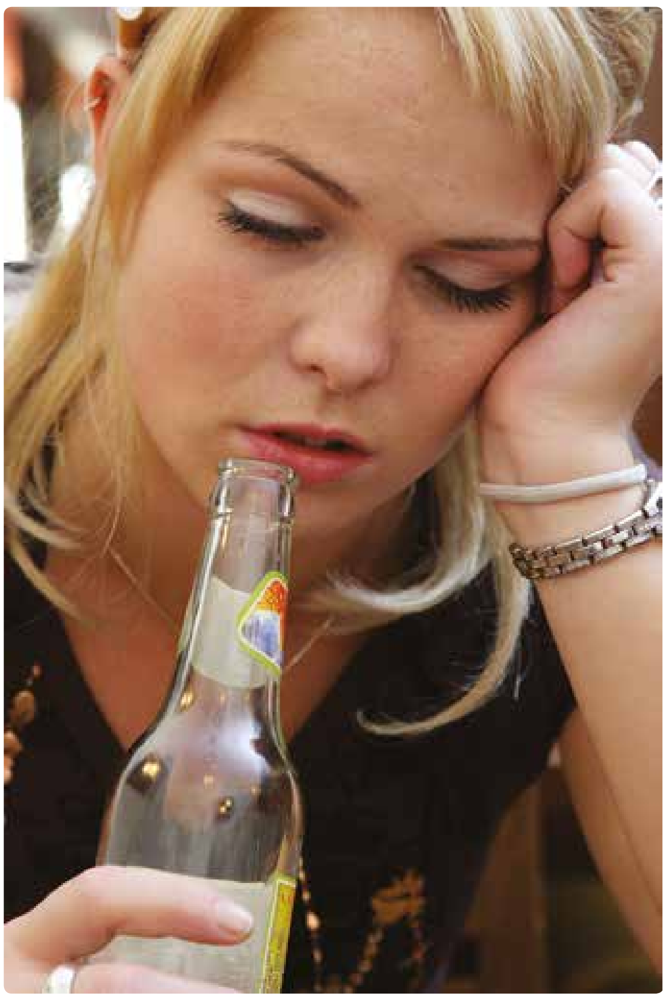


Figure 2.14 This participant's headache may be due to poor sleep quality induced by excessive alcohol consumption.

Confounding variables

Every experiment used in psychological research is designed to answer the same basic question: *Does the IV cause the predicted change in the DV?* The researcher recognises that there are other variables that may affect participants' responses (i.e. the DV), such as all those variables collectively referred to as extraneous variables.

Extraneous variables are inevitable and do not pose a problem if controlled in an appropriate way. By strictly controlling unwanted effects of relevant extraneous variables on the DV, the effects of the IV on the DV can be isolated. If there is a measurable change in the DV, then the researcher can more confidently conclude that the IV caused the predicted (hypothesised) change in the DV. If a variable that can affect the DV is not controlled, then its effect on the DV may not be able to be clearly distinguished from that of the IV. When this happens, the uncontrolled extraneous variable is referred to as a confounding variable.

A **confounding variable** is any variable other than the IV that may have an unwanted effect on the DV which can be confused with that of the IV. This variable systematically changes at the same time or together with the IV so the researcher cannot tell which of the variables produces the change in the DV. Basically, a confounding variable is like a second unwanted IV that could have influenced the DV together with the IV. It is called a confounding variable because its effects are entangled and therefore potentially confounded (meaning 'confused') with those of the IV, thereby preventing the researcher from concluding with any confidence that the IV caused the predicted change in the DV.

Not all extraneous variables become confounding variables. Confounding variables are typically built into the experiment itself, but unintentionally. For example, suppose that a researcher interested in person perception is investigating whether facial attractiveness influences our first impression of someone. The researcher conducts an experiment to test a hypothesis that more attractive people will receive higher likeability scores than less attractive people. Participants rate photos of 'models' varying in attractiveness using a 7-point likeability scale.

The results show that models in the 'more attractive' group were given significantly higher likeability scores than models in the 'less attractive' group. This suggests that facial attractiveness (the IV) directly influenced likeability (the DV) and therefore accounts for the difference in scores.

However, suppose that coincidentally the more attractive models were also 'well dressed' and the less attractive models were also 'poorly dressed'. Then, the researcher cannot tell which variable — facial attractiveness or dress style — actually accounts for the likeability scores. In such a case it would be said that 'dress style is a confounding variable' and that 'facial attractiveness and dress style are confounded'. This confounding is shown in Table 2.3 on the next page.

Table 2.3 Results of facial attractiveness and likeability experiment

Intended IV →	*Less attractive models*	*More attractive models*
Confounding variable →	*Poorly dressed*	*Well dressed*
Likeability scores →	*2* *1* *2* *1* *3* *3*	*5* *6* *6* *5* *4* *6*

In the left-hand column in Table 2.3 are likeability scores for the less attractive models and in the right-hand column are likeability scores for the more attractive models. The results provide support for the researcher's hypothesis that more attractive people will receive higher likeability scores but they also show that dress style may actually be the variable related to likeability instead of facial attractiveness. Furthermore, it is plausible that the groups of models could have been called 'well dressed' and 'poorly dressed' rather than 'more attractive' and 'less attractive' and that an alternative hypothesis about dress style influencing likeability could have been tested (Heiman, 2002).

The presence of one or more confounding variables does not necessarily mean that the IV did *not* cause the changes in the DV. However, the presence of a confounding variable suggests that there may be one or more alternative explanations for the results obtained in the experiment. The more alternative explanations there are for the results, the less confident the researcher will be that the IV alone was responsible for the results.

An experiment with one or more confounding variables compromises interpretation of the results and the validity of the experiment, specifically *internal validity* (see page 88). The more alternative explanations there might be for an observed result, the less confidence a researcher will have in their research hypothesis, which states or implies that the IV *will* be the cause of a particular result.

Because humans are complex and there are often multiple causes of how they may think, feel or behave in any given situation, good experimental design involves anticipating potential extraneous and confounding variables and developing strategies to minimise their influence or ensuring that extraneous variables do not become confounding variables.

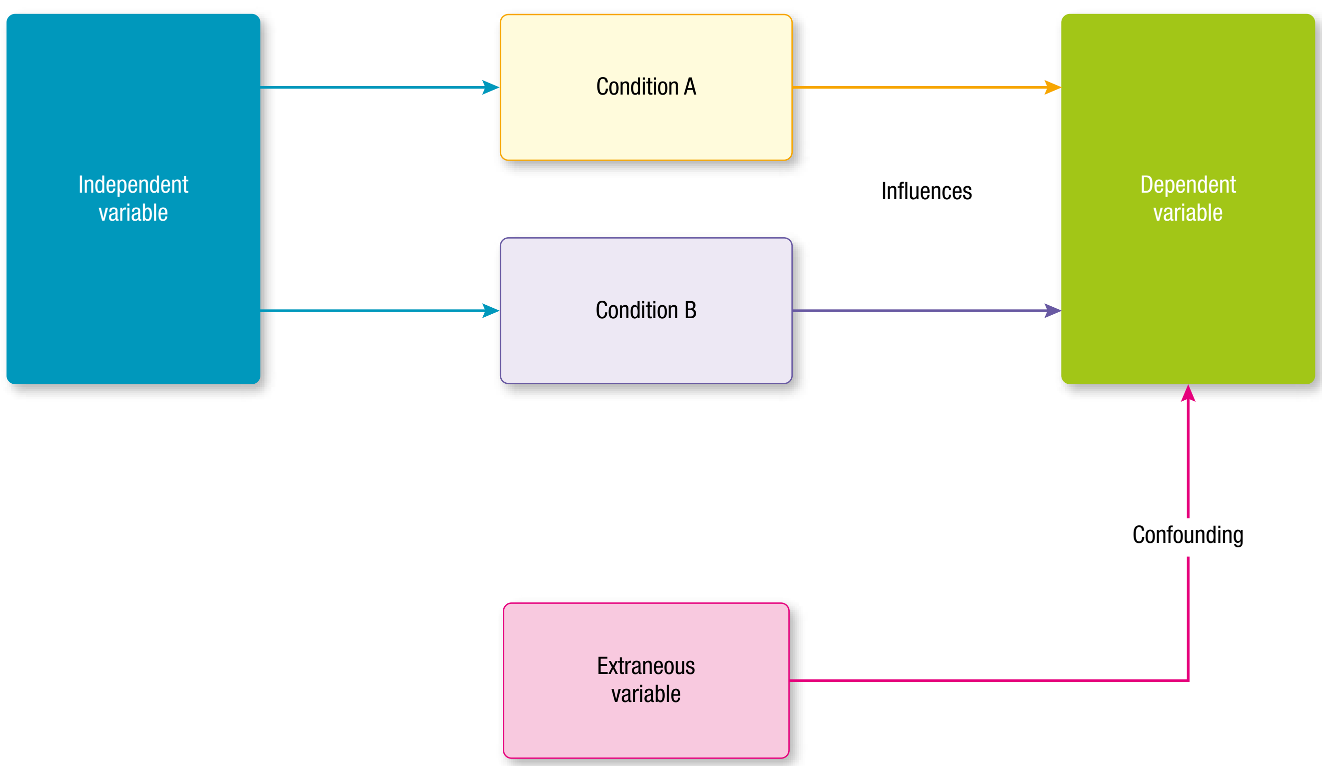


Figure 2.15 When an extraneous variable influences the DV in an unwanted way, it may be difficult to isolate its effects from those of the IV. If this type of confusion occurs, the variable will usually be referred to as a confounding variable, or simply as a 'confound'.

BOX 2.1 Other types of variables that apply to VCE Psychology

Type of variable	Definitions
Categorical	Categorical variables are qualitative variables that describe a quality or characteristic typically addressing 'what type?' or 'which category?' They are generally represented by non-numeric values and may be further classified as ordinal or nominal. **Ordinal variables** can take values that can be logically ordered or ranked, for example, birth order (1st, 2nd, 3rd), level of stress (low, medium, high) and attitudes (strongly agree, agree, disagree, strongly disagree). **Nominal variables** can take values that cannot be organised in a logical sequence, for example, gender, colour, taste (sweet, sour, bitter, salt, savoury) and type of sleep (REM, NREM). Bar charts and pie graphs are used to graph categorical data.
Numerical	Numerical variables are quantitative variables that describe a measurable quantity as a number, typically addressing 'how many?' or 'how much?' They are further classified as continuous or discrete. **Continuous variables** can take any value between a certain set of real numbers, for example, distance, height (2.85 metres), length of time (12.5 seconds) or temperature (25.4 °C). **Discrete variables** can take a value based on a count from a set of distinct whole values and cannot take the value of a fraction between one value and the next closest value, for example, number of neurons in a brain or number of facts recalled from a list. Scatter plots and line graphs are used to graph numerical data.

Source: *VCE Psychology: Advice For Teachers* (2016), p. 71. Retrieved from http://www.vcaa.vic.edu.au/Pages/vce/studies/psychology/psychoindex.aspx

LEARNING ACTIVITY 2.6

Review questions

1. What are extraneous and confounding variables?
2. In what way are extraneous and confounding variables alike yet different?
3. When is it best to identify extraneous variables? Explain your answer.
4. Explain why the presence of extraneous and/or confounding variables is problematic for the researcher.
5. Give an example of an extraneous variable that may be relevant in one experiment and therefore require control but irrelevant in another experiment and not requiring control. Explain your answer.
6. For each of the following research topics, identify the IV, the DV and three potential extraneous variables that could affect the DV.
   (a) The effect of shyness on the ability to make new friends at school
   (b) Whether meditation can improve performance on a VCE English exam
   (c) Whether males are more willing than females to taste different foods
   (d) Whether students who have breakfast concentrate better in class
   (e) Whether having a pet in an aged-care nursing home improves happiness for elderly people who live there

Identifying potential extraneous and confounding variables

Researchers have described many variables that can be extraneous or confounding variables in an experiment. VCE Psychology prescribes the study of individual participant differences, use of non-standardised instructions and procedures, order effects, experimenter effect and placebo effect. We examine each of these in turn and then, in the next section, consider how researchers can minimise their potential influences.

Individual participant differences

Individual participant differences refer to the unique combination of personal characteristics, abilities and backgrounds each participant brings to an experiment (or any other research study). These *participant variables,* as they are sometimes called, may be biological, psychological or social in nature. For example, some participants will be more or less easy going, anxious or motivated than others. They will also differ in a wide range of mental abilities such as intelligence, learning, memory, reading comprehension and problem-solving skills, as well as physical abilities such as strength, athleticism, hearing, vision, eye–hand coordination and finger dexterity. Furthermore, they will differ in such variables as sex, age, educational background, social relationships, ethnicity, cultural experiences and religious beliefs.

Any one or more of these variables can affect how participants respond in an experiment. However, they are expected and the researcher focuses on minimising the influence of those participant variables other than the IV that could have a measurable effect on the DV if left uncontrolled.

Consider, for example, an experiment to test whether ignoring attention-seeking behaviour of children who misbehave in class will reduce the frequency of their attention-seeking behaviour. A reduction in the number of times attention-seeking behaviour has occurred after a month of ignoring this type of behaviour may not only be a result of ignoring the misbehaviour. Variables relating to the children or their respective personal experiences can impact on their changed behaviour. For example, a child's family situation may have become more or less unsettled or their behaviour may change irrespective of the researcher's experimental treatment. A child's health, mood or peer relationships may also have an impact on whether or not they use attention-seeking behaviour and how often they may do so. Consequently, the researcher will try to ensure that the influence of these specific variables is minimised so they do not becomes confounds, and will do so before the experiment is conducted.

Figure 2.16 Even if they share a common interest, participants will differ in all kinds of personal characteristics, abilities and backgrounds. Variables arising from such differences can become confounding variables if unwanted and uncontrolled.

Use of non-standardised instructions and procedures

The instructions and procedures used by the researcher can also impact on how participants respond, and therefore on the results. For example, suppose that a researcher is interested in studying the effect of prior experience on food perception and eating. The researcher sets up an experiment in which participants must eat different foods that are 'plated' in novel ways but which they may refuse to eat. Figure 2.17 shows two examples of the 'test materials'.

Figure 2.17 (a) Would you eat soup out of this bed pan when assured that the pan is brand new and sterile? (b) Would you eat these insects when assured they are nutritious and considered a delicacy by millions of people worldwide?

Imagine how the results could be affected if participants received different *instructions* on what the experiment is about, what eating actually means (as compared to tasting), how many foods there are, whether the foods are safe, whether they can refuse to eat, and so on. What if some participants present for the experiment just before they have eaten a meal and others just after? Or what if some participants complete the task alone while the rest have other participants present? What if the researcher laughs at or comments on the responses of some participants but not others?

Generally, *procedures* involve everything the researcher does to actually conduct their study, including:

- selection of participants
- instructions for participants in different groups
- interaction with participants
- use of materials or apparatus
- use of rooms or other experimental settings
- observation and measurement of variables
- data-recording techniques.

Procedures not only involve what the researcher does but also how the relevant research activities are conducted, including their sequence. When the research procedures (including instructions) are **non-standardised**, this means that they are not the same for all participants (except for exposure to the IV by participants in the experimental group). Even small variations in procedures may affect participants' responses in unforeseen ways.

An experiment that uses non-standardised instructions and procedures is not strictly controlling all of the possible extraneous and confounding variables that can influence the DV and therefore the results.

Order effects

In some experiments, participants may be required to perform the same type of task twice or even many times under different conditions. For example, in the experiment described earlier to determine the effects of alcohol on driving performance, the *same* group of participants may be exposed to the control condition for which they do not drink any alcohol before a driving test in a simulator. After a short break, the participants may then be exposed to the experimental condition for which they are given an alcoholic drink before completing the test. It is possible that the order in which participants experience different conditions can be a problem in an experiment with this type of design.

An **order effect** occurs when performance, as measured by the DV, is influenced by the specific order in which the experimental tasks are presented rather than the IV. Performing one task affects the performance of the next task. Order effects may change the results so that the impact of the IV may appear to be greater or less than it really is. Two types of order effects that explain how this can occur are called practice effects and carry-over effects.

Practice effects are the influence on performance (the DV) that arises from repeating and/or prior experience with a task, including the test materials, procedures and settings. Practice effects can improve or impair performance.

For example, the participants' performance in the alcohol experiment may be influenced or partly determined by practice. Through repeated experience in the driving simulator, participants may get better at the driving task and perform better on the driving test due to greater familiarity with the simulator and its controls, or by anticipating events designed to cause driving errors that were presented during the first driving test.

Participants' responses can also be unduly influenced by practice effects. For example, performance may get worse as the experiment proceeds due to fatigue or tiredness (sometimes called a *fatigue effect*). Similarly, their performance may be influenced by boredom due to repeating the same task, especially if the task takes a long time and does not change. Boredom is quite common in experiments in which participants are required to complete many trials or tests, especially when tasks are not particularly interesting.

Carry-over effects are the influences that a particular task has on performance in a task that follows it. They arise simply from experiencing a task. The effect of experiencing a task has the potential to 'carry-over' to the next task, regardless of whether the task is the same or different.

For example, if alcohol was given first in the driving simulator task and the task is then repeated without alcohol (in the control condition), a carry-over effect would occur if insufficient time was allowed for the effects of the alcohol in the first condition to wear off.

As with practice effects, a carry over effect can help or hinder performance. For example, if a task (such as taking a test in a driving simulator) happens to be very easy, difficult, frustrating or even anxiety-provoking, the feeling may 'carry over', improving or lowering performance the next time the task is completed (driving in the simulator again) depending on the participant's perception or feeling the first time. Either way, this is an unwanted effect.

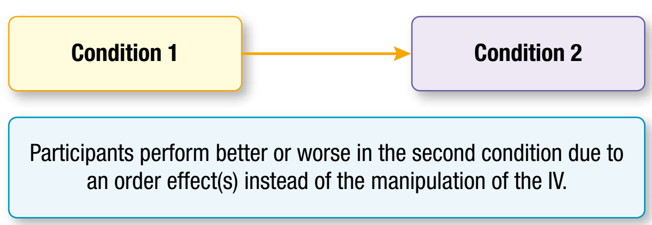


Figure 2.18 Order effect

Experimenter effect

Personal characteristics of the experimenter (or any other researcher) and their behaviour during an investigation are also sources of extraneous and confounding variables. The **experimenter effect**, sometimes called *experimenter bias* or *research bias*, is an unwanted influence(s) on participant performance and therefore the results which is produced intentionally or unintentionally by a person carrying out the research. In an experiment, the effect occurs when there is a change in a participant's response because of the experimenter's expectations, biases or actions, rather than the effect of the IV. A common type of experimenter effect is called experimenter expectancy.

Experimenter expectancy involves cues ('hints') the experimenter provides about the responses participants should make in the experiment. In particular, the experimenter's non-verbal communication ('body language') can produce a *self-fulfilling prophecy* — the experimenter obtains results that they expect to obtain. The results may therefore be attributable to behaviour associated with the experimenter's expectations rather than the IV. Actions that can promote a self-fulfilling prophecy include:

- facial expressions, such as smiling at participants in one group but not at those in another
- mannerisms, such as shaking hands with participants in one group but not with those in another
- tone of voice, such as speaking in a monotone voice to participants in one group and in a more lively way to those in another.

Placebo effect

A *placebo* is an inactive substance or fake treatment. In an experiment, the **placebo effect** occurs when there is a change in a participant's behaviour due to their belief that they are receiving some kind of experimental treatment and they respond in accordance with that belief, rather than to the effect of the IV. Essentially, the participants' behaviour is influenced by their expectations of how they should behave.

BOX 2.2 An experiment on the experimenter effect

German-born American psychologist Robert Rosenthal has demonstrated the experimenter effect in numerous research studies. In one well-known experiment, 12 university students taking a course in experimental psychology unknowingly became participants themselves.

The participants were asked to place rats in a maze. Some were deliberately told that their rats were specially bred to be 'maze bright' and would show 'learning during the first day of running' in the maze. The others were deliberately told that their rats were 'maze dull' and would 'show very little evidence of learning'. In reality, the rats were all standard laboratory rats and were randomly allocated to each group (Rosenthal & Fode, 1963).

As evident in Figure 2.19, the group of apparently 'maze bright' rats learned the maze significantly faster than the 'maze dull' rats (as measured by the number of errors in the maze).

The researchers concluded that the lower error rate had more to do with the participant's expectations of their rats than the rats' actual abilities. They suggested that 'experimenter expectations' about their rats' capabilities caused participants to subtly alter their training and handling techniques, which in turn affected the animals' learning. The participants were not cheating or purposefully manipulating their results. The participants were thought to have unintentionally and unconsciously influenced the performance of their rats, depending on what they had been told by the experimenter.

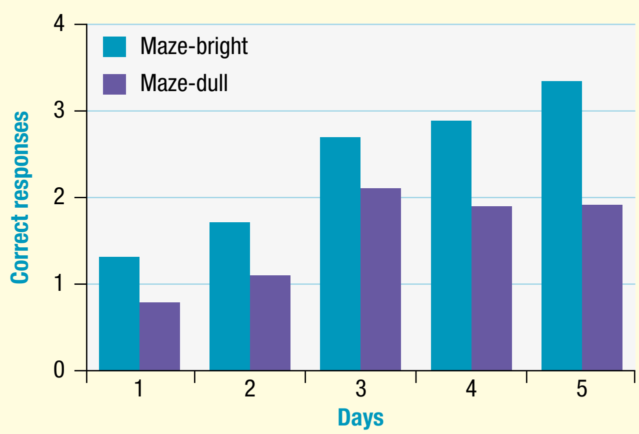


Figure 2.19 Mean number of correct responses per rat per day

Figure 2.20 Example of a maze used for 'maze running' laboratory experiments with rats

Figure 2.21 The placebo effect can be triggered by the belief that a substance or treatment is real, even though it isn't.

For example, consider an experiment to test a hypothesis that drinking alcohol makes members of the opposite sex look more attractive. Participants aged over 18 are randomly allocated to either the experimental or control group. The experimental group are given drink containing orange juice with vodka and the control group drink orange juice alone. All participants are told whether their drink contains vodka. After enough time passes for the alcohol to take effect, participants are asked to rate the attractiveness of the faces of various individuals in a set of colour photos.

Suppose that the experimental group rated the photos as significantly more attractive than did the control group. The researcher would like to conclude that alcohol caused the difference in perceived attractiveness. However, alcohol consumption may not have been the only variable that impacted on the DV.

Participants who drank alcohol also knew they drank alcohol, and those who did not drink alcohol knew they did not. The act of being given an alcoholic drink by a researcher might have promoted expectations in participants about how they should respond. For example, experimental group participants might have thought that they were given alcohol because they were expected to perceive more people as attractive, so they did.

Because the experimental group received the alcohol and the control group did not, only the experimental group experienced the placebo effect. This means that a confounding variable is present. Therefore the researcher cannot be certain whether it was the effect of alcohol or the placebo effect that caused the performance difference (Stangor, 2004).

LEARNING ACTIVITY 2.7

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Word copy of table

Summarising potential extraneous and confounding variables

Complete the following table.

Variable	Description	Example	Why a potential extraneous or confounding variable?
individual participant differences			
non-standardised instructions and procedures			
order effect			
experimenter effect			
placebo effect			

LEARNING ACTIVITY 2.8

Review questions

Identify the IV(s), DV(s) and a potential extraneous or confounding variable in each of the following experiments. Explain your answers.

1. An experiment was conducted to investigate whether young adults performed better on maths problems when working alone or when working in small groups.
   Two groups of participants were used, ensuring an equal spread of mathematical ability and personal characteristics across both groups.
   Because of a shortage of rooms, the participants working alone completed the problems in a small tutorial room with no windows in the corner of the school library. The participants working in small groups completed the problems in a large classroom with big windows on the first floor of the building (above the library).
   As hypothesised, the groups performed better than the individuals.
2. An experiment was conducted to investigate whether alcohol consumption increases errors when driving.
   Volunteer participants were given a drink that they were led to believe contained alcohol. It looked and tasted like an alcoholic drink but did not contain any alcohol. The participants were then given a test in a driving simulator with automatic transmission and the number of driving errors was recorded.
   The next day, at the same time, participants were given an alcoholic drink that looked and tasted like the non-alcoholic drink. After allowing sufficient time for the alcohol to take effect, the participants were given a test in a driving simulator with manual transmission and the number of driving errors was recorded.
   The results showed that more driving errors were made after having the alcoholic drink.

Ways of minimising extraneous and confounding variables

When planning an experiment, the researcher will consider potential extraneous and confounding variables. The extent to which these variables are anticipated and controlled will determine the quality of their experiment and its results. Ways of minimising extraneous and confounding variables include use of appropriate sampling procedures for selection and allocation of participants, counterbalancing, single- and double-blind procedures, placebos, standardised instructions and procedures, and use of an appropriate experimental research design.

Participant selection

A sample has to be selected in a scientific way so that the results obtained for the sample can be legitimately applied to the population from which it was selected. The process of selecting participants from a population of interest is called **sampling**.

A key goal of sampling is to ensure that the sample closely represents its population so that the results can be generalised to that larger group. It must reflect its population in all the personal characteristics of participants that are important in the research study. Participant variables that are considered to be important are those that can influence the results of the study to be conducted. For example, in a study on how friendships form among adolescents, personal characteristics of participants such as their sex, age, type of school attended, family background, career aspirations, religion and cultural background could be assumed to be important.

When a researcher selects a sample that represents its population, the sample is called a representative sample. A **representative sample** is a sample that is approximately the same as the population from which it is drawn in every important participant variable.

Figure 2.22 One way of accessing participants in a population of research interest is to advertise.

Larger samples also minimise the likelihood of a freak 'sampling error' resulting in a sample which does not represent its population well and would therefore make it difficult to apply the results to that population. Some researchers have described the law of large numbers in relation to sampling. The *law of large numbers* states that as sample size increases, the attributes (characteristics) of the sample more closely reflect the attributes of the population from which the sample was drawn. Basically, the more people who are selected, the more likely it is that they will reflect and therefore be representative of the population.

There are different ways of obtaining a sample. The most common sampling procedures are called random sampling, stratified sampling and convenience sampling. Convenience sampling is the simplest method but is the least likely to achieve a representative sample.

Random sampling

The dictionary definition of the term 'random' is something which is haphazard, unpredictable or 'hit-or-miss'. However, when the term random is used by researchers in relation to a sample, it has the opposite meaning. Random actually means using a planned, systematic procedure to obtain a sample.

Random sampling is a sampling procedure that ensures every member of the population of research interest has an equal chance of being selected to be part of the sample and thereby helps achieve a representative sample. This can be done in a number of different ways.

One way is to obtain a complete list of all the people in the population. This list is commonly called a *sampling frame*. For example, an electoral roll may be used as a sampling frame, or the telephone numbers of all the people in a relevant and current database may be used. If you were conducting a research study in your school, class rolls could be used, but only those with the names of students in the 'target population' — the population of interest.

After the sampling frame is obtained, the researcher could obtain a random sample using a simple lottery procedure to select the required number of names. The lottery procedure could involve drawing names out of a box or tossing a coin. For example, if a sheet of paper had all the names of the people in the population on it, the sheet would be cut up into slips of paper equal in size, with one name on each slip of paper. The names would then be thoroughly mixed in the box to help ensure their distribution throughout the box. Then, names of sample members (or research participants) could be drawn out 'blindly', one at a time. As a result of this simple but systematic procedure, the likelihood that the sample is representative of the population is increased, and so is the ability of the researcher to generalise the results to the sample's population.

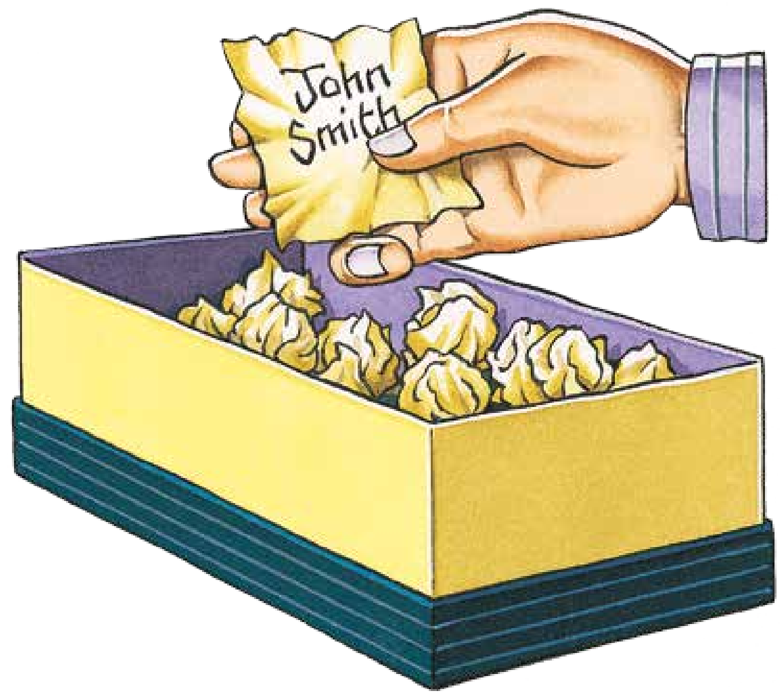

Figure 2.23 Under certain conditions, the lottery procedure of drawing names of research participants from a box is an appropriate random sampling procedure because each member of the target population has a genuinely equal chance of being selected.

When a large number of participants are required, researchers often use a digitally generated list of random numbers. Each participant in the sampling frame is given a number from 1 through to however many are in the target population. If the first number in the digitally generated list of random numbers is 22, then the twenty-second person in the sampling frame is included in the sample; if the second number in the digitally generated list is 93, then the ninety-third person in the sampling frame is selected, and so on until the required number of participants have been selected.

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Online App for generating random numbers

Sometimes a researcher may not find it necessary or even desirable to use a random sample that is fairly representative of a population of interest. For example, a researcher interested in the language development of children may intentionally undertake a case study of a child raised in a harsh, deprived environment where there is little or no opportunity to learn language, rather than studying a sample of 'average' children from a 'normal' home environment.

The most important advantage of random sampling is that it helps ensure a highly representative sample. The larger the sample, the more likely it is that this will occur, but there is no guarantee that the sample will be representative.

The main limitation of random sampling is that it can only be carried out if a complete list of the target population is available. If available, it may be difficult to gain access. If accessed, the process of random selection may be time-consuming.

Figure 2.24 Steps in random sampling

Stratified sampling

In some research studies it is important to ensure that particular groups in a population of interest are represented in their known proportions in that population. For example, suppose that a researcher wanted to study the attitudes of adult Australians to arsonists who deliberately light bushfires. They could reasonably expect that attitudes may differ depending on whether someone lives in an inner city suburb or in a rural community located in a bushfire prone area. Consequently, the researcher may want to ensure that each of these groups was represented in the sample in about the same proportions that they were known to exist in the adult population. This can be achieved by using the sampling procedure called stratified sampling.

Stratified sampling involves dividing the population to be sampled into different subgroups (called *strata*), then selecting a separate sample from each subgroup (called *stratum*) in the same proportions as they occur in the population of interest. Socio-cultural factors such as residential area, type of accommodation, age, sex, income level, income type, educational qualifications and cultural background are examples of personal characteristics that may be used as the basis of dividing a population into strata.

The stratified sampling procedure is commonly used to study behaviour and mental processes that tend to vary greatly among different subgroups of a population. For example, suppose you were going to undertake a research study on attitudes of students in your school towards teachers' use of rewards and punishments. You expect that attitudes may differ among students in different year levels so you want to ensure each year level (stratum) is proportionally represented in your sample.

You could first obtain separate lists of the students in each year level and then randomly sample from each list. If, for example, about 10% of all students in your school are enrolled in year 12 and about 15% in year 11, then your sample would consist of about 10% year 12 students and about 15% year 11 students. This would ensure students from each year level are represented in about the same proportions in the sample as they are in the population (the school).

Figure 2.25 shows an example of a stratified sample that could be obtained for the attitudes study.

Using a *stratified random sampling* procedure would ensure that the sample is highly representative of the population and therefore not biased in a way you consider to be important. For example, it would be biased if everyone in the target population (or a stratum) does not have an equal chance of being a participant or if one or more groups are significantly under- or over-represented in the sample.

The most important advantage of stratified sampling is that it enables the researcher to sample specific groups (strata) within populations for comparison purposes; for example, males vs females, or people of different ages and cultural backgrounds who have been diagnosed as having schizophrenia and will be exposed to a new type of treatment program for the disorder. This means that a stratified sample can provide greater precision for a research study and its findings when compared to the standard random sample taken from one larger group.

A major limitation of stratified sampling is that, like random sampling, it can be carried out only if complete lists of the target populations (strata) are available and accessible. However, if accessed, a representative sample cannot be obtained unless stratified random sampling is used. Either way, stratified sampling can be a very time-consuming procedure, more so than standard random sampling.

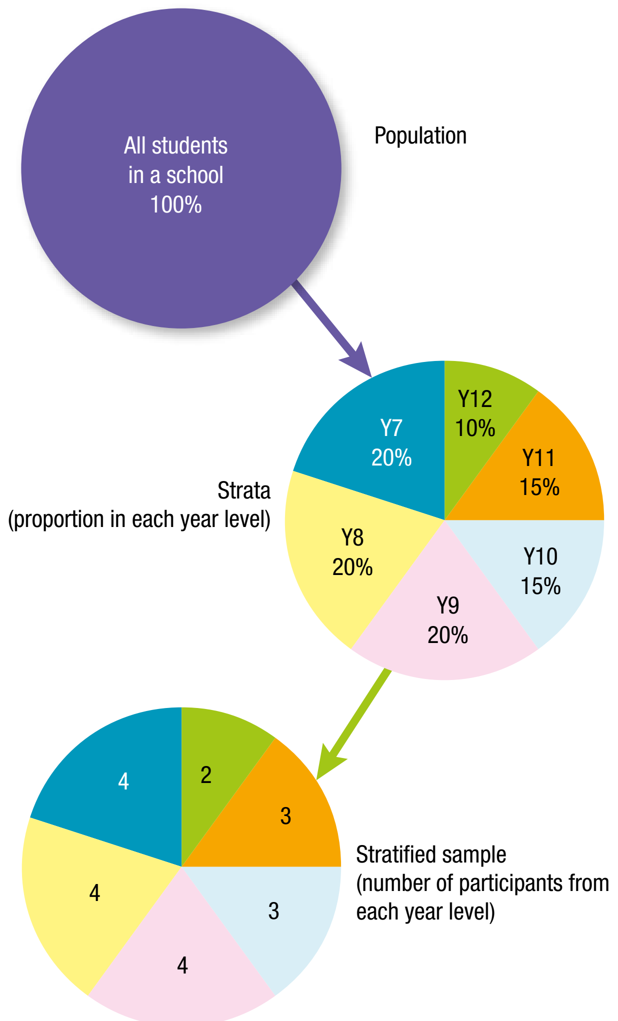

Figure 2.25 An example of stratified sampling for an attitude study

Convenience sampling

For some research studies it is not practical, suitable or possible to obtain a representative sample. In such cases, a *convenience sample* (also called an *opportunity sample*) may be used and the researcher may use anyone who is available or present.

Convenience sampling, or *opportunity sampling*, involves selecting participants who are readily available without any attempt to make the sample representative of a population. For example, a representative sample of homeless teenagers or illegal drug users is not often readily available. Consequently, the researcher may go to locations known to be frequented by the required participants and simply select the first individuals they meet who are in the target population and who are willing and available to participate.

Similarly, a researcher conducting a study on drivers who do not obey red traffic lights at a particular intersection at a particular time would be using convenience sampling. Psychology students often use convenience sampling; for example, when selecting participants they have the opportunity to study, such as other students in their school, children at a local primary school, friends, parents or relatives.

In most cases, convenience sampling produces a biased sample because the way in which it is selected favours particular individuals or groups — only those people available at the time and location of the study will have a chance of being included in the sample. If for example, a researcher used convenience sampling at a local shopping centre, they may select only those shoppers who look as if they will be cooperative to be in the sample and ignore those who appear uncooperative. Shoppers left out of the sample might think, feel or behave differently from those who are selected in the sample, yet these thoughts, feelings and behaviours will not be represented in the sample. Since a convenience sample is not representative of the target population under investigation, the data obtained can be misleading and the results of the study cannot be legitimately applied (generalised) to the entire population.

Despite these limitations, convenience sampling is widely used in psychology. It is typically quick, easy and inexpensive. These are considered significant advantages when compared with other sampling methods. Convenience sampling can also be of considerable value when conducting research to pilot, or 'test', procedures or to gain a preliminary indication of possible responses (and therefore a possible hypothesis) before conducting the actual study.

Many researchers regard convenience sampling as an adequate sampling procedure when investigating aspects of mental processes or behaviour that are assumed to be similar in all 'normal' individuals, despite individual differences. For example, all 'normal' adults are capable of reflecting on their personal experiences and using language to communicate what they think or feel. Similarly, all normal adults are capable of seeing, hearing and responding reflexively.

Figure 2.26 Convenience sampling involves selecting participants who are readily available without any attempt to make the sample representative of a population. This may involve going to known locations of potential participants (such as homeless people) and seeking their voluntary participation.

LEARNING ACTIVITY 2.9

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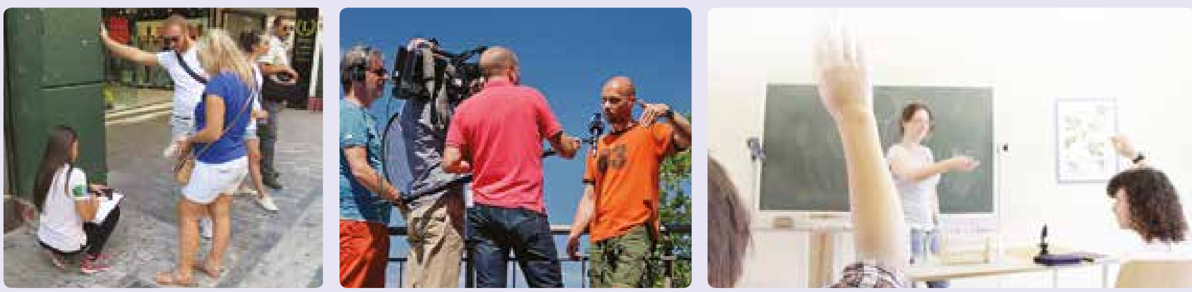
Summarising sampling procedures for participant selection

1. Explain the difference between a sample and a population.
2. What does sampling involve?
3. Name the sampling procedure that appears to be used in each of the following photographs.



4. Distinguish between a biased sample and a representative sample.
5. What are two potential limitations of small sample size?
6. Explain how the type of sampling procedure used can minimise extraneous and confounding variables.
7. Complete the table below.

Sampling procedure	Description	Example for a within-school investigation	Advantages	Limitations
random sampling				
stratified sampling				
convenience sampling				

LEARNING ACTIVITY 2.10

Media analysis/response — advertising for participants

Read the newspaper advertisement shown on page 41 and answer the following questions.

1. What is the specific topic of research interest?
2. Identify the population from which the sample will be selected.
3. Identify an important personal characteristic of the sample required by the researchers.
4. Are the researchers undertaking random sampling, stratified sampling or convenience sampling?
5. Is it possible that people who respond to the advertisement and are selected to be in the sample may behave or respond differently in the study, as compared with participants sampled from a relevant group targeted for the research study? Explain your answer.
6. (a) How representative is the sample obtained using the advertisement likely to be?
   (b) Suggest a definition for 'sampling bias'.
   (c) Will the researchers be able to apply (generalise) their results from the study described in the advertisement? Explain your answer.

Participant allocation

The method of selecting the sample is important in ensuring it is unbiased and representative of the population being studied. Equally important is the way in which research participants are placed in either the experimental or control group in an experiment.

In an ideal research world, everything about the experimental and control groups would be identical except for the IV. In reality, however, it is to be expected that there will be individual participant differences that may become extraneous or confounding variables and make it difficult to isolate the effects of the IV on the DV. Consequently, it is important to ensure that participant variables that might affect the results of the experiment are evenly spread in the experimental and control groups.

Random allocation

One way of minimising differences in the composition or make-up of the experimental and control groups is to randomly allocate participants to these groups. **Random allocation**, also called *random assignment*, is a procedure used to place participants in groups so that they are as likely to be in one group as the other. This means that every participant has an equal chance of being selected for any of the groups used. Participants selected for the experiment are just as likely to be in the experimental group as the control group.

As with random selection, random allocation can be achieved using a lottery procedure in which chance alone will determine the group to which each participant will be assigned. For example, drawing 'names out of a box' or tossing a coin are also appropriate ways of randomly allocating participants to groups.

With a sufficiently large number of participants, it is reasonable to assume that each group will end up with the same kind of spread of participant characteristics, abilities and backgrounds that may affect the DV and therefore the results. For example, consider the experiment on alcohol consumption and driving ability described previously. If the experimental group has a larger proportion of 'bad' drivers than the control group and the experimental group makes significantly more driving errors in the driving simulator, it will be difficult for the researcher to isolate the effect of alcohol (the IV) on driving ability (the DV).

The problem is that the participants in the experimental group may make more driving errors than the control group even when *not* under the influence of alcohol. Through random allocation of participants to the experimental and control groups, each group would be expected to end up with relatively even numbers of participants who are 'good' and 'bad' drivers.

The purpose of random allocation is to obtain groups that are as alike as possible in terms of participant variables *before* introducing the IV. With random allocation of participants to the experimental and control groups, researchers can more confidently conclude that if two groups responded differently in the experiment in terms of the number of driving errors, then it most likely had something to do with the effect of the IV. Consequently, random allocation is a crucial means of experimental control.

For a classroom experiment, placing all males in one group and all females in the other group would *not* be a random allocation procedure. Similarly, assigning the people seated in the front half of the room to one group and the people seated in the back half to the other group is not random allocation. There could be a difference in one or more personal characteristics of participants who prefer to sit at the front or back of the classroom.

Random allocation is different from random sampling. Random allocation is used to place participants in groups whereas random sampling is one of the methods that can be used to select participants for an experiment. Random sampling, however, is based on the same principle of 'equal opportunity for all participants'.

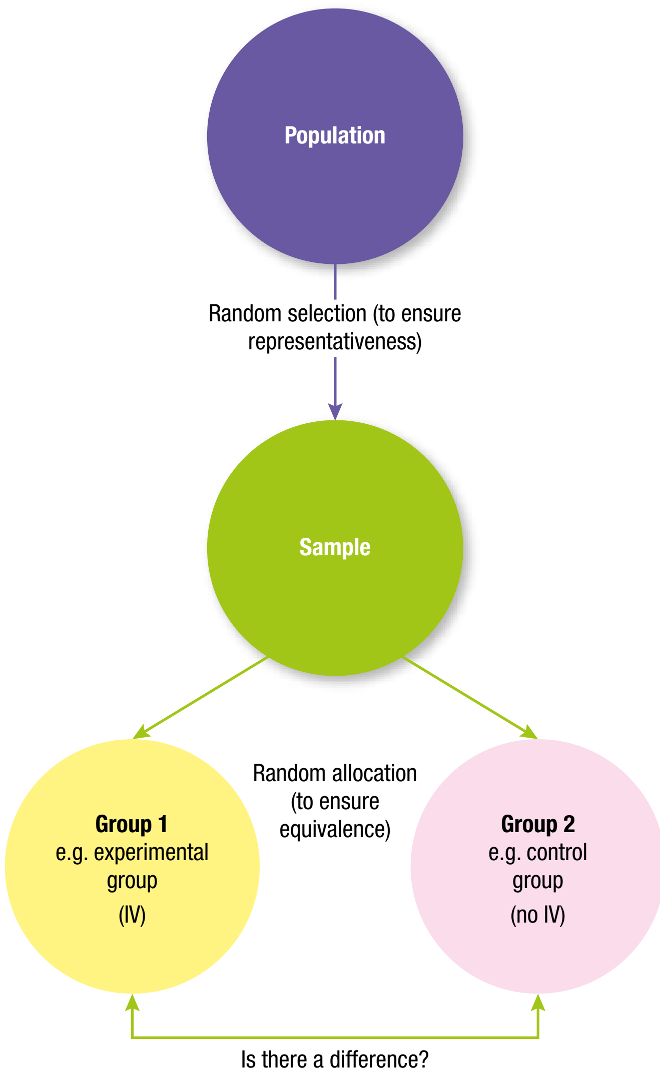


Figure 2.27 A simple experimental design using random sampling to select participants and random allocation to assign them to either condition

LEARNING ACTIVITY 2.11

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Practical activity — testing random allocation

Review questions

1. What is random allocation?
2. What does random allocation achieve in relation to groups selected for an experiment and why is it assumed that this is possible?
3. Why is random allocation considered to be a crucial feature of good experimental design?
4. Give an example of a random allocation procedure that could be used for a class experiment at school.

Counterbalancing

A procedure called counterbalancing is commonly used to minimise order effects such as practice and carry-over. **Counterbalancing** involves systematically changing the order of treatments or tasks for participants in a 'balanced' way to 'counter' the unwanted effects on performance of any one order. By counterbalancing, the researcher recognises that an order effect is a potential extraneous or confounding variable and cannot be controlled or eliminated in any other way.

There are different types of counterbalancing procedures. The simplest and most commonly used is called *between-participants counterbalancing*. This involves alternating the order in which the groups of participants are exposed to the experimental conditions. Each group of participants is exposed to each condition of the experiment in a different order.

For example, if there were 20 participants in the alcohol and driving experiment, counterbalancing could require half the participants to undertake the driver test in the no alcohol condition first, followed by the test in the alcohol condition. The other half of the participants would undertake the driver test in the alcohol condition, followed by the no alcohol condition. Participants would also be randomly allocated to experience one condition or the other first or second.

The results for all participants are then combined across the entire experiment to achieve counterbalancing. In this way, any order effect that impacts on performance, as measured by the DV, is controlled. This procedure is shown in Figure 2.28.

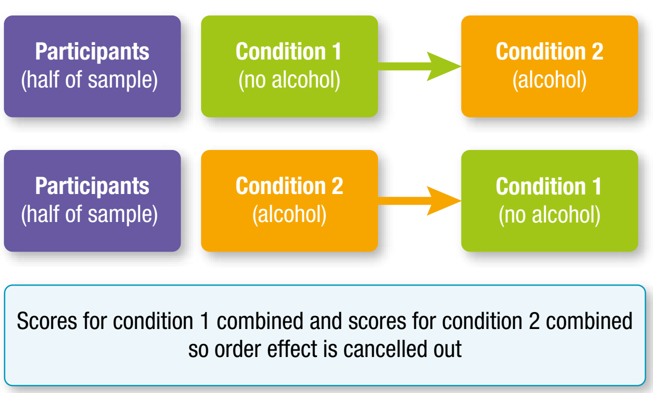

Figure 2.28 A simple counterbalancing procedure for the alcohol and driving experiment

Single- and double-blind procedures

Participants' expectations can influence the results of any investigation, so it is important that participants do not know whether they are in an experimental or a control group. In this case, the experiment is said to be using a single-blind procedure. It is called a **single-blind procedure** because the participants are not aware of (are 'blind' to) the condition of the experiment to which they have been allocated and therefore the experimental treatment (the IV).

To control possible experimenter effects, while also controlling participant expectations, researchers may use a procedure in which neither the participant nor the researcher interacting with the participants knows which participants are in the experimental or control groups. This is called the **double-blind procedure** because the participants *and* the researcher directly involved with the participants are unaware of (are 'blind' to) the conditions to which the participants have been allocated. Only a researcher who is removed from the actual research situation knows which participants are in which condition (or groups).

The double-blind procedure is an effective control procedure in experiments in which knowledge of the conditions might influence the expectations or behaviour of the researcher as well as the participants.

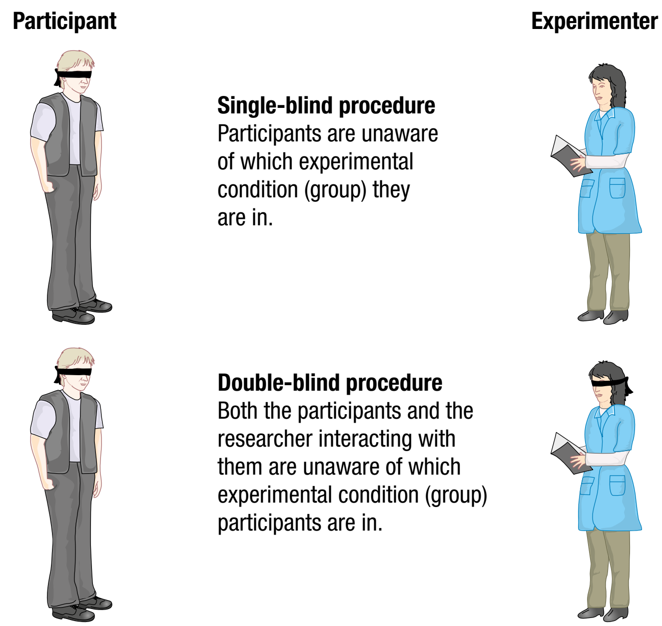

Figure 2.29 Comparison of the single- and double-blind procedures

Placebos

In an experiment, participants in the experimental group are exposed to the IV 'treatment' and participants in the control group are not. Because only the experimental group receives the treatment, they may be influenced by their expectations about how they should behave. Therefore, there is a potential confounding variable — the experimental group may respond differently to the control group either because of the IV or because of their expectations of how they should behave.

In order to minimise the impact of this variable on the DV, the control group can be given a **placebo** — a fake treatment that is like the IV treatment used in the experimental group but which is actually neutral or has no known effect. In this way, control group participants should form the same expectations as the experimental group, thereby controlling the effects of this unwanted variable.

For example, consider an experiment to test a new herbal drink called Attendo Memoro that claims to improve concentration and memory. Participants in the experimental group could be given a daily drink of Attendo Memoro over a 6-week period and control group participants could be given a drink that looks, smells and tastes like Attendo Memoro but has no active ingredient. At the beginning and end of the study all participants could be given tests to assess their concentration and memory. Because a placebo was used in the control group, any difference in the results could not be said to be due to participant expectancy effects.

Similarly, when testing drugs (or new medical therapies), researchers give placebo pills or injections to the control group so that all participants experience the same procedure and form the same expectations. And in studies that require the experimental group to perform, for example, a physically or mentally demanding task prior to making a response, the researcher would have the control group perform a similar placebo task to eliminate differences between the groups in terms of motivation or fatigue (Heiman, 2002).

Figure 2.30 In an experiment to test a new drug, a placebo would look and be used like the real drug but have no real effect.

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Huffington Post article on placebo surgery

A placebo can be any type of inert or fake treatment. It may be a drug or any other type of substance, an edible product such as a food, a special diet, a psychological therapy, a physical therapy, exercise or even surgery (such as incision and a procedure that is faked so that the participant doesn't know they actually had nothing done). When a placebo is given to a control group, the group is sometimes referred to as the *placebo control group* or the *placebo condition*.

Standardised instructions and procedures

The instructions and procedures used by the researcher are a source of extraneous or confounding variables so their potential unwanted influences must be minimised. This is achieved by standardisation ('consistency') across the different conditions. Using standardised instructions and procedures means that instructions and procedures are the same for all participants (except for variations required for experimental group participants exposed to the IV).

The use of **standardised instructions** ensures that the directions and explanations given to all participants in each condition are identical in terms of what they state and how they are given. To help ensure this 'sameness', researchers usually read from a pre-prepared script in a 'neutral' voice. The script typically contains all the information about what the researcher says and does throughout the entire experiment.

Instructions given to participants are often referred to as the 'briefing'. The briefing takes place *before* the experiment begins, unlike the 'debriefing' which takes place at the end of the experiment and includes additional information and has other requirements (see page 94).

It is also essential that all participants experience the same environment and procedures, with the only exception being exposure to the independent variable. Therefore, **standardised procedures** must be used — the techniques used for observing and measuring responses should be identical for all individual participants. All participants should be treated in the same way, as appropriate to the condition to which they have been assigned. For example, using standardised procedures means that all participants would:

- interact with the same researcher in the same environment
- participate in the experiment at the same time of day

- have the same amount of time
- learn the same amount of information
- complete the same activities (except for variations required for IV exposure).

How the researcher presents stimuli, obtains responses and records scores during DV measurement can be controlled through automation by using electronic or mechanical devices to present stimuli and to measure and record responses. Electronic timers, data projectors, video and audio recorders, and computers ensure controlled and consistent stimulus presentations (such as an image on a monitor to measure reaction time). Automating data collection ensures that the scoring system is consistently and accurately applied and provides for sensitive measurement of responses (such as the keystroke or screen tap used to measure reaction time to a stimulus).

The use of standardised instructions and procedures minimises unwanted participant variables (including the placebo effect) because all participants have the same experience. It can also help control experimenter effects, as all the researchers involved will follow the same procedures. Consequently, when the results for experimental and control groups are compared, significant differences can be said to be due to the IV with confidence.

Figure 2.31 Automation ensures recording of participant's responses is standardised across different experimental conditions.

LEARNING ACTIVITY 2.12

Review questions

1. (a) Explain what counterbalancing is and which potential problems it attempts to control.
(b) A researcher will test whether playing violent video games increases aggressive behaviour among children. All participants will play a violent game for 15 minutes then be taken to a play area immediately after where they will be observed for 30 minutes. Aggressive behaviour will be defined as the number of times a child makes actual physical contact with another child. The participants will then play a non-violent video game for 15 minutes and again be observed in the play area for 30 minutes. Differences in aggressive behaviour in each condition will then be compared.
Identify two possible order effects and explain a counterbalancing procedure that could be used to minimise their influence.

2. (a) In what way are the single-blind and double-blind procedures similar and different?
(b) Which of the two procedures gives more control and why?

3. Explain what a placebo is and how it can be used to minimise the influence of unwanted participant expectations or beliefs that may result from a specific treatment received in experimental and control groups.

4. (a) What are standardised instructions and procedures? Explain with reference to relevant examples.
(b) Explain how standardised instructions and procedures can be used to minimise the influence of participant variables and experimenter effects.

Use of an appropriate experimental research design

Various experimental designs can be used to minimise the effects of potential extraneous and confounding variables. Three of these designs are the independent groups, repeated measures and matched participants designs.

Independent groups

In an experiment with an **independent groups** design, also called *between participants*, each participant is randomly allocated to one of two (or more) entirely separate ('independent') conditions ('groups'). The simplest independent groups design uses two groups — most often one group as the experimental group and the other as the control group. Many examples of experiments with this design have been given earlier in this chapter.

Random allocation is an essential feature of the independent groups design in order to minimise individual participant differences. Random allocation to the different conditions will help ensure groups are well matched on participant variables and therefore fairly equivalent. The bigger the groups, the more likely it is that a uniform spread of characteristics and abilities will be achieved. Although random allocation does not guarantee that different conditions are entirely equivalent in the spread of participant variables, it does greatly reduce the likelihood of differences so that the effect(s) of the IV on the DV can be isolated.

The independent groups design is very common in experimental research. An advantage is that, unlike the repeated measures design (which is described next), there is not often a need to spread out the time period between the different conditions. This means that the experiment can usually be completed on one occasion, which also helps ensure participant attrition ('dropout' rate) is negligible. There are also no order effects between conditions to control.

However, there is often a need for a larger number of participants to help ensure the spread of participant variables within the sample will match the distribution within the population. In addition, there is less control over participant variables than in the repeated measures and matched participants designs, especially when a small sample is used.

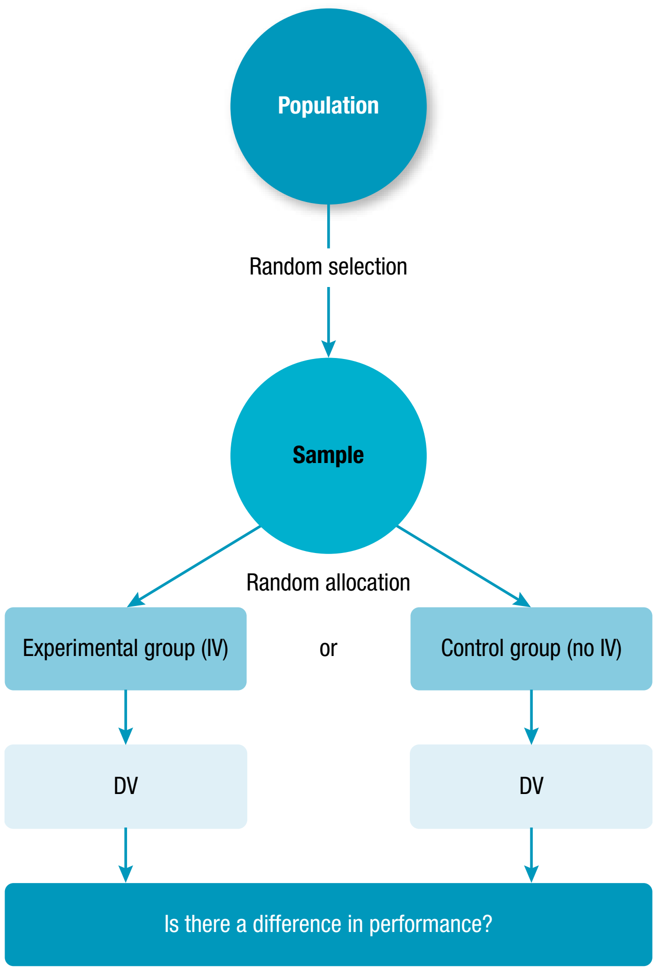

Figure 2.32 In an independent groups experiment, participants are randomly allocated to either the experimental or control group.

Repeated measures

In a **repeated measures** design, also called *within participants*, each participant is in both the experimental and control conditions. This means that the same participants are in both the experimental and control groups. The groups are therefore identical so individual participant differences are controlled.

For example, suppose a researcher is interested in investigating whether memory of a crime by eyewitnesses is better when hypnotised. Using the repeated measures design, all participants may be shown a video of two robberies that are reasonably alike in detail, once when hypnotised and once when not. For each condition they could be given a test of recall with 20 questions about the robbery. The number of correct answers given under each condition could then be compared.

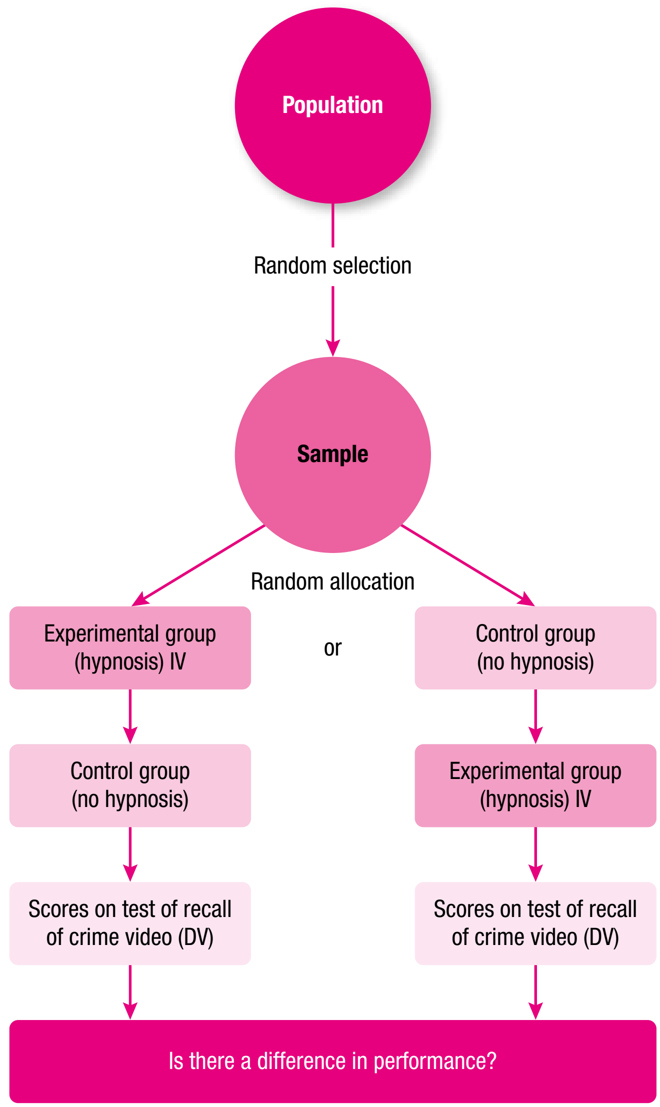

Figure 2.33 In a repeated measures experiment, the same participants are in both the experimental and control groups.

This design would give the researcher strict control over all the possible participant variables that could influence memory, such as individual differences in attention, level of alertness, motivation, mood, visual perception, prior experience, and so on. Participant differences that may not have been identified by the researcher as potential extraneous or confounding variables will also be controlled because the participants in both conditions are identical in every respect.

When planning repeated measures, the researcher has to consider order effects because they are more likely to arise for this type of design. Participants may perform better in the second condition because they have practised a task or gained other useful knowledge about the task or the experiment in general. Alternatively, participants' performance may be impaired by an order effect such as fatigue or boredom, and they may not perform as well on the second occasion. In either case, order effect is a potential confounding variable because the researcher cannot be confident about whether the IV or order effect caused the change in the DV.

One way of dealing with order effects such as practice, fatigue and boredom is to increase the time between measuring the DV in each condition. For example, participants might be in the experimental condition one day, then return a week later for the control condition.

If this procedure is inappropriate, inconvenient or impractical, the researcher can use a counterbalancing procedure. For example, as shown in Table 2.4, half the participants would follow one order (view video when hypnotised in the experimental condition first, then when not hypnotised in the control condition). The other half would follow the reverse order (view video in the control condition first, then in the experimental condition).

Table 2.4 Repeated measures experiment using counterbalancing

Participant	Experimental condition	Control condition
1	First	Second
2	Second	First
3	First	Second
4	Second	First
5	Second	First
6	First	Second

The main advantage of the repeated measures design is that it can effectively control potential confounding variables arising from individual participant differences. For instance, it can be assumed that any difference in performance on the DV in each condition of the experiment is unlikely to be due to individual participant differences because each participant is in every condition. Another advantage is that this design also tends to require a relatively smaller number of participants when compared with other designs because the same participants are in all conditions.

However, the repeated measures design also has limitations. Although this design keeps individual participant differences constant, it does not necessarily control all participant variables that can influence the results. For example, some participants may guess what the experiment is about as they compare the two conditions, creating expectations and beliefs that lead to unnatural responses. Experiments using the repeated measures design also have greater participant attrition (loss) rates, especially when the experiment is conducted over several days to reduce participant fatigue, boredom or overload. Participants may show up for the first session but not the second. Order effects are more likely to occur with this design, but counterbalancing can be used for control.

Matched participants

In a **matched participants** design, also called *matched groups,* each participant in one condition 'matches' a participant in the other condition(s) on one or more participant variables of relevance to the experiment. For example, in the memory and hypnosis experiment, memory would be the most relevant variable.

To create two matched groups, one for the experimental condition and one for the control condition, all participants could be pre-tested on memory ability to obtain scores. Then, each participant would be paired with someone else with a similar score until all the participants had been matched on memory ability.

The participants would then be randomly allocated to a group on the basis of their test scores. For example, the two participants with the highest scores would be randomly allocated to the hypnosis and no hypnosis groups respectively. Then the two participants with the next highest scores would be allocated to the two groups, and so on. In this way, the two groups in the experiment would be matched in terms of memory, thereby controlling this potential extraneous or confounding variable.

Participants can be matched on more than one characteristic when using this experimental design. Matching for age, sex and mental abilities is quite common. Randomly allocating one member of each matched pair to a different group (condition) ensures that each group is fairly equivalent in terms of the spread of participant variables that can cause a change in the DV. Matched 'triplets' or 'quads' may also be used for an experiment with three or more groups.

The main advantage of matching participants is that it ensures that in every condition there is a participant with very similar or identical scores on the variable(s) the researcher seeks to control. This means that these variables are the same across the conditions, thereby eliminating them as potential extraneous or confounding variables. In addition, participant attrition is less common than with the repeated measures design and there is not often a need to spread out the time period between the different conditions.

There are, however, limitations to the matched participants design. One potential problem is that it is often difficult and time consuming to actually recruit participants who are sufficiently alike in participant variables of research interest. There are also other practical problems. For example, to find matching participants, the researcher often has to pre-test many individuals and/or settle for a very small number of participants. This can be time consuming, especially if there are more than two groups in the experiment. Pre-testing can also create order effects. And the loss of one participant through attrition means the loss of a whole pair, triplet and so on. Pre-testing is not required for the repeated measures design and is used in an independent groups design only if the researcher elects to do so.

Use of the matched participants design is often not necessary in experimental research. Random allocation is usually sufficient to control individual differences of participants as it ensures equivalence of the experimental and control groups. Consequently, the matched participants design is not used as often as the other designs.

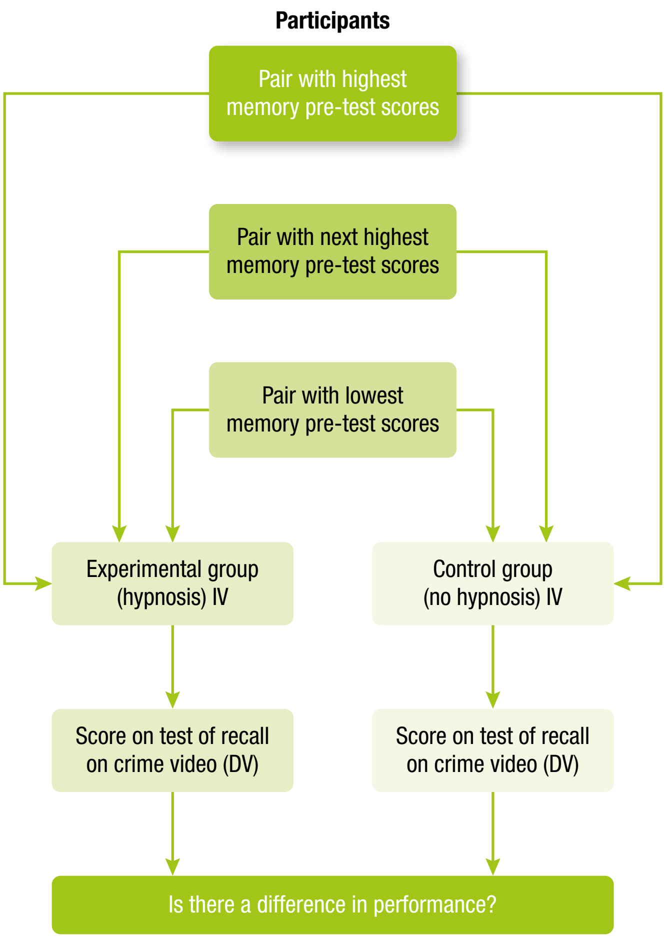

Figure 2.34 In a matched participants experiment, each participant in one condition 'matches' a participant in the other condition(s) on one or more participant variables of relevance.

Advantages and limitations of experimental research

A key feature of an experiment is the researcher's attempts to control the conditions in which a behaviour of interest or other event occurs, whether the experiment occurs in a laboratory setting or in a real-life, field setting. As well as controlling the IV, the researcher also attempts to minimise or eliminate the influence of unwanted extraneous variables to concentrate entirely on the effect the IV has on the DV. Elimination of all extraneous variables is not always possible, but control is usually greater than in other research methods, especially if the experiment is conducted in a laboratory setting. Consequently, the experiment has several advantages when compared to other research methods.

One advantage of the experiment is that the IV can be manipulated in order to observe the effect on the DV, therefore making it possible to test if there is a cause and effect relationship between the IV and DV. Furthermore, because controlled conditions are known conditions, the experimenter can set up the experiment a second time and repeat it to test (or 'check') the results.

Alternatively, the experimenter can report the conditions of an experiment in such a precise way that others can replicate the experiment and test the results. Replication is very important because when a study is repeated and similar results are obtained, there can be greater confidence in the reliability and validity of the results obtained.

Despite its precision, there are several limitations of the experiment. Although a field experiment occurs in a real-life setting and therefore has a relationship to the real world, it is often difficult to strictly control all variables because of the unpredictability of real-life settings. The ability to more strictly control variables is an advantage of the laboratory setting; however, it can be artificial and too dissimilar to real life. For example, bringing someone into the unfamiliar environment of a psychology laboratory can change their behaviour to the point where it is not appropriate to generalise or apply the observed behaviour to situations outside the laboratory.

Furthermore, some things cannot be measured in a laboratory, especially for ethical reasons. The researcher cannot break up families, for example, to measure the effects of family separation. Nor would the laboratory always be the best setting for testing variables such as grief, hate or love. It may be difficult for participants to express these emotions naturally or very realistically in a laboratory setting.

LEARNING ACTIVITY 2.13

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Animation on experimental design (independent groups)

Summarising three experimental designs

1. Complete the following table.

Experimental design	Description	Advantages	Limitations
independent groups			
repeated measures			
matched participants			

2. For each of the following potential extraneous or confounding variables, rate each of the three experimental designs from 0 to 10 to indicate how well it controls the variable, as compared to the other designs. A score of 0 indicates no control and a score of 10 indicates perfect control. Explain your choice of ratings.
   (a) individual participant differences
   (b) order effects
   (c) experimenter effect
   (d) placebo effect
3. (a) Formulate a definition of experimental research.
   (b) Briefly describe two advantages and two limitations of experimental research in general.

LEARNING ACTIVITY 2.14

Identifying the experimental design

Name the type of experimental design is most likely to have been used in each of the following research studies.

1. To compare the effectiveness of different psychotherapies for treating spider phobia, participants with a spider phobia are allocated to one of two treatment conditions or a control condition.
2. To study the effects of an anxiety reduction medication, participants diagnosed with a phobia are tested before and after they are given the medication.
3. To compare the effects of inspirational message types A and B, participants listen to message A for one week then complete an assessment on their personal wellbeing. The next day they start listening to message B for two weeks after which they complete the wellbeing assessment.
4. To study whether meditation reduces stress, participants' blood pressure is measured before and after a period of meditation.
5. A study on whether males and females are persuaded differently by a female car salesperson.
6. For study 5, a requirement that for each male of a particular age there is a female of that age.

BOX 2.3 Correlational research — measuring co-relationships between variables

Sometimes, an experiment is impractical or inappropriate to use. For example, suppose a researcher wanted to find out how a severe psychological trauma in childhood affects school performance. It would be unethical to set up two similar groups of participants and expose one of these groups to some kind of traumatic event that would trigger a severe emotional reaction so that its effects on a measure of school performance could be observed. In such cases, researchers tend to rely on existing information. For instance, a researcher could conduct a correlational study to measure the 'co-relationship', or correlation, between the variables of interest.

Correlational research is used to study the type and strength of relationship between two or more variables. Unlike experimental research, there is no attempt to manipulate any variable. The researcher merely measures the relationship between the variables of interest. This is usually done by applying a statistical technique to data that have been collected on each variable.

For example, to study the relationship between air temperature and occurrence of violent crimes, the researcher could obtain existing data on both the daily air temperature (such as maximum and minimum temperatures) during a period and violent crimes committed over this period of time, then determine the number of violent crimes committed on very hot days and very cold days.

Figure 2.35 A researcher would access existing data to study whether there is a correlation between air temperature and violent crime.

(continued)

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The term *correlation* is used to identify and describe how variables are 'co-related'. The existence of a correlation does not establish whether one variable (such as air temperature) *causes* another (such as violent crimes). Rather, it indicates the direction of the relationship and the strength of the relationship.

Direction of correlation

For any two variables which are measured in a correlational study, there are three possible relationships between them: positive, negative and zero (no relationship).

A *positive correlation* means that two variables vary ('change') in the same direction — as one variable increases, the other variable tends to increase (and vice versa). For example, as a child's age increases, vocabulary tends to increase (and as vocabulary increases, age tends to increase, or the lower the age, the smaller the vocabulary).

A *negative correlation* means that two variables vary in opposite directions — as one variable increases, the other variable tends to decrease (and vice versa). A negative correlation is like a seesaw. For example, as self-esteem increases, sadness tends to decrease (and as sadness increases, self-esteem tends to decrease).

A *zero correlation* means that there is little or no relationship between two variables. For example, there is no relationship between intelligence and hair colour. These two variables can change entirely independently of each other.

A correlation is usually described by a number known as a *correlation coefficient*. This is expressed as a decimal number which can range from +1.00 to −1.00. The plus or minus sign describes the *direction* of the relationship between the two variables; that is, positive or negative.

A correlation coefficient with a *plus* sign indicates a positive correlation. This means that high scores for one variable tend to go with high scores on the other, middle scores with middle scores, and low scores with low. For example, consider the results of a correlational study on age and problem-solving ability. If a high positive correlation (say +0.75) is found between age and problem-solving ability, then older people tend to be good problem-solvers (e.g. they solved many problems in a 20-minute period) and younger people tend to be poor problem-solvers (e.g. they solved fewer problems in a 20-minute period).

A correlation coefficient preceded by a *minus* sign indicates a negative correlation. This means that when a score on one variable is high, the score on the other tends to be low, and middle scores tend to go with middle scores. For example, if a high negative correlation (say −0.75) is found between age and problem-solving ability, then older people would tend to be poor problem-solvers and younger people would tend to be good problem-solvers.

When reporting correlation coefficients for positive correlations, researchers usually omit the plus sign from the front of the score. However, the minus sign is always included for a negative correlation.

Strength of correlation

The decimal number of the correlation coefficient describes the *strength* of the relationship between the sets of scores for two variables; that is, whether the relationship is strong, moderate or weak. A correlation coefficient which is close to +1.00 indicates a very strong positive correlation between two variables. A correlation coefficient which is close to −1.00 indicates a very strong negative correlation between two variables.

Correlation coefficients of 1.00 and −1.00 indicate perfect correlations but these rarely occur in psychology. A correlation coefficient which is close to 0.00 indicates little or no relationship between two variables. For example, 0.13 and −0.13 would be considered a weak positive and weak negative correlation respectively.

Correlation and causation

Correlations show the existence and extent of relationships between variables but they do not necessarily indicate that one variable causes the other. For example, people get older as the world rotates on its axis. There is an extremely strong correlation between these two factors, but it would be incorrect to assume that the Earth's rotation *causes* people to age or that people's ageing *causes* the Earth to rotate.

There are also many instances when high correlations suggest a logical cause–effect relationship, and sometimes correlations really do represent causal relationships. The number of friends a person has may be closely related to how happy they are. But a very high correlation doesn't necessarily mean that there is a cause–effect relationship because both variables may be correlated with a third variable.

For example, there is a high positive correlation between the number of permanent teeth in children and their ability to answer increasingly difficult questions on intelligence tests. It cannot be assumed, however, that having more teeth causes increased cognitive ability. The correlation is high because a third variable — increasing age — accounts for both new teeth and cognitive development.

When two variables are strongly correlated, this is not accepted by psychologists as evidence of causation in the absence of other research evidence. In such cases, researchers may test the possible cause–effect relationship by conducting a controlled experiment.

Scatter plots

Correlational data are often displayed in a scatter plot (also called a *scattergram* or *scatter diagram*). A *scatter plot* is a graph of scores (or other values) on two different variables. The values of one variable are shown on the vertical axis (Y axis) and the values of the other variable on the horizontal axis (X axis). Each pair of scores is plotted as a single point (a dot) in the scatter plot.

The spread of the dots on a scatter plot gives an idea of the *strength* of the correlation — the extent to which the two variables are related. Widely spread dots in the scatter plot in Figure 2.36 on the next page suggest that the two variables, attractiveness and reaction time, are not related. This would be represented by a correlation close to 0 (zero). In a zero correlation, individuals with high scores on one variable may have high, middle or low scores on the other variable. Figure 2.36 shows that participants with high scores on attractiveness have high, medium and low reaction times.

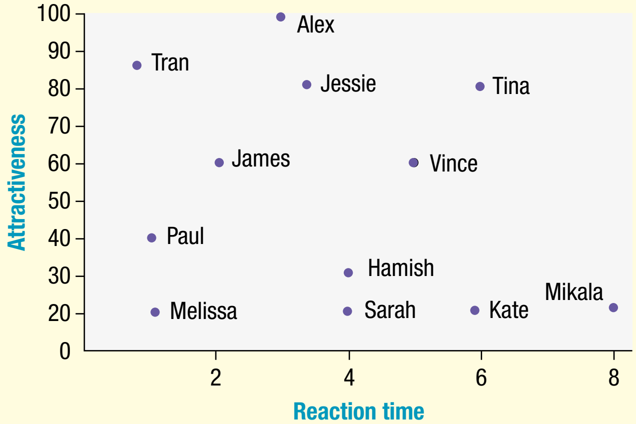

Figure 2.36 Scatter plot showing data for 12 participants obtained from a correlational study that investigated the relationship between physical attractiveness and reaction time

Figures 2.37 and 2.38 below both show a strong correlation as the dots cluster close together in a cigar-shaped pattern. Figure 2.37 shows a strong positive correlation and Figure 2.38 shows a strong negative correlation.

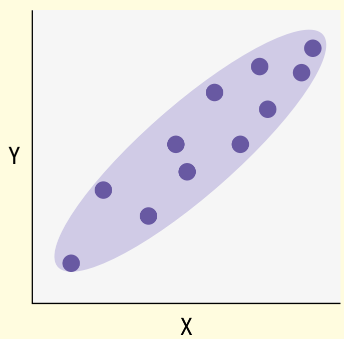

Figure 2.37 Strong positive correlation

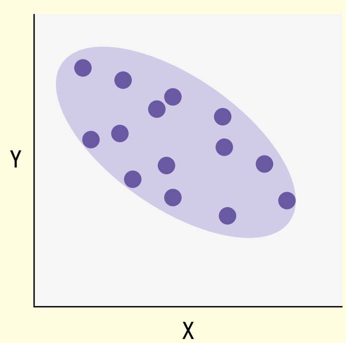

Figure 2.38 Strong negative correlation

The *direction* of the correlation — whether the correlation is positive or negative — is indicated by the slope or 'lean' of the dots, that is, whether they slope upwards or downwards (or neither). For example, in Figures 2.39 and 2.40, a line has been drawn through the middle of the dots to help identify the slope. In Figure 2.39, the upward sloping line indicates a positive correlation, whereas the downward sloping line in Figure 2.40 indicates a negative correlation. Note that in both Figures 2.30 and 2.40, the dots are closely clustered around each line, indicating a strong positive correlation in Figure 2.39 and a strong negative correlation in 2.40.

Figure 2.39 Strong positive correlation

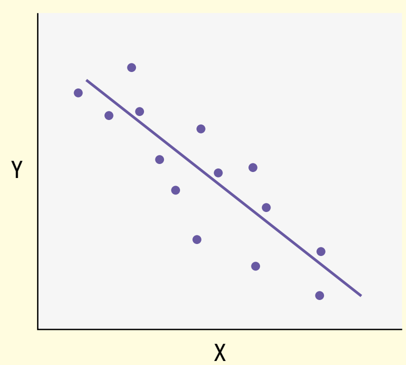

Figure 2.40 Strong negative correlation

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Video: The danger of mixing up causality and correlation 5 m 57 s

Cross-sectional studies

A **cross-sectional study** is used to observe and compare groups of participants on one or more variables of interest at a single point in time. It is commonly used in psychology to study age-related differences. For example, to study the use of rules in games played by children, groups of children representing each age group from three to seven years inclusive can be selected and observed at about the same time. Or, to study age differences in how much information can be held in short-term memory, groups of people selected at ten-year intervals from 10 to 80 year olds could be tested and the results compared.

A cross-sectional study may also be used to determine the prevalence of some variable of interest; for example, the number of cases of a particular issue or problem in the population at a given point in time. In addition, it may be used to study differences between groups in any one of a wide range of variables at a specific time. For example, samples may be selected on the basis of one or more mental abilities, personality types, family environments, mental health characteristics, sleep habits, cholesterol levels, dietary intake, drug use, physical health, social media use, cultural background and so on. In all such studies, the data will be collected at one point in time (or within a short time frame).

A cross-sectional study uses an independent groups design and is sometimes called a *quasi-experiment* because of its resemblance to an independent groups experiment. However, it is not a true experiment because participants cannot be randomly assigned to experimental and control groups. Instead, a cross-sectional study uses existing, naturally formed or occurring groups. For example, in a cross-sectional study investigating age-related differences, the researcher can select participants from different age groups of interest but cannot randomly assign people to be a particular age. In addition, the researcher observes and measures characteristics or events that already exist or occur naturally in a sample (or population), without manipulating any variables.

A cross-sectional study may be repeated periodically to study a trend. It may therefore also involve repeated measures but this does not mean it is the same as a repeated measure experiment.

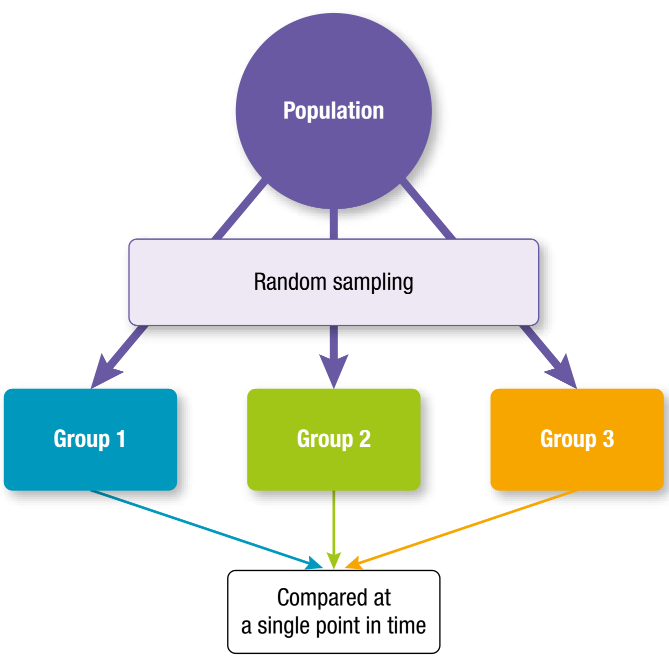

Figure 2.41 A cross-sectional study uses an independent groups design to enable comparison of one or more variables in existing groups at a single point in time.

Advantages and limitations of cross-sectional studies

A major advantage of a cross-sectional study is that multiple segments of the population can be compared on one or more variables relatively quickly. Compared to other research methods, it tends to be simpler to undertake, not too time-consuming and less expensive. For example, a researcher can study differences in one or more variables of interest in 5-, 10- and 15-year-olds at one time over a short period, instead of tracking them over 10 years to complete their investigation. In this way, a snapshot of age-related differences can be obtained without having to conduct follow-up studies and ultimately wait many years for the results.

Another advantage is that a cross-sectional study provides a means of conducting research on certain topics that are unethical and/or impractical to conduct through experimentation. For example, to study the effects of exposure to a major stressor on mental health, the researcher could access one or more groups who have been exposed to a war zone or natural disaster and assess their mental health. Unlike an experiment, in a cross-sectional study, participants are not deliberately exposed to any IV treatment, so there are seldom ethical issues.

Cross-sectional studies also provide a useful means of determining the prevalence of a variable of interest within a population (or sub groups) and for identifying relationships that can then be more rigorously studied using other research methods. A major limitation of cross-sectional studies is that a cause–effect relationship between variables cannot be tested or determined.

In addition, when age differences are studied, variables other than age can influence the results and therefore be confounding variables. Differences found between age groups may be due to factors other than age such as the particular backgrounds and life experiences of participants in each age group. For example, genetic make-up, number of siblings, family environment and schooling can cause differences in a cross-sectional study of language development in young children.

In particular, one participant variable that cannot be controlled in a cross-sectional study is called a *cohort effect*. This shows up when the researcher measures characteristics in groups of people ('cohorts') who were born many years apart and members of each group share life experiences associated with the period in which they grew up or a particular event or situation to which they were all exposed. For example, people who are currently in their nineties experienced childhood during the 1930s depression. They may behave differently from 20-, 40- or 60-year-olds not because of chronological age differences, but because of that particular life experience. They may, for example, be very thrifty and reluctant to spend money on luxury items or 'waste' food by throwing it out. Similarly, consider also the fact that you have grown up during a period marked by widespread access to the internet and use of new digital technologies and social media, which is a different experience from that of your parents and grandparents when they were growing up.

The larger the differences in age between different groups in a cross-sectional study, the greater the potential for a cohort effect — when age differences may be entangled with (and therefore confounded by) differences in participants' life experiences associated with being born at a particular time and growing up as a member of a particular generation.

Figure 2.42 The larger the difference in age between groups in a cross-sectional study investigating age-related differences, the greater the potential for a cohort effect that causes confounding.

BOX 2.4 Longitudinal studies — tracking change over time

A *longitudinal study* tracks the same group (or groups) of people over an extended period of time, observing changes that occur in behaviour and/or mental processes at several points in time. Some longitudinal studies are relatively brief, lasting for one to two years; others can last a lifetime.

Usually, the same group(s) of participants is studied and re-studied at regular intervals, thereby involving a non-experimental (i.e. quasi-experimental) repeated measures design. For example, *Growing up in Australia: the Longitudinal Study of Australian Children* is being conducted by the Australian Institute of Family Studies (2017) in conjunction with other organisations. The study commenced in 2004 and follows the development of 10 000 children and families from all parts of Australia. There are two groups with about 5000 in each — families with 4–5 year old children and families with infants aged 0–1 years.

The study is investigating the contribution of children's social, economic and cultural environments to their adjustment and wellbeing. Parents, child care providers, teachers and the children themselves provide information. Families are visited for a face-to-face interview every two years. Various aspects of the children's development are also measured, including their physical development, emotional wellbeing, and intellectual and social development.

The longitudinal method is particularly useful in the study of development within certain periods or across the entire lifespan. These studies provide information to help psychologists understand over time changes in thoughts, feelings and behaviour; for example, whether intelligence test scores (IQ) change with age or remain stable, whether temperament remains relatively unchanging after birth, whether memory declines with age, whether regular physical or mental exercise inhibits onset of a dementia such as Alzheimer's disease, risk factors that may be associated with parents not reading to their children at certain ages, how identical twins reared together or apart may differ on a variety of variables, and how symptoms of a mental health disorder may progress over time. Because longitudinal studies use the same group(s) of participants, they also allow researchers to study ways in which early development *may* influence later development.

The longitudinal method also has limitations. For example, it can be expensive and take a long time to get results. Keeping in touch with the same group over a long period of time can also be difficult — participants may lose interest in a study and withdraw, move to another location where they are unable to be contacted, or even die.

(continued)

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Growing Up in Australia: The Longitudinal Study of Australian Children

						Cross-sectional study
						Participant's age
						5 years 10 years 15 years 20 years
Longitudinal study	Participant's age	5 years	10 years	15 years	20 years	25 years
	Year of testing	2000	2005	2010	2015	2020

Figure 2.43 In a longitudinal study, the *same* participants are tested at different points in time over an extended period (e.g. 2000, 2005, 2010, 2015, 2020). In a cross-sectional study investigating age-related differences, *different* participants in different age groups are tested at a single point in time (e.g. 2020).

LEARNING ACTIVITY 2.15

Review questions

1. Explain what a cross-sectional study is, with reference to an example.
2. What is an advantage of the cross-sectional study (other than efficiency and expediency) when compared to other research methods?
3. (a) A cross-sectional study is sometimes referred to as a quasi-experiment. What is a quasi-experiment?
   (b) Explain why a cross-sectional study cannot be used to investigate a causal relationship between age and another variable of interest.
4. (a) Suggest a definition for a cohort.
   (b) Explain the meaning of cohort effect in relation to cross-sectional study.
   (c) Give an example of a potential cohort effect other than the one referred to in the text.

Case studies

Sometimes a researcher will collect detailed information on only a small number of people, perhaps an individual or a small group of two or three. When this is done, the researcher may be conducting a case study.

A **case study** is an intensive, in-depth investigation of some behaviour or event of interest in an individual, group, organisation or situation. For example, many of the early language researchers started out by keeping detailed diaries on the language development of only a few children. Psychologists have also learnt about behaviour in small friendship groups by conducting case studies in which they observe and record social interactions within the same group of people in different situations over a period of time. An assumption is that patterns of behaviour observed within the group may apply to other friendship groups made up of people of similar ages and backgrounds. Such case studies can also suggest hypotheses that could be tested using other research methods.

Case studies are often used when large numbers of participants are not available for study; for example, to study individuals with a rare or unusual disorder or ability. The case study may involve a combination of different data collection methods. For example, an individual may be interviewed at length. Information may also be collected through interviews of family members, friends and teachers or co-workers. The individual's medical records and school reports may also be considered. Other sources of information can include extensive psychological testing and observations of the person's behaviour. The research may also continue for an extended period of time so that processes and developments can be studied as they take place.

Much of what was first known about the role of the brain in behaviour and mental processes has come from case studies. When used in a clinical setting for therapeutic (or 'treatment') purposes, a case study is often referred to as a *case history* or a *clinical observation*.

In psychology, case studies are often confined to the study of a particular individual. For example, one early case study conducted by a neuropsychologist involved a rare disorder called prosopagnosia or 'face agnosia' (Bodamer, 1947). Prosopagnosia is an impaired ability to recognise faces. People with this disorder have difficulty in recognising the faces of family and friends or famous personalities.

The case study involved a young female who was also unable to recognise her own face. She was referred to as S.T. in the case study report to protect her identity. Whenever S.T. looked in the mirror, she saw a reflection of a stranger. However, S.T. knew that she was the strange looking person because she was the only person in front of the mirror. In one series of tests, S.T. was asked to speak in front of the mirror and make gestures such as a nod or a shrug. S.T. often recognised her own voice and occasionally recognised gestures, but her face was always completely new to her. S.T. also had difficulty recognising animal faces. For example, she described a dog's face as 'a human face with funny hair'.

Although unable to recognise faces, S.T. knew what a face was and could recognise and name everyday objects such as furnishings, articles of clothing, trees, cars and so on without difficulty. This suggested that the area of the brain involved in facial recognition was different from that involved in recognising objects. Furthermore, the different brain areas probably interacted with language and memory in different ways.

When neuroimaging devices such as PET and *f*MRI scans became available, neuropsychologists were able to conduct experiments with individuals suffering from face agnosia. Such experiments over the past 30 years confirmed the conclusions of early case studies. They have also enabled researchers to pinpoint brain areas and structures that interact in facial recognition, object recognition, memory and language.

Figure 2.44 Case studies are commonly used when large numbers of participants are not available. For example, eccentric behaviour has been studied using the case study method. Eccentric behaviour refers to a pattern of human behaviour that is viewed as very odd or unusual within the particular society or culture in which it occurs.

Researchers have found that despite their typically non-conforming behaviour, most eccentrics tend to be happy, well-adjusted people who are 'strange but sane' (Weeks & James, 1995).

Table 2.5 Examples of case studies

Person	The study of one single individual, generally using several different research methods
Group	The study of a single distinctive set of people, such as a family or small group of friends
Organisation	The study of a single organisation or company and the way that people act within it
Event	The study of a particular social or cultural event and the interpretations of that event by those participating in it
Location	The study of a particular place and the way that it is used or regarded by people

Advantages and limitations of case studies

Case studies provide a useful way of obtaining detailed information on behaviour and mental processes. In particular, they often permit investigation of otherwise impractical (or unethical) situations such as when a large number of people with an unusual condition cannot be accessed. There is usually no manipulation or control of variables as with experimental research (unless an experiment is used to collect some of the case study data). Consequently, case studies can avoid artificiality and provide a snapshot of the actual experience of one or more individuals (or groups) at a particular time in a particular situation. They can also provide insights into how others may think, feel or behave under similar circumstances.

Another advantage of case studies is that they can be a valuable source of hypotheses for further research. However, case studies cannot be used to actually test hypotheses unless combined with the results of other case studies of similar participants or another research method that is suitable for testing hypotheses. Case studies are also difficult to replicate to test the reliability of the results in the way that an experiment can be replicated.

A major limitation of case studies is their sample size. They are commonly based on the experiences of only one individual or a very limited number of individuals. The very small sample means that case studies can usually provide only weak support for drawing scientific conclusions. Furthermore, generalising or applying the results to others in a relevant population cannot be done with any certainty. Generalising is a bigger problem when the case study involves someone with a rare or unusual disorder or ability. The researcher can never be fully confident that the conclusions drawn from their study are representative of similar instances within the wider population or apply elsewhere.

Case studies also have the limitation of being susceptible to biased information from the participant or the researcher. This can influence the accuracy of the information that is obtained and conclusions that may be drawn. For example, case studies usually rely on the individuals under investigation to provide a great deal of the required information. Some participants may not remember clearly what they actually experienced, or they may intentionally change or omit information that they do not wish to reveal for personal reasons.

Similarly, case studies are usually conducted by one researcher and are vulnerable to experimenter effects. It is possible that the researcher sees or hears what they expect or hope to see or hear. Furthermore, the researcher is also responsible for deciding what to include in their descriptions and what to leave out. In writing a report on the case, the researcher may select information that supports key points or conclusions they wish to make, and omit other points that may be just as relevant and could have been included by another researcher interpreting the same information.

LEARNING ACTIVITY 2.16

Review questions

1. What is a case study?
2. Give three examples of research findings or theories that have been derived from case studies in psychology.
3. Give an example of a case study in psychology of interest to you that is not described in the text.
4. Suggest an example of an experiment that could be conducted as part of a case study. Explain your choice.
5. Describe two advantages and two limitations of case studies when used for research purposes.

Observational studies

In our everyday lives we observe the behaviour of other people and draw conclusions about them from their actions. For example, if we notice that someone is always quiet in class, prefers to sit by themself and blushes when asked a question, we might conclude that the person is shy, lacking in confidence or withdrawn.

Researchers in psychology, however, use observation in a more precise and planned way. For example, they precisely define the behaviour to be observed, and do not jump to conclusions about attitudes, personality characteristics, motives or other factors that may underlie the observed behaviour.

An **observational study** involves collection of data by carefully watching and recording behaviour as it occurs. Psychologists use observational studies to collect data in research when the behaviour under investigation is clearly visible and can be easily recorded.

Data collection may be:

- *structured:* a prepared system is used to guide and record observations; for example, a checklist of items to precisely guide what to look for and to record or exclude
- *unstructured:* observations are made without a predetermined format
- *semi-structured:* a part of the observational study involves use of a predetermined format.

Most observational studies conducted in psychology are structured and use systematic data collection techniques, such as the checklist with predetermined criteria shown in Figure 2.45.

A structured study typically involves operationalising the behaviour of interest and variables that are involved. For example, a researcher might elect to observe 'laughing' as an indicator of a participant's level of enjoyment during a presentation or social interaction of research interest. To do this, the precise facial and bodily responses to be measured must be specified to distinguish between 'laughing' and other similar behaviours, such as 'smiling' or 'chuckling'.

Sometimes an observational study might resemble an experiment. For example, to investigate roles and hierarchies ('pecking orders') in groups, a researcher might ask the members of a friendship group to discuss a controversial issue, then observe and record who starts the discussion, who changes the topic, who speaks, how often and for how long, and so on. This study could occur in a controlled laboratory setting, or in a field setting such as a place where the group normally meets and interacts; for example, the

Coder name Olive				
	Coding categories			
Episode	Proximity	Contact	Resistance	Avoidance
Mother and baby play alone	1	1	1	1
Mother puts baby down	4	1	1	1
Stranger enters room	1	2	3	1
Mother leaves room, stranger plays with baby	1	3	1	1
Mother re-enters, greets and may comfort baby, then leaves again	4	2	1	2
Stranger tries to play with baby	1	3	1	1
Mother re-enters and picks up baby	6	6	1	2

The coding categories are:

Proximity The baby moves toward, grasps or climbs on the adult.
Maintaining contact The baby resists being put down by the adult by crying or trying to climb back up.
Resistance The baby pushes, hits or squirms to be put down from the adult's arms.
Avoidance The baby turns away or moves away from the adult.

Figure 2.45 This checklist was used to observe and record the behaviour of 12-month-old infants in an observational study of attachment behaviour (as indicated by responses to strangers). The infants were observed playing in a room with two adults — the infant's mother and a stranger. The infants' behaviour in different situations ('episodes') was rated ('coded') on a 7-point scale according to fear categories. A rating of 1 meant 'The infant makes no effort to engage in the behaviour' and a rating of 7 meant 'The infant makes an extreme effort to engage in the behaviour' (Ainsworth et al., 1978).

school canteen or an area of the school grounds. The researcher might also observe roles and hierarchies in a group comprising strangers to make comparisons with the friendship group.

Although a particular observational study might use an independent groups design and all experiments actually involve observation of responses, an observational study is *not* a true experiment unless random allocation is used. Furthermore, an observational study can reveal a relationship between two variables (e.g. group type and roles adopted by group members), but only a true experiment can establish a cause–effect relationship.

Natural and contrived settings

Observations may be conducted within a participant's natural environment or in a contrived environment. In both settings, the researchers would wait for the behaviour of interest to occur voluntarily and to unfold as it usually does.

When observations are conducted within the participant's natural environment, the method is commonly called naturalistic observation. In **naturalistic observation**, the researcher views behaviour in the natural, 'real-life' environment where it would ordinarily occur. This is a situation where behaviour in its genuine form would be most likely to be observed. In addition, the researcher conducts their observations in an inconspicuous or 'unnoticeable' manner so that their presence does not influence the behaviour of interest.

For example, in a study on the development of social behaviour, a researcher might observe children at play in a preschool centre's outside area at lunchtime. They would do so from the 'sidelines' so that the children are not aware that they are being observed to help ensure their presence does not interfere with the naturally occurring, voluntary play behaviour. The researcher may observe that younger children tend to play alongside other children but not actually interact with them, whereas older children tend to interact more in their play with other children. On the basis of these observations, the researcher may assume that there are different types of play in which children may engage and that these types of play are age-related or age-dependent.

A *contrived* environment is one that the researcher creates for the specific purpose of conducting an observational study. It is an artificial ('non-naturalistic') environment for the behaviour of interest and is sometimes referred to as a *structured* or *laboratory* environment because of the degree of control the researcher has over it or where the observations are made.

For example, the researcher conducting the study on social behaviour may decide to observe children at play in a room set up for that purpose at a venue outside the preschool centre. Specific playthings may be made available and strategically located together with a table and chairs. Observations could then be made from behind a one-way mirror so that the children are not aware that they are being observed. The children's behaviour might also be video recorded so that researchers can also record observations to help ensure reliability of the data.

Figure 2.46 A researcher used naturalistic observation to compare the effectiveness of different strategies used by street beggars in tourist precincts.

Participant and non-participant observation

Sometimes, psychologists engage in *participant observation*. They actually participate in the activity being observed and may deliberately try to be mistaken by the participants as being part of the group or situation being observed.

In one study that used participant observation, the researchers had themselves admitted to several different psychiatric hospitals by imitating the symptoms of a serious mental health disorder. After they had been admitted, they kept records of their observations while in the hospital. Their record-keeping behaviour was regarded by the hospital staff as being a symptom of their disorder (Rosenhan, 1973). This study is described in more detail on pages 307–8.

When researchers try to conceal their presence while making observations, it is commonly called *non-participant observation*. When observations of behaviour are made in a field setting, that is, the usual or real world surroundings in which the behaviour occurs, psychologists will often conceal their presence by watching from the 'sidelines'. For example, a researcher might sit on a nearby bench pretending to be absorbed in a book in order to observe people's reactions to street beggars such as those shown in Figure 2.46 above. Or they may observe queuing behaviour by attending an airport and positioning themselves where they can blend in with the crowd, concealing as best as possible what they are doing so as not to influence the behaviour of interest. In other situations, psychologists might use a hidden video camera to record events.

Advantages and limitations of observational studies

Each type of observational study is useful under different circumstances and has advantages and limitations depending on the specific procedures used, particularly the degree of structure in the data collection technique and the observational setting.

The main advantage of observational studies, especially naturalistic observation, is that researchers can watch and record behaviour as it usually occurs, without the need for any manipulation or intervention. When people are observed in this way, they are not influenced by perceptions that can form in artificial, contrived environments and lead them to behave differently from how they normally do. Sometimes, merely being present in an artificial or unfamiliar environment can cause an unnatural change in behaviour. Thus, naturalistic observation often enables researchers to gain more accurate information about the typical behaviours of people (and animals), both immediately and over a longer period, than do other research methods. When compared to research methods that involve asking people about their behaviour, the researcher can observe what people actually do (or say), rather than what they say they do.

In addition, structured observations through use of checklists and specific criteria enhance the accuracy of data collection and therefore the results obtained. This is a more likely outcome when the observational setting is strictly controlled, as in a contrived laboratory-type situation.

Another advantage of naturalistic observational studies is that some types of human behaviour can only be studied as they naturally occur because it would be unethical or impractical to study them in a laboratory setting. For example, it would be unethical to severely deprive children in their early life in order to observe the effect of deprivation on behaviour in the future. Similarly, some behaviours cannot be realistically reproduced in a laboratory. A researcher cannot, for example, study crowd behaviour in a laboratory. Nor could a researcher expect to obtain valid information about how people usually behave when they are in love by bringing a pair of participants into a laboratory situation and asking them to 'be in love' so that observations can be made. However, since the observer does not directly influence the behaviour being observed in an unobtrusive observational study, it sometimes requires a lot of time and patience to wait for the behaviour of interest to occur. Consequently, some observational studies can be very time-consuming.

A practical advantage of naturalistic observation is that it does not require the co-operation of participants being observed. However, this raises the ethical issue of not obtaining informed consent, particularly if participant observation is required. When participant observation is used without informed consent, a person's expectation of privacy can be violated. This issue has to be weighed up against the fact that the participants are not informed that they will be observed in some special way so that their observed behaviour is more likely to be true to life.

Another limitation of an observational study is that it can be difficult to determine the *causes* of the behaviour of interest that is observed, because many factors may influence that behaviour. This is especially the case in a natural environment. For example, a researcher could not determine through observation alone *why* some children become aggressive towards others in the school yard. The true factors that control a particular behaviour could be ones of which the researcher is not immediately aware.

A potential limitation of any observation procedure is *observer bias*, which is a type of *experimenter bias*. It is possible, for example, that researchers sometimes unconsciously distort what they see so that it resembles what they hope to see, even when they are using structured formats. Researchers who collect the data must be trained to observe and record accurately in order to minimise the influence of their personal biases. Furthermore, when recording participant responses or making detailed notes as part of the observation process, the researcher may neglect to record certain behaviours that they either judge to be irrelevant or do not actually see. To overcome these limitations, researchers often use two or more observers for data collection and check for inter-rater ('inter-observer') reliability. This procedure usually results in a more complete and accurate set of data than one observer could obtain alone.

Figure 2.47 (a) An advantage of an observational study is that behaviour can be studied as it naturally occurs in a real-life setting without any intervention or the need for participant cooperation. For example, behaviour in a long queue could be observed and recorded from the sidelines. (b) A limitation is that participants may change their behaviour when they know they are being observed. For example, the driving behaviour of someone who sees a police car following them will probably be affected in some way.

BOX 2.5 Using observation to develop a theory of children's play

The earliest system for classifying and describing children's play was devised by American psychologist, Mildred Parten (1932) through an observational study.

Parten visited a preschool centre over a period of 6 months and observed 42 children aged between 2 and 4 years. Each child was observed during free play time for 1 minute each day, with 60 observations per child being made. Parten's observations focused on the ways in which the children interacted during play. She found that older children spent more time in social play, whereas younger children were more likely to play alone.

Parten's sequence in the development of social play

On the basis of her results, Parten identified a sequence in the development of social play. The sequence starts with *solitary play* and culminates in *cooperative play*. It shows that children's play becomes increasingly interactive as they become older. However, this does not mean that children are unable to shift from one kind of play to another. For example, there are times when a child quite capable of cooperative play will choose to play alone even if there are playmates around, simply because they want to.

(continued)

(continued from previous page)

Solitary play (1–2 years)

Figure 2.48

The child plays alone and independently even if other children are nearby. Toys used are different from those of other children. There is no reference to what other children are doing, nor is any attempt made to get close to or interact with other children. This kind of play is common among children younger than 2 years of age.

Parallel play (2–3 years)

Figure 2.49

The child plays alone and independently alongside other children but not with them. The toys used are like those of the other children nearby but the way in which they are used may be different.

The child makes no attempt to influence or interact with the other children.

This kind of play is at its peak among 2 to 3 year olds. Although there is no interaction with other children, parallel play is viewed by some psychologists as a basic form of true social play because the child appears to prefer to play close to other children.

Associative play (4–5 years)

Figure 2.50

The child plays with one or more other children in a similar or identical activity but in their own way. The child may speak with others and share playthings but there is no organisation of activity or division of labour. The child may sometimes attempt to control which children may or may not play in the group. Generally, the child's interest appears to be primarily in the association with others rather than the play itself. This kind of play usually starts to show up in 4 year olds.

Cooperative play (5+ years)

Figure 2.51

The child plays with one or more other children at the same game or activity in a group situation.

There is direct interaction through sharing of ideas and playthings. The group is organised with a division of labour involving children in different roles.

One group member (or two) has a leadership role and directs the activity of others. The combined efforts of the children involved help ensure the goals of the game or activity are attained. This kind of play usually starts to show up in 5 year olds.

LEARNING ACTIVITY 2.17

Review questions

1. (a) What is an observational study?
   (b) Give an example of an observational study with an independent groups design, but not an example from the text.
   (c) Explain why this study would not be considered to be a true experiment.
2. Distinguish between each of the following.
   (a) A naturalistic and a contrived observational study
   (b) Structured and unstructured observations
   (c) Participant and non-participant observations

Self-reports

A **self-report** is the participant's written or spoken responses to questions, statements or instructions presented by the researcher. For example, a self-report may be responses to questions about bullying, romantic relationships or thoughts when daydreaming, to statements in rating scales measuring the extent of agreement or disagreement on asylum seeker policy, or diary records on homework and exercise activity kept in response to a researcher's specific request. In most cases, one person's self-report is compared with those of others responding to the same questions, statements or instructions.

Assuming that the participants are honest, understand the questions, can accurately recall what they have been asked about and are able to give sufficiently detailed accounts of the thoughts, feelings or behaviour under investigation, self-reports can provide useful data on virtually any topic of research interest.

Questionnaires, interviews and rating scales are the most commonly used self-report tools. All use questions or statements requiring participant responses, but they are often distinguished in terms of how the questions or statements are asked and answered. For example, a questionnaire usually involves asking and answering questions in writing, whereas an interview usually involves asking and answering questions orally. However, this is not a fixed 'rule'. Sometimes, a researcher may prefer to orally ask the questions in their questionnaire.

Although questionnaires, interviews and rating scales can be used exclusively or in combination to collect self-reports, they are also commonly used to collect additional data as a part of research studies using other methods, such as experiments, case studies and observational studies.

Questionnaires

A **questionnaire** is a written set of questions designed to draw out self-report information from people on a topic of research interest. It has a structured format and the questions are usually answered by participants in writing, at their own pace and without supervision.

Questionnaires are most often used when responses are required from a large number of participants; for example, as part of a survey. They are an efficient way of collecting self-reports because a researcher can administer the questionnaire via surface mail, over the phone, the internet, or at the same time to a group who are located in the one place, such as in a school or workplace.

By guaranteeing anonymity to participants, written questionnaires can be a useful way of collecting self-report data that people are not willing to disclose publicly, such as ambitions, motivations, fantasies, sexual behaviour, gambling behaviour, addictive behaviour, socially unacceptable behaviour and illegal behaviour.

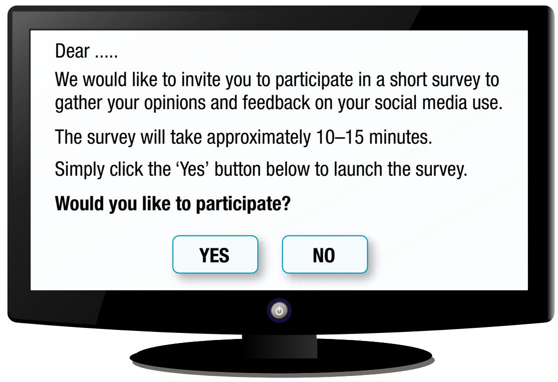

Figure 2.52 Surveys can be conducted electronically to administer a questionnaire to large numbers of people anywhere in the world.

Interviews

An **interview** usually involves questions that are asked by the researcher with the aim of obtaining self-report information on a topic of research interest. How questions are asked and the categories of responses are predetermined, but not necessarily fixed.

Interviews are most often conducted with individuals, in a face-to-face meeting or sometimes over the phone or even an App like Facetime or Skype. They usually require spoken answers to questions and are rarely used with large samples as data collection would require a considerable amount of time. Unlike questionnaires, which are usually structured, interviews may be structured, unstructured or semi-structured (National Health and Research Council [NHMRC], 2007).

In a *structured interview*, the participant is asked specific, pre-determined questions in a controlled manner. The most structured interview is when the interviewer simply reads fixed-response questions to participants and records their answers, for example, 'Have you ever been bullied at school or in the workforce?' with a predetermined answer such as 'Yes', 'No' or 'Not sure'. The interviewer follows a script and the questions are read in a neutral manner with no comments or cues. This is done to ensure that all participants are treated in the same way and thereby helping maintain standardised procedures. A less structured interview may use free-response questions (such as 'How do you feel when bullied?'), but the researcher will follow a script to ensure consistency across all participants.

In an *unstructured interview*, the researcher has an overall aim of what data should be collected but the questions asked can vary widely from participant to participant. The interview is driven by the participant. There is also freedom of discussion and interaction between the interviewer and participant. For example, the interviewer may ask additional questions to follow up on a participant's response (NHMRC, 2007).

A goal of unstructured interviews is to allow people to describe their thoughts, feelings and behaviour in their own way using their own words and to give more or less emphasis to relevant issues. This is different from structured interviews (and questionnaires) for which participants have to use the questioner's terms and concepts to describe how they think, feel or behave. However, this also means that the data collected through unstructured interviews is much more detailed, has far less structure, and is therefore more difficult to analyse, summarise and describe for reporting purposes.

In a *semi-structured* interview, the researcher uses an interview guide listing a set of issues to be explored. The researcher aims to cover all issues but there are no set questions to be asked. As with the unstructured interview, there is spontaneous generation of questions through interaction with the participant (NHMRC, 2007).

Figure 2.53 An interview is often a face-to-face discussion between a researcher and an individual for the purpose of obtaining detailed information.

BOX 2.6 Free-response and fixed-response questions

When using a questionnaire or interview to collect self-report data, the researcher may choose to use free-response and/or fixed-response questions.

Free-response (or *open-ended*) *questions* require participants to describe their thoughts, feelings or behaviour 'freely' in their own words. For example, the researcher might ask a question such as, 'How do you feel when you are confronted by a barking dog?' or 'Why do you draw graffiti on trains?' These kinds of open-ended questions enable participants to provide detailed responses without being restricted to giving answers that fit into pre-determined categories (such as those of fixed-response questions). Furthermore, in an unstructured or semi-structured interview, free-response questions enable the researcher to ask questions of clarification or follow-up questions as participants give information about the thoughts, feelings or behaviour under investigation.

With this, however, comes a limitation. Answers to free-response questions are often difficult to summarise or score. This makes it harder for researchers to statistically analyse, describe and interpret the data obtained.

To avoid or overcome this limitation, researchers often ask fixed-response questions. *Fixed-response* (or *closed-ended*) *questions* usually provide a respondent with a number of 'fixed' alternative answers from which they are required to choose.

Examples of such questions are 'Have health warnings on cigarette packets led you to cut back on smoking: Yes, No, Undecided?' and 'How much time do you usually spend on Facebook each night: 0–30 minutes, 30–45 minutes, 45 minutes–1 hour, 1–2 hours, more than 2 hours?'

Answers to fixed-response questions are usually easier to interpret than are answers to free-response questions. In addition, because fixed-response questions provide specific alternatives from which the participant chooses, the researcher can accurately and concisely summarise and describe the responses numerically. For example, a '0–30 minutes' response to the Facebook question can be assigned a score of 1, '30–45 minutes' a score of 2, and so on. Furthermore, the same scores can be reliably assigned to all other participants who give these responses and all responses can be efficiently analysed, described and interpreted using statistical procedures and tests.

Figure 2.54 Answers to fixed-response questions about health warnings on cigarette packets will probably be easier to interpret than answers to free-response questions.

Rating scales

A **rating scale** uses fixed-response questions or statements for which participants rank ('rate') each item by selecting from a number of choices. They may be used to get data on any behaviour or mental process about which a participant can provide information.

For example, participants may be asked to rate their level of happiness or sadness, how often they feel lonely, how much they like meeting new people, how easy it is to fall asleep, how tired they are when the alarm sounds in the morning, their level of stress when lining up to enter an exam, their confidence in an answer to an exam question, or their attitude to capital punishment. The questions or statements to which participants respond are usually related as they have been devised by the researcher for the topic or issue under investigation.

Responses are typically assigned numerical values which enables answers to be quantified (converted to numbers) for summary, analysis and interpretation. The rating scale is like a multiple choice test, but the answer options represent levels or degrees of a particular characteristic rather than a series of possibly correct answers. Furthermore, there is no correct answer for a Likert scale item, other than what the participant decides to give.

The best known and most commonly used rating scale is the *Likert scale*. This consists of about 20 questions or statements to which the participant responds using a five-point scale. It is most commonly used to measure attitudes. For example, in a study on attitudes to war, a Likert scale statement could be '*War is sometimes necessary to maintain freedom*'. Participants may then be required to rate their answers by selecting one response from five options ranging in strength, such as *strongly agree, agree, neither agree nor disagree, disagree* or *strongly disagree*.

Researchers have several choices in selecting how answers should be indicated on the five-point scale — for example, ticking or crossing a blank space, circling a number or underlining a response. Each of the responses has a numerical value (e.g. from 1 to 5) and the respondent's attitude is defined as the sum (total) of these values. A Likert scale for measuring attitudes towards illegal drugs could include statements such as those shown in Box 2.7.

When developing a Likert scale, half the attitude statements are worded in a positive way and half are worded negatively. For statements 1, 3 and 5, the answers would be scored as follows: SA = 1, A = 2, N = 3, D = 4 and SD = 5. For statements 2, 4 and 6, the answers would be scored in reverse: SA = 5, A = 4, N = 3, D = 2 and SD = 1.

When a respondent has completed the Likert scale, all of the responses are scored and a total is calculated. The result is a score on the attitude or whatever else was measured. Generally, the higher the score, the more favourable the attitude. Box 2.8 on page 68 describes how to construct a Likert scale.

BOX 2.7 Sample items in a Likert scale for measuring attitudes towards illegal drugs

Circle your response to each statement below.

Statement					
1. The use of illegal drugs is a major social problem in Australia today.	SA	A	N	D	SD
2. There should be no restrictions on using illegal drugs as long as the individual using them does not harm anyone else.	SA	A	N	D	SD
3. Laws should be strictly enforced regarding the use of illegal drugs.	SA	A	N	D	SD
4. It is an invasion of privacy when law enforcement authorities search people suspected of carrying illegal drugs.	SA	A	N	D	SD
5. Individuals using illegal drugs should be punished severely.	SA	A	N	D	SD
6. In the privacy of their own homes, individuals should be allowed to use any illegal drug they desire.	SA	A	N	D	SD

SA = Strongly agree A = Agree N = Neither agree nor disagree D = Disagree SD = Strongly disagree

BOX 2.8 How to construct a Likert scale

The following steps enable you to construct a Likert scale to collect quantitative data for your own research on an attitude. Although your scale is likely to be a useful measure of an attitude, it will not be valid or reliable. This means that you will have to be careful with the conclusions you draw from the results obtained.

Step 1
Identify an attitude towards an object, group, issue or event of interest or importance to you.

Step 2
Write a list of different aspects of the attitude topic. For example, the Likert scale on illegal drugs in Box 2.7 is based on aspects such as crime, punishment, civil liberties, privacy laws and impact on Australian society. If you have difficulties in generating a list, you may find it helpful to discuss your topic with others.

Step 3
Use your list to develop a group of attitude items (questions or statements) on the topic. Although Likert scales usually contain about 20 items, you should consider a scale based on about six or eight items. Generally, the list should consist of items which deal with different points of view on the topic. Consider the following guidelines for writing Likert scale items.

- Write items that are unlikely to be agreed with by everyone or no-one. About half of your items should be favourable towards the topic and the other half unfavourable. The more effective items will be those that tend to push respondents towards the strongly agree or strongly disagree ends of the scale. Try to avoid including items which are neutral and likely to cluster responses in the uncertain category (that is, 'neither agree nor disagree').
- Use simple, clear language that is suited to the experience, age, and cultural and educational background of the participants whose attitudes you are measuring.
- Write your items in such a way that they are unambiguous and only one interpretation is possible.
- Write each item so it contains only one complete idea.
- Avoid using words such as 'all', 'always', 'none' and 'never'.

Step 4
When you have written your items, trial ('test') them with people who will not be a part of your sample but who have personal characteristics in common with those likely to be in your sample. This will assist you to identify problems with your items which you may not have noticed.

- Form your items into a list, with columns for respondents to indicate whether, and to what extent, they agree or disagree with each item. Randomly distribute positive and negative items in the list to avoid a pattern of responses.
- Present the items in a questionnaire format. The questionnaire should have a short introduction that includes instructions for respondents. For example: 'Here is a list of statements about . . . Please read each statement quickly but carefully, then indicate whether you agree or disagree with each one by putting a circle around:
  SA = Strongly agree
  A = Agree
  N = Neither agree nor disagree
  D = Disagree
  SD = Strongly disagree.'

Step 5

- Make several copies of your questionnaire and test your questions again by asking two or three people with similar backgrounds to those in your sample to rate each response.
- Determine their scores for each response and then calculate their score for the entire scale. Score responses by allocating 1 for the most negative response, through to 5 for the most positive response for each item.
- Analyse the responses to determine which items you should include in the final scale. The best items are those that have a very high or very low relationship with the total score for all items. You may wish to rewrite or even replace items that seem to cluster responses in the neutral/unsure category.

Adapted from Grivas, J., & Lawrie, P. A. (1991). *Psychology: Experiments and activities*. Marrickville, NSW: Harcourt Brace Jovanovich. pp. 401–403.

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Weblink
Survey Monkey to create free online self-report tools

Advantages and limitations of self-reports

Self-reports such as questionnaires, interviews and rating scales are widely regarded as useful techniques for collecting any type of data on how people think, feel and behave. In particular, they can be an efficient means of collecting data from a large number of people in a relatively short period of time.

By guaranteeing anonymity, questionnaires in particular provide a means of collecting self-report data on 'sensitive' or controversial topics that many people are not willing to disclose publicly, such as in an unstructured oral interview. However, like other self-reports, they rely on the assumptions that people are actually willing to answer all questions and that they will give accurate answers. We cannot always reliably recall or communicate information about how we think, feel or behave.

Another limitation of self-reports is *social desirability*. People may intentionally give false or misleading answers to create a favourable impression of themselves. For example, with socially sensitive issues such as attitudes to 'boat people', Aboriginal land rights, same-sex marriage and animal research, people sometimes give socially desirable responses instead of reporting their true attitudes. They want to appear likeable, to have a 'social conscience', or to look good, so they present attitudes which encourage others to see them in a positive way.

Alternatively, the participants may be embarrassed to report their true attitudes or feelings, especially for very personal topics. Furthermore, in self-reports based on interviews, the interview situation may be a source of experimenter effect whereby the interviewer's personal biases and prejudices influence how questions are asked and how the respondent answers them.

Even when researchers make careful use of random sampling, they need to consider the possibility of a type of sampling bias known as *non-response bias*. For example, if only a small percentage of randomly sampled people agree to respond to a questionnaire, it is quite likely that those who did respond will be different than those who refused or did not bother to participate.

Self-reports are language dependent so there are limitations when used with young children, adults with English speaking backgrounds but with weak literacy skills, people from non-English speaking backgrounds who have yet to learn English well (unless translated) and people with a severe intellectual disability. Generally, they are best used with people who have well-developed language skills, although interpreters and skilful interviewing can help overcome communication barriers.

When comparing the advantages and limitations of different self-reports, it is important to take account of the type of data that will be collected and the type of question used. Generally, questions that allow free, open-ended descriptive responses (a type of qualitative data) give answers that are richer in detail. However, these responses are often difficult to summarise and statistically analyse. Questions with scoreable fixed responses (a type of quantitative data) enable more precise and efficient statistical summaries and analyses.

Figure 2.55 Self-report methods of data collection provide useful information about human thoughts, feelings and behaviour. However, they rely on participants having well-developed language skills and being able to accurately recall and state the information required of them.

LEARNING ACTIVITY 2.18

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Word copy of table

Summarising three self-reports

Complete the following table.

Self-report	Description	Advantages	Limitations
questionnaires			
interviews • structured • unstructured • semi-structured			
rating scales			

LEARNING ACTIVITY 2.19

Selecting an appropriate research method

For each of the following topics, decide which research method(s) — experiment, cross-sectional study, case study, observational study or questionnaire/interview — would be the most appropriate for undertaking the investigation and briefly explain why.

1. Investigating why someone with great potential gave up their career for a job they don't really like so that they can spend more time with their family
2. Investigating differences in use of game apps by 2-, 3- and 4-year-olds
3. Investigating how young adolescents behave on their first date
4. Investigating whether people will obey a person in authority who ordered them to hurt another person
5. Investigating whether boys and girls in preschool have different preferences for book reading
6. Investigating differences in the diets of adolescents who jog regularly and those who do not jog at all

TYPES OF DATA

All psychological research involves collection of information. In research, the information which is collected is called **data**. The data is empirical evidence that will form the results of the study and be the basis of the conclusions that will be made.

Data can take different forms. The type of data collected is determined by the specific kind of research method used. For example, questionnaires and interviews often provide data in the form of words, whereas data collected in experiments is usually in the form of numbers.

There are many ways of classifying data. We consider the distinctions between primary and secondary data and qualitative and quantitative data in relation to psychological research.

Primary and secondary data

Primary data is data collected directly by the researcher (or through others) for their own purpose, usually to test a hypothesis. It is collected from the source and is sometimes described as 'first hand' data. For example, you will collect primary data when you conduct an experiment to test a research hypothesis for a practical activity. You will also be collecting primary data if you interview people as part of a survey. The primary data will be the participants' responses. Their original responses may also be called *raw data* because they have not been processed. Raw data is a type of primary data.

When you summarise your data as a table or convert it to percentages, it will still be primary data because you are the researcher who collected and processed it. You have also retained control over it.

When someone else accesses your primary data, you lose control over it because they can manipulate or use it in whatever way they want for their own purpose. It will be secondary data for the other person.

Secondary data is data that has been collected by someone other than the original user for their own purpose. It has been collected by some other individual, group or organisation and will not be used for the first time, which is why it is referred to as 'secondary' (like second-hand). For example, when you access data in a journal, book or at a website for your self-directed research investigation in Unit 1, then you will be using secondary data. The Australian Bureau of Statistics is a widely used source of secondary data, as are the results reported by researchers in journal articles.

The main difference between primary and secondary data is in who collects the original data. Both types of data have their advantages and limitations.

Primary data offers tailored information sought by the researcher to test a hypothesis on a topic of their choosing. To the researcher, there is little doubt about the quality of the data collected. They are also responsible for the quality of their data, but it can be time-consuming to collect and process.

Secondary data tends to be readily available and can usually be accessed in less time, especially if you know where and how to look. There can be uncertainty about its quality because it was collected for another purpose and there is often a need to comb through it to find what you're looking for.

Qualitative and quantitative data

Primary and secondary data may be qualitative or quantitative. The majority of studies referred to in this text use quantitative data. This reflects the preference for quantitative data in most psychological research.

Qualitative data is information about the 'qualities' or characteristics of what is being studied. It may be in the form of descriptions, words, meanings, pictures and so on. It can describe any aspect of a person's mental experience or behaviour; more specifically, what something is like, how something is experienced or whether it was X or Y type of experience.

Qualitative data may be collected as written or verbal statements made by participants, or as descriptions of behaviour observed and recorded by the researcher. For example, a researcher studying self-esteem in young children may collect qualitative data through an interview by asking children open-ended questions related to their self-esteem. Likewise, a researcher interested in learning about the factors that enable some people to cope better than others with personal trauma may collect qualitative data through a questionnaire involving participants' responses about how they felt in a specific traumatic situation and how they dealt with their feelings.

Figure 2.56 Qualitative data may be collected through research on the life experiences of refugees and asylum seekers in a detention centre.

Quantitative data is numerical information on the 'quantity' or amount of what is being studied; that is, how much or how many of something there is. It may be raw data that have not been analysed in any way, such as lengths or weights of prematurely born infants, or percentages of participants who respond with 'Yes' or 'No' to survey questions, or the mean reaction time of participants when a light is flashed onto a screen in an experiment, and so on.

All types of mental experiences and behaviours can be described in quantitative terms, as quantities or numbers. For example, in a survey, a question might ask participants to use a five-point scale to rate their feelings on issues such as compulsory school uniform or the persuasiveness of a particular advertisement.

Information about individuals' scores on a range of psychological tests such as intelligence tests, personality tests and various ability and interest tests are also provided as quantitative data. In addition, data collected during experiments are typically collected in a numerical form and are therefore usually quantitative.

The use of numerical data makes it easier to summarise and interpret information collected through research. This is why quantitative data is often preferred to qualitative data, although this does not mean that qualitative data is less important or less useful than quantitative data.

Experiments can produce qualitative data as well as numbers. For example, consider the Stanford Prison Experiment conducted by Zimbardo (1972) which you will study in Unit 2. Zimbardo observed, described and reported common and unusual behaviour and verbal responses of 'prisoners' and 'guards' in a prison set up at a university, often referring to specific examples (qualitative data). However, Zimbardo also measured the extent to which the 'prisoners' were prepared to obey the demands of the 'guards' and reported his observations in the form of graphs and tables (quantitative data).

Although qualitative data is typically expressed in the form of words, it can be converted into a quantitative form. For example, participants' responses to open-ended interview questions about their thoughts and feelings when they are anxious could be summarised as numbers based on the frequency ('how often') or intensity ('how strong') with which certain feelings are reported.

Figure 2.57 In this experiment involving animal learning, an electronic recording device is used to collect quantitative data on the frequency of responses made by the rat when a specific brain area is activated.

BOX 2.9 Objective and subjective data

The terms 'objective' and 'subjective' are also used in relation to data — primarily, to refer to the way in which data are collected and the way they are described and explained.

Objective data is information that is observable, measurable, verifiable and free from the personal bias of the researcher. For example, the data can be seen, heard or touched (observable), counted or precisely described (measurable), can be confirmed by another researcher (verifiable) and is factual (free from personal bias). All scientifically conducted investigations target collection of objective data.

Data collected through a strictly controlled experiment in which observations and measurements are planned, precise and systematic is considered objective. So is data collected using an assessment device that yields a score, such as an intelligence or personality test.

Automated and mechanical devices can also be used to collect objective data. For example, an instrument that shows underlying physiological activity in measurable form, such as an EEG which records brain wave activity, provides objective data.

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Sometimes researchers collect information about behaviour or mental processes that cannot be directly observed; for example, sexual behaviour or criminal acts. In these cases, researchers tend to rely on self-reports — participant responses to questions asked by the researcher. This information will be subjective.

Subjective data is information that is based on personal opinion, interpretation, point of view or judgment. Unlike objective data, this data is determined by the research participants and often cannot be verified by the researcher. It is often biased, can vary from person to person, day to day from the same person, and is not always entirely accurate.

When using subjective data, researchers assume that participants are honest, can accurately recall what they are asked to describe and are able to give detailed accounts about their thoughts, feelings or behaviour.

Although subjective data may be more detailed than that available from more scientifically rigorous methods under controlled conditions, it tends to be difficult to interpret accurately when compared with objective data (which is usually quantitative).

BOX 2.10 Scales of measurement

The process of assigning numbers to objects and events that have been studied in research is called *measurement*. Essentially, measurement is no different from the process of assigning words to objects and events when using language. Furthermore, in the same way that language has rules which are followed in its correct use, so too does measurement have certain rules. For example, a measurement rule may use the symbol + (plus) for combining numbers. This means adding one thing to another when the symbol for the addition rule is correctly applied.

Researchers use different scales, or 'types' of measurement, when collecting data. In turn, the type of scale used determines the way in which the data can be described and interpreted. For example, a researcher investigating which leadership style is most effective might record how often (the number of times) employees follow instructions given by three different managers, each of whom uses a different leadership style. Alternatively, observers might watch the behaviour of employees in various work situations and rate each interaction between employees and their managers on a scale from extremely negative (a score of one) to extremely positive (a score of 10). In both cases, the researchers are using rules to assign numbers to people's behaviour so that the data can be described and interpreted. However, the rules for assigning the numbers in each example differ. Which rule and therefore measurement scale is used will depend on what the researcher wants to find out and how they collect their data.

Four different scales of measurement used with data obtained from psychological research are called nominal, ordinal, interval and ratio scales.

Nominal scale: Numbers are attached to categories as labels ('names') to identify and differentiate between the data categories (and scores do not actually indicate amounts), e.g. data about eye colour could be organised into the categories of (1) blue eyes, (2) green eyes and (3) brown eyes. This is not unlike the way a footballer is identified by the number on their jumper. But the numbers indicate only that one footballer is qualitatively different from another. In research, if an experiment compares males and females, then this IV involves a nominal scale.

Ordinal scale: Ranks ('orders') categories of data according to some 'more or less' dimension, e.g. from highest to lowest, best to worst, or always to never. Thus, the numbers of an ordinal scale show a relationship between numbered items and represent more than simply a category. The AFL ladder uses an ordinal measurement scale to indicate current performance of teams relative to one another. But the same amount does not separate categories in an ordinal scale, e.g. 1st on the AFL ladder may be 4 points ahead of 2nd and 2nd may be 12 points ahead of 3rd. In research, if an experiment compares level of obedience to officers with different ranks, then this IV involves an interval scale.

Interval scale: Each number indicates an actual quantity and an equal amount separates all adjacent scores (i.e. equal intervals). Temperature in degrees Celsius is an example of an interval scale. The scale includes zero but it is not a true zero — it does not mean none of the variable is present, e.g. 0 °C does not mean 'no temperature' or complete absence of heat. In research, if the experimental conditions were based on whether participants were in a positive, negative or neutral mood, then this IV reflects an interval scale.

Ratio scale: Each number is an actual quantity, an equal amount separates adjacent numbers, and 0 truly means 'absolutely nothing there' (or none of the variable is present). Comparisons can be made between two numbers (or 'bits of data'), e.g. it can be said that 100 kg is twice as heavy as 50 kg. In research, if the experimental conditions compare effects of 5, 10 and 15 mg of a new anxiety drug, then this IV involves a ratio scale.

In addition, any measurement scale may be either continuous or discrete.

A **continuous scale** allows for fractional amounts; it 'continues' between the whole number amounts and so decimals make sense. The variable of age is continuous because it can be represented as specifically as 16.74 year-old.

By contrast, some variables involve a **discrete scale**, which can be measured only in whole number amounts. For example, being male or female, or being in Year 10 or Year 11 are discrete variables, because you can be in one group or you can be in another group, but you can't be in between.

Usually, researchers assume that nominal and ordinal variables are discrete, and that interval or ratio variables are continuous.

LEARNING ACTIVITY 2.20

Review questions

1. (a) Distinguish between primary and secondary data with reference to an example of each data type.
   (b) Define the terms qualitative data and quantitative data with reference to examples that are not used in the text.
2. (a) Indicate whether the data collected in each of the following research studies is primary or secondary data. Explain your answers.
      (i) Audio recordings of a student's description of the effect of background noise on their ability to learn previously unseen material
      (ii) A student's ratings on a seven-point rating scale used to assess how much background noise affected their ability to learn previously unseen material
      (iii) A newspaper article reporting psychological research
      (iv) A documentary on a controversial psychological experiment that is narrated by the experimenter
      (v) Records of whether people who wear glasses can read more quickly than people who do not wear glasses
   (b) Indicate whether each of the following research designs will obtain qualitative or quantitative data, or both.
      (i) Conducting an experiment to investigate whether having regular rest breaks during a prolonged study session improves performance on a test
      (ii) Observing the social interactions of students in a study group using pre-determined items on an observation checklist
      (iii) Organising a small number of participants into a discussion group to collect self-reports on the experience of sexual discrimination in the workplace
      (iv) Using a written questionnaire with fixed-response items (e.g. Yes/No) to survey a large number of bushfire victims who may be experiencing post-traumatic stress disorder
      (v) Observing the effects of using a treat as a reward to teach a dog to sit on command
      (vi) Drawings made by patients with a brain injury

LEARNING ACTIVITY 2.21

Media analysis/response — psychological research reporting in the mass media

Option A

Select a contemporary newspaper, magazine or internet article that reports psychological research and has been published in the last calendar year (but is not a formal research report published in a journal).

Make a copy of the article (or the relevant excerpt/s) so that it can be presented on an A3 sheet of paper or within PowerPoint or similar. If required, reduce the size of the article but ensure it is still legible.

Using point form and lines, arrows or shapes to or around relevant information, complete the following tasks on the article.

1. Identify the research method used to collect data.
2. Suggest a possible research hypothesis if not stated.
3. Identify the data type(s) collected, e.g. qualitative, quantitative.
4. Identify the sample and sample selection procedure (if stated).
5. (a) Outline the main finding(s) of the study reported in the article.
   (b) Comment on information that should have been included in the report to enable the reader to judge the accuracy of the reported findings.
6. Suggest a potential limitation of the research, taking account of possible sources of bias and potential extraneous and confounding variables.
7. Comment on your choice of article for the purpose of this Learning Activity, e.g. why it captured your attention, aspects to which you wanted to draw the attention of others.

Option B

Select a contemporary electronic media item that reports psychological research, such as a TV program, movie, YouTube clip, Ted talk or podcast.

Make a copy of the item (or relevant extracts), its URL or another link that would give teacher access. Write a one paragraph outline of the item, then answer the questions above. Use screen shots, clips or other excerpts or links to exemplify answers or key points.

ORGANISING, PRESENTING AND INTERPRETING DATA

When data have been collected to test a hypothesis, the researcher must decide whether the results support or do not support the hypothesis. The researcher must also draw a conclusion(s) relating to the hypothesis. This conclusion(s) must be based on the results obtained and limitations of the conclusions should be identified, described and explained. Reasons must be suggested about why the particular results were obtained and what they mean, including whether they can be applied to other groups or situations. In addition, suggestions for further research and evidence are often made.

To support all of these requirements, researchers use *statistics* to analyse ('break down') and describe the data they collect. They also use statistics to help organise, present and interpret ('make sense of') the data obtained from their research.

Two main kinds of statistics are used in psychology — descriptive statistics and inferential statistics. **Descriptive statistics** are used for analysing, organising, summarising and presenting data obtained for a specific sample. They include calculations such as percentages and mean scores, and preparation of tables and graphs which help 'describe' the data. **Inferential statistics** are used for interpreting and giving meaning to the data. Like descriptive statistics, inferential statistics involve the use of mathematical procedures. However, unlike descriptive statistics, inferential statistics involve judgments, especially conclusions requiring the hypothesis and whether the data for the sample can be applied to the population from which it was drawn.

Descriptive statistics

Suppose that a researcher is interested in studying whether body image (a person's 'view' of their body) changes during puberty and adolescence. The researcher might give a body image rating scale to ten 10-year-olds, ten 12-year-olds, ten 14-year-olds, ten 16-year-olds, ten 18-year-olds, ten 20-year-olds and ten 22-year-olds. Each research participant would be required to make a judgment about their physical appearance using a rating scale ranging from 1 to 10, with 1 being equivalent to very unattractive, 5 to neither attractive nor unattractive and 10 to very attractive. In all, there would be 70 bits of data (i.e. ratings) about the body image of participants in different age groups. How can the researcher make sense of all these different bits of information so that meaningful conclusions about body image and age can be drawn?

The first step would be to use descriptive statistics to analyse, organise and summarise the data so that it can be described and interpreted. It is difficult to draw conclusions about whether (and if so, how) body image changes with age by looking at 70 individual ratings. Thus, in order to compare the body image ratings of the seven different age groups to determine whether there is a change with age, the data for each group could be summarised and presented in a table.

Tables are an effective means of recording data, but they may not be the best way to show trends, patterns or relationships. Often, a graphical representation of the data is best for this purpose.

In this section we consider the descriptive statistics specified for study in VCE Psychology. Note that this textbook uses its publisher's conventions for tables (and graphs), not the conventions used in psychology for formal research reports.

Tables

A table is an orderly arrangement and display of data in columns and rows. The columns and rows are usually identified by names (or 'headers') that assist in making comparisons. Some conventions (standards) for tables used in psychology are:

- All tables should be consecutively numbered, e.g. Table 1, Table 2.
- Each table should have an individual title that is italicised (except the word 'Table' and its number) and has each word in the title capitalised (except words such as 'for', 'of', 'in', 'and', 'with').
- The title should be a clear statement which explains what the table is about without being too long; for example, *Mean Body Image Ratings of Each Age Group*.
- The table number and title should be on separate lines with the table number above the title.
  For example:
  Table 1
  Mean Body Image Ratings of Each Age Group
- Each column should be identified using a descriptive header.
- The first letter of each header in the table should be capitalised.
- The reader should be able to quickly work out what the table is about and comparisons of data should be easy to make.
- In the research report, essay or other document, the word table is capitalised whenever referring to it, e.g. '. . . as shown in Table 1'.

Table 2.6 provides some order to the data on body image ratings by organising the ratings into different age groups.

However, comparison of ratings across the age groups is still difficult because the data have been inadequately summarised. To enable the ratings of different age groups to be compared, a single number that summarises all the data for each age group would be calculated.

Table 2.6 Raw data — participant ratings

Age group (years)	Participant ratings									
10	5	2	8	7	5	6	10	3	6	7
12	7	3	6	7	5	4	2	8	4	1
14	9	7	5	5	3	1	1	4	2	9
16	6	7	4	3	8	2	1	9	4	2
18	4	1	7	2	3	8	6	1	9	4
20	6	8	7	8	2	9	7	8	7	7
22	8	7	4	7	7	7	8	6	8	8

For this investigation, the researcher could calculate the mean rating for each age group. The mean scores could be used to describe the 'average' body image rating for each age group and would enable the researcher to compare the different age groups. This is shown in Table 2.7. The mean is another type of descriptive statistic.

Table 2.7 Mean body image ratings of each age group

Age group (years)	Mean scores
10	5.9
12	4.7
14	4.6
16	4.6
18	4.5
20	6.9
22	7.0

Graphs

A graph is a pictorial representation of data. Graphing or plotting data typically involves the use of two lines (axes) drawn at right angles to one another. The horizontal line is the *X axis* and the vertical line is the *Y axis*. The point where the axes intersect is called the *origin* (0). When drawing a graph for experimental research data, the IV is represented on the horizontal (x) axis and the DV is represented on the vertical (y) axis.

Graphs are best used to determine and communicate trends, patterns or relationships in the data collected; for example, how often a response is made, how aspects of behaviour change over time or as a research participant's experience changes and how one variable may be related to or change in relation to another.

Various types of graphs display data in different ways. The kind of graph used depends mainly on the nature of the research that was conducted (e.g. experimental or self-report) and the type of variables investigated (e.g. categorical or continuous).

Among the more commonly used graphs in psychology are bar charts and line graphs. In psychology, graphs are more formally referred to as 'figures' (along with drawings, photos and any type of illustration).

As with tables, there are conventions for presenting graphs. These include:

- All graphs should be consecutively numbered, e.g. Figure 1, Figure 2.
- Each graph should have an individual title. The title is not italicised, but the word Figure and its number are, e.g. *Figure 1*. Reaction time of each age group. The title should be a clear statement that explains what the graph is about without being too long.
- The number and title are both on the same line and shown below the graph.
- Both the horizontal and vertical axes must be labelled clearly and indicate what is plotted.
- The reader should be able to quickly work out what the graph is about.

Bar charts

One type of graph is the bar chart. A bar chart is a graph which uses a series of discrete (separate) bars or rectangles adjacent (next) to, but not touching one another, to enable comparisons of different categories of data. The bars can be positioned horizontally or vertically. One axis is used to show the types of categories (e.g. age, sex, type of response) and the other axis is used to show the frequency with which each category occurs (e.g. how often, how much).

One important feature of a bar chart is that each of the categories shown in the graph is separate and there is no continuation between one category and the next; for example, there would be separate bars for data about female participants' responses and male participants' responses. Each bar is the same width and has a small space between it and the next bar.

Figure 2.58 shows an example of a bar chart. Researchers who studied the type of play in which four- to five-year-old children engaged recorded the type and amount of time children spent participating in each type of play at a kindergarten over a one-week period.

The type of play in which children engaged was categorised according to American psychologist Mildred Parten's (1932) system for classifying play behaviour. As described in Box 2.5 on pages 63–4, Parten identified four main types of play: solitary play, when the child plays alone and independently; parallel play, when the child plays alone and independently alongside, but not with, other children; associative play, when the child plays with other children in a similar activity, but in their own way; and cooperative play, when the child plays with other children at the same activity.

The researchers were testing the relevance of Parten's theory among children today. They added a further category called unoccupied play which was observed when the child did not engage in any play at all for a period of time.

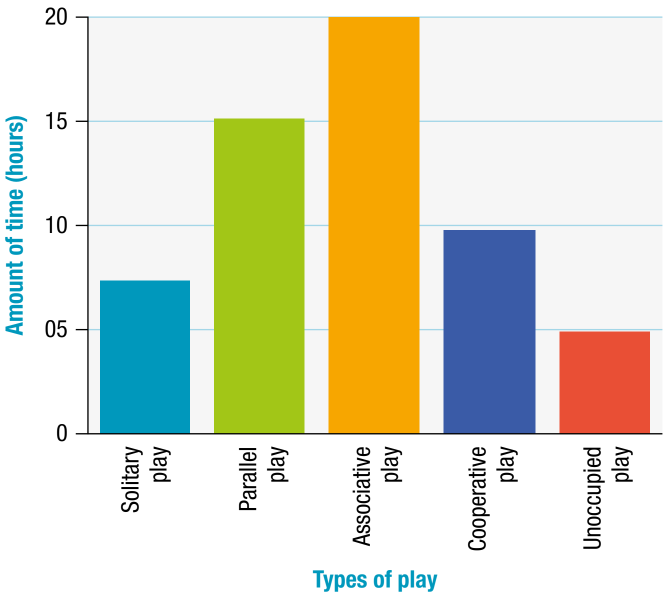

Figure 2.58 Example of a bar chart displaying categorical data for play types

Sometimes a bar chart is used to present values or scores for two different categories within each bar. For example, Figure 2.59 shows mean scores on a test of recall (memory) obtained by males and females of different ages.

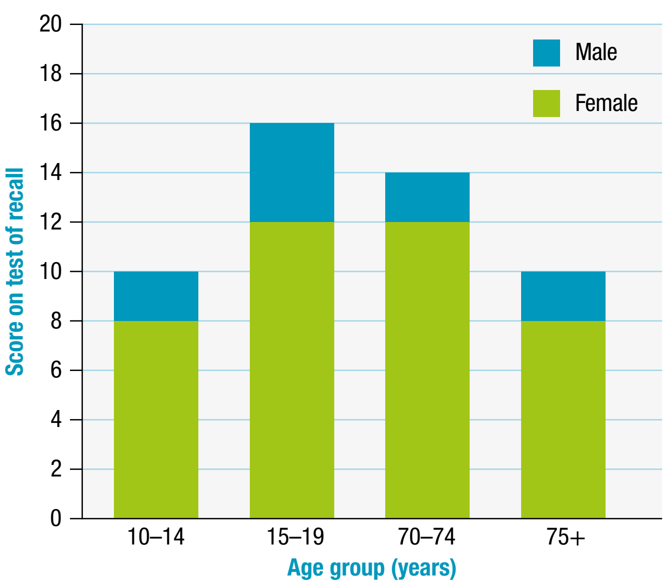

Figure 2.59 Mean scores on a test of recall obtained by males and females of different ages

LEARNING ACTIVITY 2.22

Representing data using a bar chart

A researcher obtained data from a group of university students on the relaxation technique they each they found to be most effective for minimising anxiety experienced prior to exams. The raw data are shown in Table 2.8 below. Present these data:

(a) in another table that summarises the raw data according to the relevant categorical variables

(b) in a bar chart.

Table 2.8 Type of relaxation technique used

Participant	Relaxation technique
1	meditation
2	drinking coffee
3	drinking coffee
4	listening to music
5	exercise
6	meditation
7	sleeping
8	listening to music
9	exercise
10	listening to music
11	exercise
12	sleeping
13	meditation
14	drinking coffee
15	exercise
16	exercise
17	meditation
18	sleeping
19	sleeping
20	listening to music

Line graphs

A **line graph** uses points connected by lines to show how one variable changes (e.g. reaction time) as another variable changes (e.g. a person's age, group size and time taken to complete a task) as shown in Figure 2.60 opposite.

When used to show the results of an experiment, the horizontal, or X axis, usually has the IV plotted on it, with the numerical value of the data increasing from left to right along the axis. A line graph that describes the relationship between group size and time taken to complete a task would list the group size in terms of the number of members of the group on the X axis, in intervals; for example, beginning at two, then three, four people and so on. One important feature of a line graph is that the variable plotted on the X axis is a continuous variable; so there is a series of progressively increasing values that can be listed.

The vertical, or Y, axis usually has the dependent variable (the measure of performance) plotted along it. A line graph that described the data from the experiment on group size and time taken to complete a task would record the amount of time taken along the Y axis, in intervals; for example, beginning at zero (which is a convention or 'rule' for graphs), then one, two, three, four and five minutes where five minutes is slightly higher than the maximum time ever taken by any group to complete the task.

Various points on a line graph represent the score on one axis that corresponds with a value on the other axis. The intersecting point can represent a corresponding IV/DV score on the two variables by one research participant, or the mean score of a group of participants.

A number of different sets of data can also be plotted on the one graph. For example, in Figure 2.61 there are three sets of data showing age-related performance in a problem-solving task following different amounts of sleep deprivation. To identify the results of different age groups, a different kind of line has been used for each set of data. Note too the use of colour and shapes to identify the points of intersection between data for the X and Y axes.

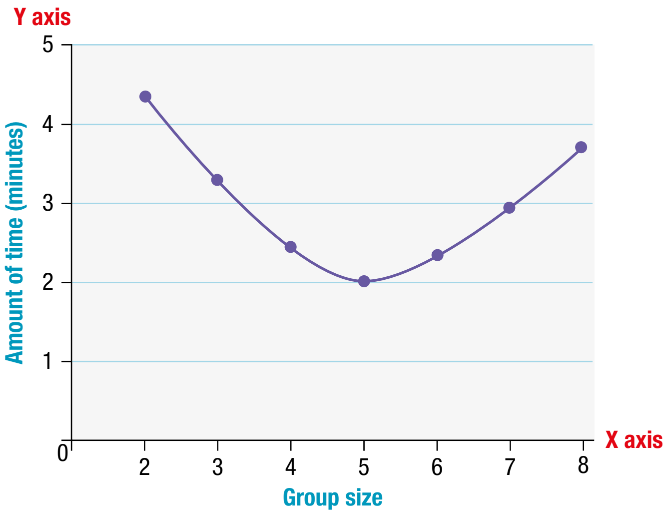

Figure 2.60 Example of a line graph showing the relationship between reaction time and group size

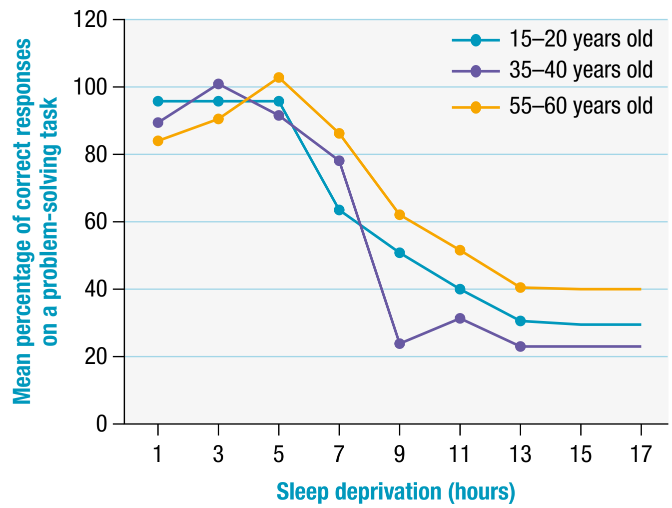

Figure 2.61 A line graph showing three sets of data so comparisons can be made.

BOX 2.11 Histograms and pie charts

A *histogram* is a graph which shows the frequency with which a particular score (or range of scores) occurs in a set of data. It usually has the types of categories (e.g. sex, age groups) plotted on the horizontal (X) axis and the frequency (how often/many of each score) plotted on the vertical (Y) axis. Rectangular bars are used to indicate the frequency of a particular score and each rectangular bar is the same width, as shown in Figure 2.62.

Histograms look like bar graphs but they differ in two main ways — first, in histograms the bars touch; second, the type of information or variables described on the X axis is continuous and usually numerical, such as age, time or the amount of something. Thus, the X axis of a histogram can be plotted as individual numbers (e.g. 0.5) or as intervals (e.g. 0.5–1, 1–1.5 etc.)

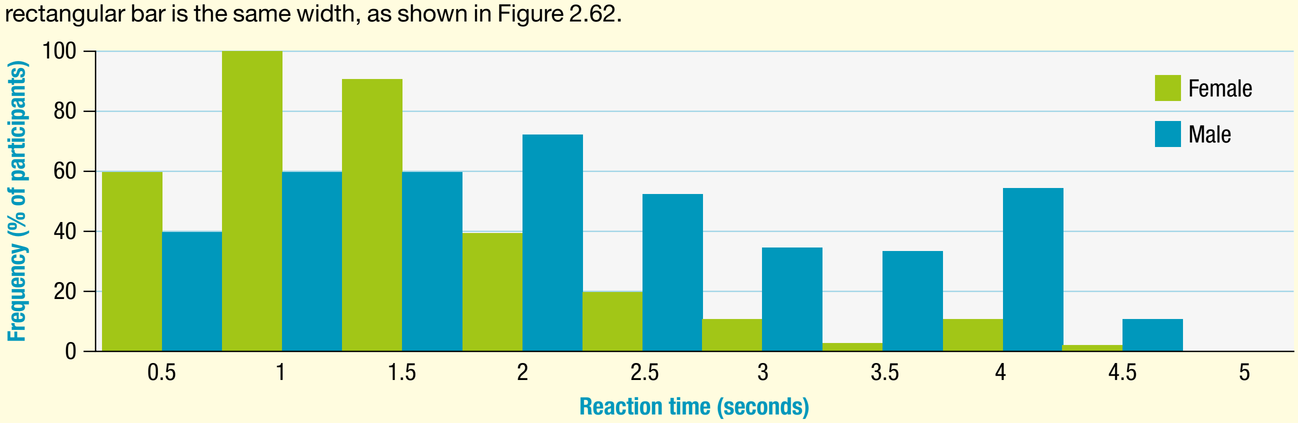

Figure 2.62 Example of a histogram

(continued)

(continued from previous page)

A *pie chart* (or pie graph) is a circular diagram that shows the proportions of values or scores for different categories of data. Each category is shown as a 'slice of the pie'. The different-sized 'slices' represent the differences between categories. As shown in Figure 2.63, a pie chart doesn't use a set of axes to plot data and the data are usually shown as percentages.

A pie chart is best used to compare different parts of the same whole, particularly when there is a relatively small number of categories. The circle of a pie chart represents the whole, or 100%. Each portion ('slice of the pie') within the circle represents a part of that 100%. In this way, it is possible to see how something is divided up according to categories. In Figure 2.63, a key is used to indicate each category ('slice') of the graph and the percentage for each category is clearly shown.

A pie chart can easily be constructed with Microsoft Excel®, or similar software, to clearly show each category and its respective percentage. A pie chart can also be drawn by hand using a compass to construct the circle and a protractor for each portion of the circle. The circle is equivalent to 360° and each portion of the pie chart is calculated as a percentage of 360°, with 1% being equivalent to 3.6°. For example, if 20% needs to be represented in the pie chart, then 20% of 360° is 72° (or 20 × 3.6° = 72°). Within the pie chart, 72° would be a slice equivalent to 20% of the whole area of the pie.

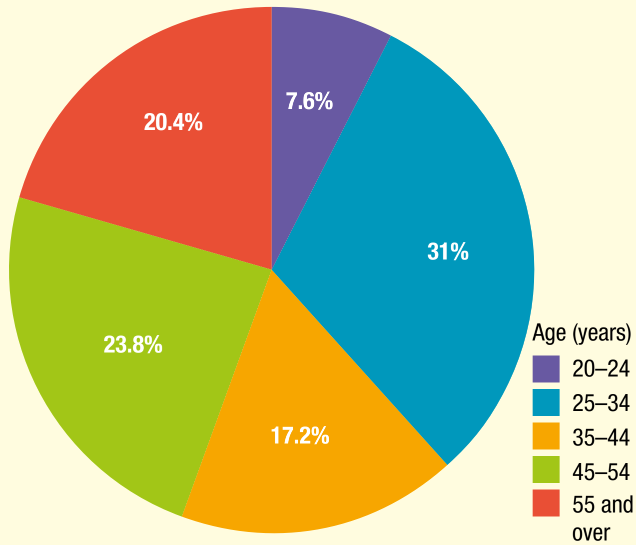

Figure 2.63 An example of a pie chart showing the age of people employed as psychologists in Australia

Percentages

Suppose you conduct an observational study to find out whether boys are more aggressive than girls during lunch time in the prep area of the school grounds at a local primary school. You want to obtain quantitative data, so you work out a list of observable behaviours that you consider to be aggressive, such as pretend fighting and intentional pushing or shoving.

Whenever you see a boy or girl demonstrating one of the aggressive behaviours on your list, you record your observation with a tick and shift your attention to another child. Of the 25 boys you observe, six use an aggressive act and are therefore judged as aggressive, and four of 16 girls observed are judged as aggressive.

The data clearly shows that more boys than girls were aggressive. However, more boys than girls were also observed. In order to reach a valid conclusion, you need to work out whether $\frac{6}{25}$ is more than or less than $\frac{4}{16}$. This can be achieved by calculating the percentages of boys and girls who were aggressive, then making a comparison.

A **percentage** is a statistic that expresses a number as a proportion (or fraction) of 100. The term *per cent* means 'per hundred', or 'for every hundred'. It is shown using the percentage sign (%). For example, 65% is equal to $\frac{65}{100}$ and means 65 parts out of 100; 100% of something means *all* of it. A percentage is calculated using the formula

$$\% = \frac{\text{subtotal}}{\text{total}} \times \frac{100}{1}$$

It is easy to calculate a percentage when the original amount is 100. For example, if you complete a 100 item speed and accuracy test and correctly answer 90 items within the time limit, then your percentage score is:

$$\frac{90\ \text{(subtotal)}}{100\ \text{(total)}} \times \frac{100}{1} = \frac{90 \times 100}{100} = \frac{900}{100} = 90\%$$

For the data obtained in the observational study of aggressive behaviour:

$$\text{boys: } \frac{6\ \text{(subtotal)}}{25\ \text{(total)}} \times \frac{100}{1} = \frac{6 \times 100}{25} = \frac{600}{25} = 24\%$$

$$\text{girls: } \frac{4\ \text{(subtotal)}}{16\ \text{(total)}} \times \frac{100}{1} = \frac{4 \times 100}{16} = \frac{400}{16} = 25\%$$

This means that the proportion of boys (calculated 'out of 100') who were aggressive in the school grounds is slightly less than the proportion of girls. The main problem in making a comparison of the boys and girls based on the raw data is that the two groups were of unequal size. Calculating a percentage for each group overcame this problem and enabled comparison of the scores for boys and girls.

Percentages are commonly used in psychology to describe data; for example, scores on a test, categories of scores, changes or trends in scores, the percentage of people who respond in a particular way (such as correct or incorrect, agree or disagree, do something or do not do something) and the percentage of people in a socio-cultural group (such as gender, age, income level, educational qualifications and ethnicity).

LEARNING ACTIVITY 2.23

Calculating percentages

1. Calculate percentages for the following raw data. Round your answer to the nearest whole number.
   (a) Sixteen out of 62 participants observed in the library broke a rule at least once during a 10 minute observation period. What percentage of participants broke a rule at least once?
   (b) Data collected through an online survey show that 52 out of 75 VCE students check Facebook before school. What percentage of students check Facebook before school? What percentage do not check Facebook before school?
2. A researcher gave parents a 50 item questionnaire on child-rearing practices. There were 28 fathers and 44 mothers in the sample. The raw data were first organised in a table (shown below) to enable comparison of scores achieved by fathers and mothers. Complete the table by calculating each percentage to the nearest whole number.

	Fathers		Mothers	
Scores	Raw score	%	Raw score	%
0–9	4		4	
10–20	9		7	
21–30	10		10	
31–40	3		12	
41–50	2		11	
Total	28	100%	44	100%

Mean as a measure of central tendency

A **measure of central tendency** is a score that indicates the 'central' or 'average' value of a set of scores. When a measure of central tendency is calculated, it often provides a 'typical' score for a set of scores.

Suppose you collected data for a practical activity which involved comparing males and females on a test for speed and accuracy of visual perception. The research participants are in five year 7 classes, each of which has 25 students. Data for each of the 125 students — 65 girls and 60 boys — are obtained. To help determine which group performed best, a measure of central tendency could be calculated. This would provide a single score for girls and a single score for boys. Scores could then be compared to estimate which group of participants, boys or girls, performed best on the visual perception test.

The mean is the most commonly used measure of central tendency. You are expected to be able to calculate a mean in your study of VCE Psychology, and to understand its advantages and limitations as a measure of central tendency.

The **mean** is the arithmetical average of all the individual scores (or values) in a set of scores. It is calculated by adding all the scores together and dividing the total by the number of scores. For example, 10 four-year-olds were required to complete a seven-piece jigsaw puzzle. The length of time (in seconds) it took each child to complete the puzzle is listed below:

26, 17, 21, 18, 12, 17, 18, 24, 25, 17

The mean for the group is calculated by adding the scores together (195), then dividing the total by the number of scores (10). The mean is 19.5 seconds. The formula for calculating the mean is shown as:

$$\bar{x}(\text{mean}) = \frac{\Sigma(\text{sum or total of all scores})}{\text{N(number of scores)}}$$

In this example, the mean provides the most exact measure of central tendency. However, in other sets of data, the mean may not always provide the most accurate measure of central tendency of a set of scores, especially if the scores cluster at the extreme ends of the set of possible scores.

For example, if a set of scores consisted of 140, 140, 140, 140, 180, 180, 180, 180, the mean would be 160. Suppose that these data referred to the height (in centimetres) of players in a girls' netball team. A manufacturer of netball skirts would be surprised when the players attended for fitting of their skirts, having been informed that the mean height is 160 centimetres. The skirts would not fit any of the players — they would be either too short or too long. Thus, when a mean is provided for a set of data, it doesn't necessarily follow that any of the individual scores will be the same as the mean or even approximate it.

Note also that extreme scores (called 'outliers') can influence the accuracy of the mean as a measure of central tendency (see Box 2.12 on the next page).

Often the mean is calculated to several decimal places. In many instances this does not create a problem; however, sometimes the mean score may become meaningless in real life. For example, if the mean number of children per family in Australia is 1.75, it is difficult to imagine what 0.75 of a child means.

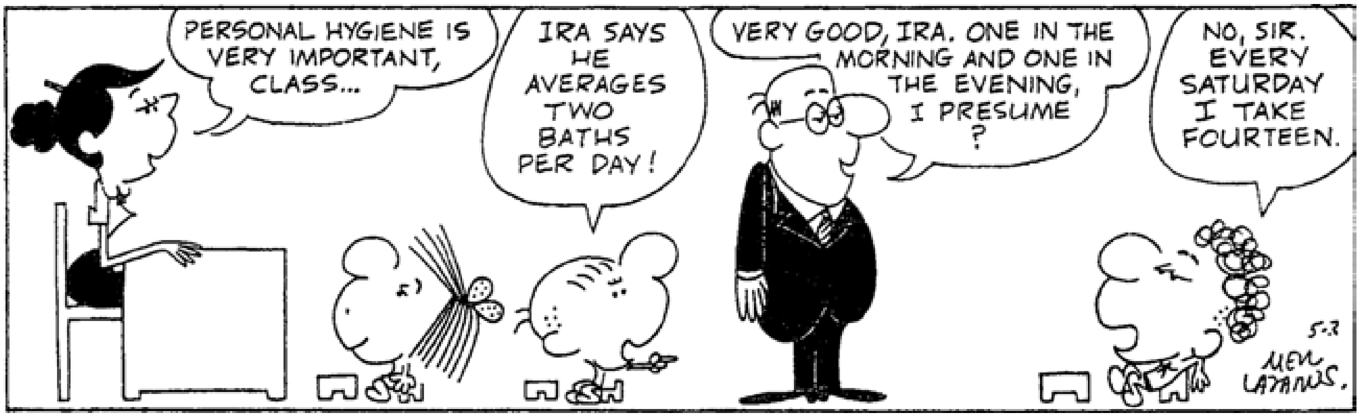

Figure 2.64 The mean does not always give a completely accurate picture of scores.

BOX 2.12 Median and mode as measures of central tendency

When scores in a set of data cluster closely around a central score, the mean is a fairly accurate indicator of the 'typical' score; that is, it is representative of the scores. If, however, the scores are very widely spread, unevenly distributed or cluster around extreme values, then the mean can be misleading. For example, a few high or low values ('outliers') within a relatively small set of data may inflate (increase) or deflate (decrease) the mean. In such cases, another measure of central tendency will be a more accurate measure of the 'typical' score and would therefore be used. Two other measures of central tendency which can be considered are the median and the mode.

Median

Another way of obtaining a score that may represent the central point in a set of scores is to arrange the scores in order of size and select the score that falls in the middle as being typical of the whole set of scores. This score is called the median.

The *median* is the middle score (or mid-point) of a set of scores. For example, the time taken (in seconds) for each child to complete a jigsaw puzzle in rank order (from lowest to highest) is:

12, 12, 17, 17, 17, 18, 18, 21, 24, 25, 26

In this example the median is 18. When there is an even number of scores, the median is the average of the two middle scores. For example, if the two middle scores are 20 and 21, the median would be 20.5.

The median is a particularly useful descriptive statistic if there is a limited amount of data, but if there is a large amount, determining the median can be time consuming and often impractical. The median is also a useful statistic when many very high or very low scores occur in the set of scores because the median is not affected by extreme scores. For example, the test scores shown in Table 2.9 were obtained when a psychology teacher gave her class of 10 students a test on research methods in psychology.

The calculation of the mean score on the test does not provide an accurate impression of the average score on the test, because the inclusion of three very high scores inflates the mean figure. In situations such as this, the median is a more accurate reflection of the 'typical' score on the test as it is closer to the majority of scores in the set of data.

Table 2.9 Test scores

Rank	%
1	98
2	91
3	91
4	60
5	59
6	57
7	57
8	57
9	56
10	54
Total	680
Mean	68
Median	58

Mode

A third measure of central tendency is the mode. In everyday language, the word mode means 'common'. This term accurately describes what the statistical mode is; that is, the *mode* is the most frequently occurring score in a set of scores. Using the scores again for the children completing the jigsaw puzzle:

26, 25, 24, 21, 18, 18, 17, 17, 17, 12, 12

the mode would be 17 because it occurs three times.

The mode is infrequently used in statistics because it is often not typical or representative of a complete set of data. For example, if a set of scores is 1, 1, 6, 7, 8, 10, the mode would be 1, which is not a representative score of the entire group. If one of the scores of 1 is changed to 10, the mode shifts completely to the opposite end of the scale. Thus, a single score can alter the mode dramatically, which is in contrast to the median, and to a lesser extent the mean, where individual score changes tend to have less of an effect.

LEARNING ACTIVITY 2.24

Review questions

1. (a) What is a measure of central tendency and what does it indicate?
   (b) When would a researcher use a measure of central tendency to describe data in preference to a summary of the data in a table or graph?
2. A researcher studied the effects of stress during pregnancy on the birth weight of infants. The following data on the birth weight (in kilograms) of infants whose mothers stated they were stressed for the majority of their pregnancy were obtained:

   2.8, 3.3, 2.5, 3.0, 2.9, 4.4, 3.5, 2.7, 3.2, 4.4.

   (a) What is the mean weight of the sample of infants?
   (b) Is the mean weight an accurate representation of the infants' weights? Explain your answer.
3. The birth weight (in kilograms) of infants whose mothers stated they were not stressed during their pregnancy were also obtained. These data were:

   3.8, 5.4, 4.3, 4.2, 3.5, 4.1, 4.0, 4.4, 3.9, 5.4.

   (a) What is the mean weight of the sample of infants?
   (b) Is the mean weight an accurate representation of the infants' weights? Explain your answer.

Standard deviation as a measure of variation around the mean

Suppose that two psychology teachers discussed the abilities of their respective classes. The teacher of Class A explained that the mean of her students' scores for a test was 78%. The teacher of Class B replied that the mean of his students' results for the same test was 68% and that his students must therefore be less capable than his colleague's. 'But how do you know I'm not just an easy marker? One of my students got 97%. Then again, another student got 18%,' responded the Class A teacher. The Class B teacher was surprised: 'The lowest mark in my class was 53%, but my highest mark was only 81%,' he said, 'so how do we know which class has the better abilities?'

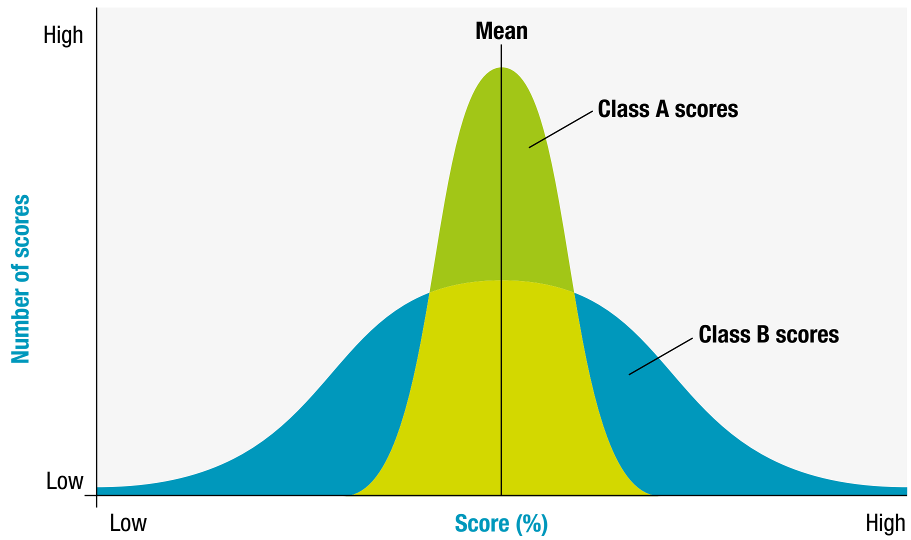

Figure 2.65 Class A and Class B both have the same means. The distribution of scores for Class A (green) shows low variation, as indicated by the clustering of scores around the mean. The distribution of scores for Class B (blue) shows high variation, as indicated by a greater spread of scores from the mean.

The discussion between the teachers indicates that a mean, on its own, doesn't provide the complete description of the data. The mean describes the 'central' value of a set of scores. In order to more accurately represent the data, a second kind of descriptive statistic is often used — a measure of variation.

A **measure of variation**, also called *variability*, indicates how widely scores are distributed or spread around the central point. The sets of scores in Figure 2.65 both have the same mean, but they differ in variation; that is, how far the scores are either side of the mean. The distribution of Class A scores shows that it is tightly packed around the mean, indicating *low variation* (or *variability*). The distribution of Class B scores is more widely spread from the mean, *indicating high variation* (or *variablility*).

The **standard deviation** summarises how far scores within a set of scores spread out, or deviate, from the mean for those scores. If all the scores in a set of scores were the same, there would be no variation and the standard deviation would be zero because none of the scores would be spread out from the mean. A low standard deviation indicates that there is little variation in the scores and that most scores are clustered around the mean. In this case, the mean is a representative descriptive statistic, as is the mean score for curve C in Figure 2.66. The higher the standard deviation, the greater the variation there is among the scores. In Figure 2.66, curve A has the highest standard deviation.

The standard deviation is a particularly useful descriptive statistic in that it provides a point of comparison between the means and the spread of two or more different sets of scores. For example, suppose a replacement teacher comes to a new school hoping for an easy day's work. The replacement teacher is offered either of two classes, both of which have a mean IQ score of 100. There appears to be no difference between the two classes. The teacher is then informed that the standard deviation of IQs in one class is 1 and the standard deviation in the other is 3. Since a higher standard deviation means more variability, the class with the standard deviation of three may take more effort to teach because students vary more in ability.

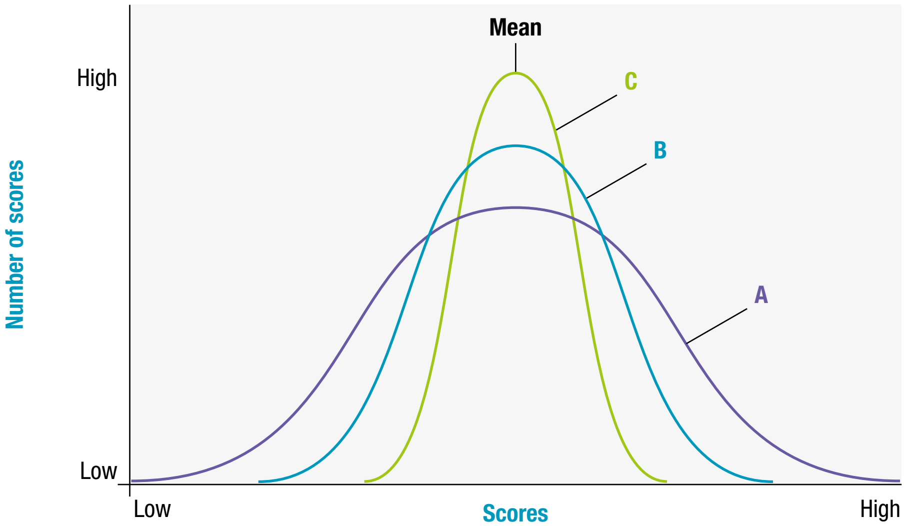

Figure 2.66 This graph shows three distributions of scores, each with a different standard deviation. The purple curve (A) has the highest standard deviation and the green curve (C) has the lowest standard deviation.

In sum, when considering standard deviations, it is important to recognise that:

- although two or more different sets of scores (or data sets) may have the same mean, they may not have the same degree of variation (or 'spread') in the data; and
- a higher standard deviation represents a greater variation (or 'spread') in a set of scores (and vice versa).

Note also that, for a normal distribution of any set of scores, 68.26% of the scores lie within one standard deviation of the mean and 95.44% of the scores lie within two standard deviations of the mean. These and other standard deviation values are shown in Figure 2.67. For example, 68.26% of the scores will fall within one standard deviation either side of the mean; 95.44% of the scores will fall within two standard deviations either side of the mean. These percentages apply consistently in a normal distribution curve, irrespective of the size of the standard deviation.

Although you need to be able to calculate a mean in VCE Psychology, calculation of standard deviation (or any other measure of variation) is beyond the scope of the VCE Psychology Study Design (VCE Psychology: Advice For Teachers, 2016).

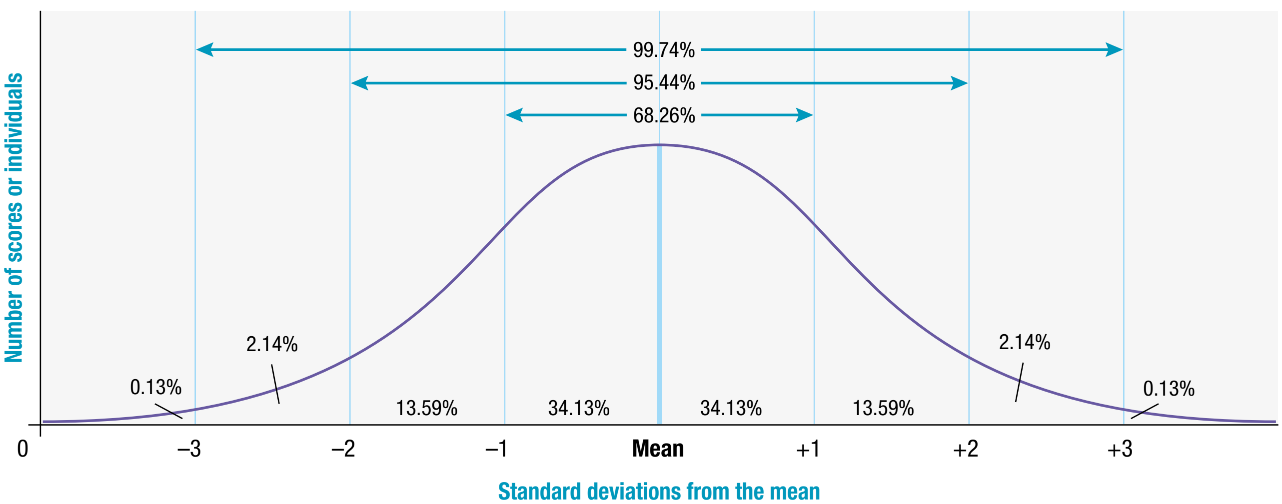

Figure 2.67 Standard deviations in a normal distribution. When standard deviations are represented on the X (horizontal) axis of a normal distribution curve, the percentage of scores falling between the mean and any given point on the axis is always the same.

BOX 2.13 Skewed distributions of scores

The normal distribution curve shown in Figure 2.67 is a 'theoretical ideal' and is rarely perfectly achieved in reality. Often, the scores or other values are unevenly distributed and cluster to the left or the right ends of the graph. In such cases, the spread is called a *skewed distribution* as there is a lack of balance or symmetry. The skew of the graph — whether it is positive or negative — is linked to the direction of its 'tail'.

Positive skew

If the number of words 12-month-old children spoke were plotted, it is highly likely that many of the scores would cluster towards the lower end (left) of the graph producing a positively skewed distribution (or spread). This is shown in Figure 2.68 below.

When the distribution of scores has a *positive skew*, there is a disproportionate number of low scores. The 'tail' of the graph tapers in a positive direction towards the higher scores.

Negative skew

By contrast with 1-year-olds, if the number of words 16-year olds know were plotted, many of the scores would cluster at the higher end (right) of the graph producing a negatively skewed distribution. This is shown in Figure 2.69 below.

When the distribution of scores has a *negative skew*, there is a disproportionate number of high scores. The 'tail' of the graph tapers in a negative direction, towards the lower scores.

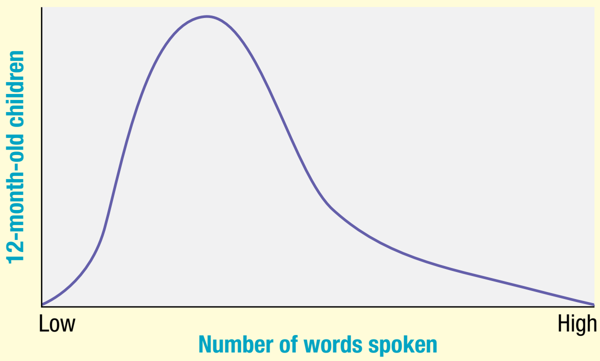

Figure 2.68 Positive skew — a curve skewed to the left, indicating that there is a clustering of a relatively large number of low 'scores'

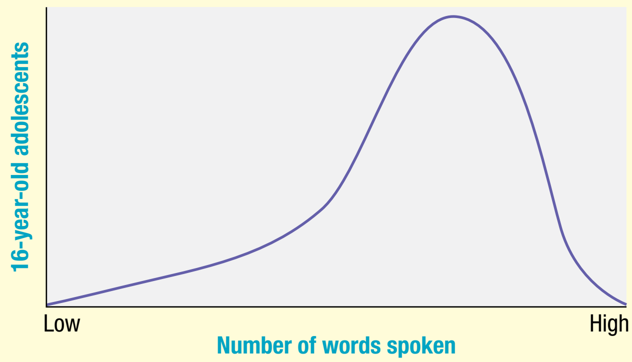

Figure 2.69 Negative skew — a curve skewed to the right, indicating that there is a clustering of a relatively large number of high 'scores'

LEARNING ACTIVITY 2.25

Review questions

1. What does a measure of variation (variability) indicate?
2. What information does the standard deviation provide about the distribution of scores?
3. (a) Two classes sat the same practice psychology exam. The following descriptive statistics were calculated from the students' results in each class:
   Class A: mean 70%
   Class B: mean 70%.
   On the basis of the mean scores alone, what might teachers of these classes conclude about the knowledge of students in each psychology class? Explain your answer.
   (b) Suppose the teachers then calculated the standard deviations for their respective classes and obtained the following results:
   Class A: mean 70%; standard deviation: 0.5
   Class B: mean 70%; standard deviation: 2.3.
   On the basis of this additional information, what conclusions might the teachers now draw about the knowledge of the students in each psychology class? Explain your answer.

LEARNING ACTIVITY 2.26

Predicting high and low variability

For each of the following examples, indicate whether you believe there is likely to be high or low variability among the data from Australian samples.

1. The amount of alcohol consumed to reach a blood alcohol content level of 0.05%
2. The amount of alcohol consumed by young adults on a weekly basis
3. The age at which adolescents go to their first party as a 'teenager'
4. The age at which children speak their twentieth word
5. The amount of bullying incidents across secondary schools
6. The amount of nightly sleep obtained by people of all ages
7. The number of people with a phobia
8. The number of people aged 75+ years who have experienced the death of a friend
9. The reaction times of young adult participants to a visual stimulus presented on a computer monitor
10. The ability to recall a recently learned list of 10 words in their correct order on the first attempt

Inferential statistics

Descriptive statistics are very useful for summarising and organising data so that it can be comprehended. For example, they can show patterns that emerge from data or provide a single number such as a mean or standard deviation that can help describe the data. However, they do not in themselves indicate whether the data are meaningful.

In order to interpret the data and find out whether the results are meaningful, inferential statistics can be used. Inferential statistics enable researchers to 'infer', or to make judgments or draw conclusions on the basis of some evidence, such as the data collected through research. For example, an inference from data may involve deciding whether manipulation of an independent variable alone is responsible for the changes in the dependent variable. Inferential statistics can help the researcher do this with some degree of confidence.

Of initial interest to the researcher for any type of study is whether the data support the hypothesis that was tested. Furthermore, when results have been obtained for a sample, inferential statistics can be used to help decide whether these would occur in the population from which the sample was drawn.

Statistical significance and *p* values

In most experiments, there will usually be a difference in the mean scores of the experimental and control groups. For example, the mean score on a task requiring concentration (time taken to thread a needle) achieved by the experimental group with a loud noise present (the IV) may be 15.7 seconds and the mean score on the same task the control group without noise may be 12.6 seconds. Can it be concluded that the difference in mean scores is due to the independent variable?

Perhaps the difference was due to chance factors in that the experimental and control groups were slightly different in their composition of relevant participant variables despite the use of random allocation. Perhaps, by chance, there were a few individuals with slightly better eye–hand coordination in the control group. Perhaps the light was slightly better when the control group participants performed the needle-threading task. Perhaps the experimenter was tired and slightly impatient when instructing the experimental group participants. Perhaps the effects of these three apparently controlled variables 'added up' and combined in such a way as to cause the difference.

How big does the difference in the mean scores between two groups need to be before it can be said that the difference is due to the independent variable rather than chance factors? What is an *acceptable* difference between the mean scores? Is a difference such as 3.1 seconds (15.7 minus 12.6) 'big enough'? Is 2.5 seconds a 'big enough' difference? 4.5 seconds?

One way to find out if the results of an experiment are due to the IV that was tested rather than chance factors is to repeat these studies several times in exactly the same way with the same participants to see if the results are about the same each time the study is replicated. This would be very time consuming, inconvenient and possibly impractical because participants may not be continually available. However, it is usually unnecessary to undertake these replications. A more efficient way of measuring the reliability of the results is to use inferential statistics by applying a test of statistical significance to determine the extent to which chance factors may account for the results.

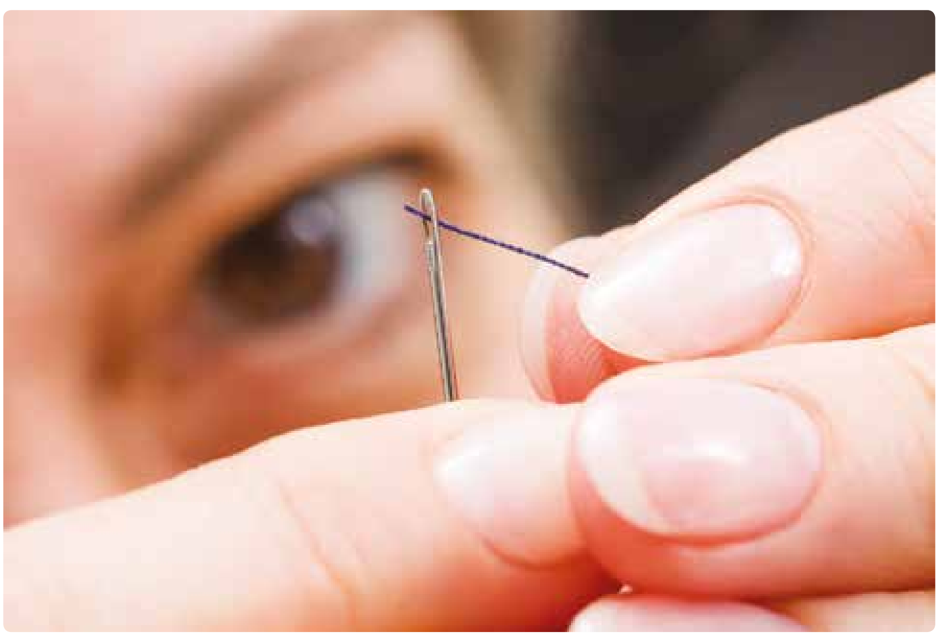

Figure 2.70 Is loud noise a distraction when threading a needle? If an experiment finds a difference between the mean scores of the experimental and control groups, how big a difference is a statistically significant difference?

Statistical significance

Tests of statistical significance can be used to determine the extent to which chance operated in an experiment and whether it is at an acceptable level. The tests enable a precise mathematical value to be obtained that will indicate the probability (likelihood) that if the same experiment were repeated, the results would be similar or different.

If the likelihood of the difference occurring by chance factors is at an acceptable level, then it is said that the difference is *statistically significant*. In general, psychologists accept a given result, such as the difference in mean scores, as statistically significant if it is found that the probability or likelihood that the result might be due to chance is 5 or fewer times ≤ 5 in 100, or a 1 in 20 chance, if the same study were to be repeated 100 times. The way of saying this is that the result is *significant* at the 0.05 level; that is $p < 0.05$.

A significance level of $p \leq 0.06$ (less than or equal to 0.06) would indicate that there was a 6% (or 6 or less in 100) chance that the result obtained was most likely due to chance and this would generally be viewed as unacceptable. It would then be said that the results are *not significant* and therefore do not support the research hypothesis.

p value

The significance level of any difference, or the probability that a specific result occurred by chance, is called a ***p* value**. The 'p' stands for probability and shows the statistical level at which chance is likely to have operated on the results. An acceptable p value for the significance of results is established before the experiment is conducted.

In some cases, a stricter probability level than $p \leq 0.05$ is used, such as $p \leq 0.01$ (less than or equal to 1 in 100) and $p \leq 0.001$ (less than or equal to 1 in 1000). Such a probability level would be used when the findings of the research are so important that the researcher wants to be extremely confident of the results; for example, when the research hypothesis being tested involves a radical new way of treating depression or if it contradicts a research finding or theory that is widely accepted.

If research is being undertaken in an area that is likely to be of immense benefit to the community, or if it involves a treatment that carries with it some risk of harm, then replication of the study is still likely to occur.

In some other cases, a researcher might be prepared to accept a more lenient level of significance than $p \leq 0.05$. For example, a researcher may conduct a pilot, or 'trial', study on a research topic of interest to see if it is worthwhile carrying out a full-scale research study. The researcher may set a significance level of $p < 0.1$ (10%). This would indicate that there *may* be a significant difference in the mean scores obtained. Therefore, it is worth continuing with further research, perhaps with refinements to the procedures.

LEARNING ACTIVITY 2.27

Review questions

1. What can be achieved with inferential statistics that is not possible with descriptive statistics alone?
2. A researcher conducts an experiment and obtains a statistically significant result. What does the term statistically significant mean?
3. Explain the meaning of the term chance factor in relation to research with reference to an example.
4. What is a p value?
5. Write the meaning of the following p values as they apply to the results of an experiment. Ensure you refer to the probable roles of chance and the independent variable.
   (a) $p \leq 0.001$
   (b) $p \leq 0.01$
   (c) $p < 0.10$
   (d) $p = 0.02$
6. (a) Which of the p values stated in question 5 above can be interpreted as being *most significant*? Explain your answer.
   (b) Which of the p values stated in question 5 above can be interpreted as being *least significant*? Explain your answer.
7. Suppose you conducted a study and obtained results with a *p value* that is not ≤ 0.5 after having determined that $p \leq 0.5$ would be required. What would you conclude from the results?

Conclusions and generalisations

When the results have been evaluated, evidence-based conclusions need to be drawn. A **conclusion** is a decision about what the results obtained from a research study mean. All conclusions must be based on evidence (the results), be consistent with the evidence, relevant to what was actually investigated can take account of potential limitations of the research.

One type of conclusion relates to whether the hypothesis is supported on the basis of the results obtained. This requires careful examination of the results so that an objective ('unbiased') decision can be made. Although the results alone may indicate that the hypothesis is supported, the DV and therefore the results may have been influenced in a significant way by one or more variables other than the IV (or in addition to the IV). Therefore, uncontrolled extraneous variables and potential confounding variables also need to be considered when drawing a conclusion. The researcher must be confident that any change in the DV was due to the IV alone and not any other variable.

The conclusion about the hypothesis is expressed as a statement in the research report. In psychology, a hypothesis may be supported or not supported, but it cannot be said to be 'proven' true or correct. Generally this is because no matter how much evidence a researcher finds to support their hypothesis, there may still be one or more alternative explanations, some of which are not yet known or even thought of, that could better explain the results.

Another type of conclusion that can be made is called a generalisation. A **generalisation** is a decision about how widely the results of a research study can be applied, particularly to other members of the population from which the sample was drawn. Because a study usually tests a sample from a population of interest rather than the whole population, making a generalisation is a process of forming an idea about whether results obtained for a limited number of cases (the sample) can be extended to apply to the entire class of objects, events or people (the sample's population).

In experimental research, generalising the results from the sample to its population is risky if the sample is not representative of the population. Like any other conclusion, a generalisation must also be based on the results obtained and must consider the potential extraneous and confounding variables, as well as any other problems with the study.

When drawing conclusions about the results and making generalisations, researchers try to avoid making errors or overstating what the results mean. For example, they attempt to ensure that:

- all conclusions are consistent with the results
- all conclusions are relevant to what was actually investigated
- any influential extraneous variables or confounding variables have not been overlooked
- analysis and interpretation of the results enables an accurate finding about whether or not the hypothesis is supported
- any gaps in the results and further evidence that may be required are identified
- limitations of the sample used in the study have been considered
- any generalisations are reasonable
- the explanation of the findings is reasonable and supported by the results.

All these aspects relate to the reliability and validity of their study.

Reliability and validity in research

An important goal of research is to obtain results that are both reliable and valid. This will mean that the results are consistent and accurate. It also means that the results are of value and use. Reliable and valid results can be achieved when the research, its data collection procedures and measurement tools are reliable and valid. Reliability and validity are not necessarily 'present-or-absent' features of a research design, its measurement tools or the results. Instead, they are considered to vary in degree on a scale ranging from low to high. Both are ways of assessing the quality of a research design, the specific tools or procedures used to collect data, and the results obtained.

Reliability

In everyday language, the word reliability is used to refer to something that is dependable and will be 'around about the same' or give the same outcome every time. For example, we may refer to a car as reliable when we are confident that it will start every time and get us to and from wherever we want to go whenever we use it. Similarly, we may refer to a friend as reliable when we trust that they are dependable. They have proven to be consistent and stable in character and behaviour over time and are unlikely to change suddenly for no good reason.

In research, reliability involves the same qualities. **Reliability** refers to the extent to which a measurement tool (or 'measure') produces results that are consistent, dependable and stable. For example, if your blood alcohol content is measured using a breathalyser and is double checked straight away, you should expect to get the same result. If so, the measurement tool and its data are reliable. Similarly, if you take a reaction time, vocabulary, intelligence or personality test two times under the same conditions, your scores on the two occasions should be very similar. If so, the test can then be described as reliable. If more than one person is observing behaviour or some event in an observational study, all observers should agree on what was observed and recorded. If so, the data are reliable. In sum, the reliability of any measurement tool used in psychological research is the extent to which it gives consistent measurements for any individual or group. The greater the consistency of the tool each time it is used, the greater its reliability.

At a more general level in relation to a research investigation, if you conducted an experiment on a group of participants to measure some behaviour of interest and repeated it again with a similar group under the same conditions, you should expect the results to be very similar on each occasion the experiment is conducted. Because conducting an experiment with multiple participants is a more complicated process than measuring the blood alcohol content of an individual, it is not likely or expected that the results will be identical each time the experiment is repeated. The main reason is individual differences within another sample. However, if the results are to be considered reliable, then they should be similar (e.g. within a narrow range of values) each time the experiment is conducted in the same way.

The researcher does not want to obtain significantly different results whenever they repeat a study and measure the same event under the same conditions. This will lead to different conclusions each time so that they will not know which conclusions are correct. Unreliable data or results are 'untrustworthy' in the sense that they reflect error and lead to inconsistent conclusions.

A researcher always sets out to conduct reliable research, use reliable measures and to obtain reliable results. However, when their study is repeated, it may be found that the results are not reliable. This is more likely to occur when, for example:

- the study uses a measure of relevant variables that produces random errors,
- the sample size is too small,
- there is an insufficient number of trials, and/or
- when the study is not repeated in the same way in which it was first conducted.

Figure 2.71 We consider a car to be reliable when we can depend on it to start every time and get us to and from wherever we want to go whenever we use it.

Figure 2.72 The general idea behind research reliability is that significant results must be more than a 'one-off' finding and therefore be repeatable. The person would be alarmed if their BAC reading was well above 0.5 but five minutes later was well below 0.5.

BOX 2.14 Replication of procedures: repeatability and reproducibility

Experimental data and results must be more than one-off findings and should be repeatable and reproducible to draw reasonable conclusions.

Repeatability refers to the closeness of agreement between independent results obtained with the same method on identical test material, under the same conditions (same operator, same apparatus and/or same laboratory).

Reproducibility refers to the closeness of agreement between independent results obtained with the same method on identical test material but under different conditions (different operators, different apparatus and/or different laboratories). The purposes of reproducing experiments include checking of claimed precision and uncovering of any systematic errors that may affect accuracy from one or other experiments/groups. Reproducibility is often used as a test of the reliability of an experiment.

Source: *VCE Psychology: Advice for Teachers* (2016, p. 12). Retrieved from http://www.vcaa.vic.edu.au/Pages/vce/studies/psychology/psychoindex.aspx

Validity

Validity refers to the extent to which a measurement tool accurately measures what it claims to measure. For example, a breathalyser should measure blood alcohol content and report the level accurately to be considered a valid measure, an intelligence test should measure intelligence and not something else such as motivation, mood state or personality traits, and the General Achievement Test (GAT) should actually measure the knowledge and skills exam it claims to measure. Similarly, if a research investigation is considered valid, this means that it has accurately measured the behaviour or mental process that it claims to have measured.

Validity also relates to the conclusions (including any generalisations) the researcher makes about a study. This means that the conclusions are specifically based on those variables that the study was investigating and the results obtained for the study. Moreover, what was measured and the data collected were based on valid measures and not unduly influenced by extraneous or confounding variables.

For example, if a researcher concludes that a new drug they tested in an experiment reduces symptoms of depression, or that participants in a taste-preference study preferred Coca-Cola™ over Pepsi™, the research is valid only if the new drug really works or if the participants really did prefer Coca-Cola™.

As with seeking reliability, researchers always attempt to conduct valid research, use measurement tools that measure what they are supposed to measure, and to draw accurate conclusions from the data they collect. Yet often, despite a researcher's best intentions, their research lacks validity or is not as valid as it could have been. This can occur for a number of different reasons.

Sometimes a researcher may draw a conclusion from their data that cannot actually be drawn; that is, the data do not actually justify, support or 'back up' the conclusion. Another reason that research and its results may be invalid is because one or more extraneous variables have not been adequately controlled, have become a confounding variable, and have therefore influenced the results in an important way. For example, in an experiment, a confounding variable and the IV may both affect the results. When this happens, the researcher will find it difficult to separate the effects of the IV and the confounding variable and therefore cannot be certain whether it was the IV or the confounding variable that caused the change in the DV.

Note that a measure can be reliable even though it is not valid, but a measure cannot be valid unless it is reliable. For example, if you measured your biceps with a cloth tape measure that had been left outside in the open weather for a long time and had become inaccurate through stretching, the result would not be a valid measure of your true bicep size. The inaccurate cloth tape measure, however, is reliable as it will give you the same result each time it is used (even if inaccurate). Similarly, it is possible to obtain a reliable measurement for skull size using a stretched cloth tape measure, but that would not be a valid measure for intelligence.

Internal and external validity

Researchers often distinguish between the internal and external validity of their studies. They consider both internal and external validity in judging the overall validity of a study. Strengths and limitations of different types of investigations and their procedures can be discussed in terms of these aspects of validity.

Internal validity refers to the extent to which the results obtained for a study are actually due to the variable(s) that was tested or measured and not some other factor. For example, in an experiment, the researcher needs to be confident that the measured change in the DV was produced solely by the IV and not by any extraneous or confounding variable, nor due to chance.

When a study is said to have internal validity, then the measurement tools and procedures used for the research measured what they were supposed to measure. If a study has gaps or 'flaws' in its procedures or measures, such as the use of a sampling method that resulted in an unrepresentative sample when it was important to have a representative sample, then it may be considered as lacking in internal validity.

Similarly, if participants were required to rate facial attractiveness, then the researcher needs to be confident that the procedures or tools actually and only measured facial attractiveness. Internal validity may be lost if participants did not understand the rating procedure or their ratings partially reflected the style of dress worn by each person in a photo.

Internal validity can be improved through a number of methods, especially use of a research design that is appropriate for testing the research hypothesis and by controlling relevant extraneous variables to ensure none become confounding variables; for example, by using appropriate sampling procedures for selection and allocation of participants, counterbalancing, single- and double-blind procedures, placebos, and standardised instructions and procedures.

External validity refers to the extent to which the results obtained for a study can be generalised to the population from which the sample was drawn or to other people in other settings and over time.

For example, suppose that a researcher conducted a laboratory experiment on the effects of stress on behaviour using a relatively small sample of participants. If the experiment has high external validity, this means that the results can more confidently be generalised to apply to the population from which the sample was drawn and to situations outside, or 'external' to, the laboratory at another point in time. Similarly, if an observed effect may actually be found only under certain conditions (e.g. in a laboratory) for specific groups of participants (e.g. university students obliged to participate as a course requirement), then a study *may* be lacking in external validity. In addition, the results should not be time-dependent; that is, the results should apply across time and be found in the future if the research were to replicated under the same conditions.

Generally, the bigger and more representative a sample is of its population, the more confident the researcher can be in generalising from the sample to the population. Conducting an experiment in a real-world setting natural to the research question of interest and therefore more like an event in 'real life' can also improve external validity.

Internal and external validity are related. Internal validity is a precondition of external validity, which means that a study cannot have external validity without internal validity. Furthermore, a story that is said to have external validity is also said to have internal validity. It does not necessarily follow, however, that an effect observed in a strictly controlled laboratory experiment with a high level of internal validity will also have the same effect in a real-world situation.

Figure 2.73 The term *ecological validity* is specifically used to refer to the extent to which the findings of a research study are able to be generalised to real-life settings. For example, the children shown above were observed to be aggressive in a controlled laboratory setting after watching an aggressive adult behave that way. To what extent does this situation reflect real life? Do the results generalise to the outside world? Do you think the research is high or low in ecological validity?

LEARNING ACTIVITY 2.28

Review questions

1. (a) Explain the meaning of the term conclusion in relation to research.
(b) Give an example of a conclusion about the research hypothesis.

2. Explain the meaning of the term generalisation in relation to research.

3. List important considerations when drawing conclusions and making generalisations.

4. What does reliability mean in relation to each of the following?
(a) a measure of self-esteem
(b) a thermometer
(c) a research study

5. What does validity mean in relation to each of the above in question 4?

6. (a) Distinguish between internal and external validity.
(b) List three procedures that could adversely impact on the internal validity of an experiment.
(c) List three procedures that could improve the external validity of an experiment with reference to a relevant example.

7. Comment on the following statement, with reference to a relevant example: 'A measure can be reliable and not valid. But a valid measure is always a reliable measure'.

ETHICS IN PSYCHOLOGICAL RESEARCH AND REPORTING

Is it appropriate for a researcher to inflict pain on a person in order to study mental experiences associated with pain? Does your answer depend on the amount of pain, or is any amount of pain unacceptable? Does it matter if the pain is psychological rather than physical? Should a person know exactly what the research will involve before they participate; for example, the specific experimental procedures to which they will be exposed? Should a participant be allowed to opt out of a research study whenever they want to, regardless of their reason? What if the researcher has gone to great expense to conduct the research? What if the research has important benefits for humankind? Such questions raise important ethical issues that need to be considered by researchers.

The term **ethics** refers to standards that guide individuals to identify good, desirable or acceptable conduct. Essentially, ethical standards help us to make judgments about which behaviours are appropriate ('right') and inappropriate ('wrong'). 'Ethical conduct' is more than simply doing the right thing. It involves acting in the right way out of 'respect and concern for one's fellow creatures' (NHMRC, 2007).

All societies and cultural groups have ethical standards that guide the behaviour of their members. In addition to these standards, most professions have their own standards of ethical conduct that must be followed. For example, just as it would be considered unethical for a medical doctor to discuss a patient's condition with anyone apart from the patient or people legally responsible for the patient, so too would it be unethical for a psychologist to reveal information discussed in a counselling session or the results of a psychological test to anyone apart from the client (or the guardians of the client if the client is a child under a guardian's care).

Ethical standards and considerations also apply to any type of research or data collection method involving people (or animals). These help ensure that the wellbeing and rights of research participants are respected and protected before, during and following their involvement in the research. In addition, ethical standards help prevent unnecessary research and promote research that is or will be of benefit to the wider community or humankind in general.

The Australian Psychological Society (APS) has a *Code Of Ethics* (2007) which provides standards and guidelines for all psychological research (and other areas of professional practice). The *Code of Ethics* has been devised with reference to a national set of standards and guidelines in a document called the *National Statement on Ethical Conduct in Human Research 2007 (Updated May 2015)*. This is simply referred to as the National Statement.

Figure 2.74 Ethical standards for human research ensure all participants are given the respect and protection due to them, irrespective of who they are.

National Statement on Ethical Conduct in Human Research

The National Statement has been jointly developed by the National Health and Medical Research Council (NHMRC), the Australian Research Council and the Australian Vice-Chancellors' Committee. The NHMRC is the Australian government's expert body for providing advice on research.

The purpose of the National Statement is to 'promote ethically good human research'. It is organised around four values — research merit and integrity, beneficence, justice and respect for human rights. The design, review and conduct of all research with people as the participants must reflect each of these values.

1. **Research merit** and **integrity**: Research that has *merit* is worthwhile and conducted appropriately to achieve the aims. Worthwhile means that the research has the potential to contribute to knowledge and understanding, and to improve social welfare and individual wellbeing. It must be properly designed and undertaken by people with suitable expertise. Research that is conducted with *integrity* is carried out with a commitment to following recognised principles and ethical standards for conducting research, including accurate and responsible reporting of findings, whether the results are favourable or unfavourable.
2. **Beneficence**: Research beneficence refers to the likely *benefits* to participants or the wider community. The researcher must consider and maximise all possible good outcomes while minimising the risks of harm to participants and to the community in general. The potential benefits must justify any risk or harm or discomfort to participants.
3. **Justice**: Research that is *just* has a concern for the use of fair procedures and fair distribution of costs and benefits. The process of recruiting and selecting participants should be fair so a researcher must avoid imposing on particular groups an unfair burden of participation in their research. Similarly, the benefits of the research should be distributed fairly between the participants and the wider community.
4. **Respect for human beings**: This involves recognition that each human being has value in himself or herself. *Respect* is demonstrated when the researcher recognises and takes account of the rights, beliefs, perceptions and cultural backgrounds of all participants. In particular, all participants have the rights to privacy, confidentiality and to make informed decisions about matters that affect them. People must be protected and empowered if they are vulnerable or their capacity to make informed decisions is impaired; for example, children and intellectually disabled people who depend on others.

All four values apply to all research conducted with or about people, including experiments, cross-sectional studies, questionnaires, interviews, observational studies, psychological testing or treatment, and analysis of personal documents or other materials with information about participants.

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Weblinks
- National Statement
- APS *Code of Ethics*

Figure 2.75 The NHMRC National Statement and APS *Code of Ethics*

Role of ethics committees

Figure 2.76 An ethics committee independently reviews research proposals for approval purposes and then monitors the conduct of the research to ensure all relevant ethical standards are adopted and followed.

The National Statement requires that all research that carries more than a low level of risk to human participants must first be reviewed and approved by an ethics committee. This type of committee is formally called a *Human Research Ethics Committee* (*HREC*).

A HREC has a minimum of eight members, with a mix of researchers and non-researchers (including community members). Its main purpose is to assess research proposals for approval purposes, and then monitor the conduct of the research (if approved) to ensure all relevant ethical standards are adopted and followed.

Generally, the roles and responsibilities of the HREC include:

- deciding whether a research proposal meets all the requirements of the National Statement and is therefore ethically acceptable
- deciding whether the researcher(s) is adequately experienced and qualified (or the researcher is supervised by a qualified person if there are concerns about their experience and qualifications)
- monitoring approved research (e.g. through progress reports, random inspections of research sites, interviews with participants)
- handling complaints (e.g. from participants, the wider community)
- ensuring accountability of the researcher (e.g. the researcher understands, accepts and maintains responsibility for all aspects of their research).

If the committee is satisfied that all ethical questions and issues raised by the research have been dealt with satisfactorily, approval will be given for the research to proceed. If the committee has concerns about some aspects, it can highlight these and return the application to the researcher so the concerns can be addressed, possibly with suggestions on how. If the proposal has ethical issues that cannot be addressed, then the research will not be allowed to proceed.

HRECs are usually established by organisations (public, not-for-profit or private) which conduct a considerable amount of research involving humans. Universities and hospitals are the most common of these organisations. Not all organisations which conduct human research, however, have their own HREC. Some organisations and individual researchers use the services of HRECs within another organisation (NHMRC, 2007).

Human research considered to be at a low level of risk, where the only foreseeable risk is one of discomfort, does not have to be submitted to a HREC. In such cases, a research proposal may be reviewed by ‘a competent person or group’ familiar with the National Statement and other relevant ethical standards.

The NHMRC also requires the use of ethics committees for research involving animals. These are called Animal Ethics Committees (AECs) and members have roles and responsibilities similar to those of HRECs.

Australian Privacy Principles

The *Privacy Act 1988* is an Australian law which regulates the handling of personal information about individuals. This includes the collection, use, storage and disclosure of personal information, and access to and correction of that information.

Personal information is information or an opinion about any individual who can be identified; for example, information about someone’s racial or ethnic origin; health; genetics; political opinions; religious beliefs and sexual orientation or practices (Office of The Australian Information Commissioner, 2017).

The Privacy Act includes 13 *Australian Privacy Principles* (APPs) which set out standards, rights and obligations for the handling of personal information, some of which apply to psychology research. The APPs include requirements such as:

- *Open and transparent information management* — how personal information will be handled must be clearly expressed and made available

- *Anonymity* — ensure individual participants cannot be personally identified
- *Data collection* — collect personal information only if necessary; ensure informed consent
- *Data use* — use only for the purposes specified
- *Data quality* — ensure information is accurate, complete and up to date
- *Data security* — protect the information (e.g. from loss or unauthorised access) and destroy or permanently de-identify personal information if no longer needed.

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Weblink
The 13 Australian APPs

Role of the experimenter

The experimenter (or researcher) must ensure their research is ethically appropriate so that participants are given the respect and protection that is due to them. They must observe all ethical standards, guidelines, codes or legislation such as the National Statement, the APS *Code of Ethics* and the Privacy Act. These will help them to meet their responsibilities to identify and properly address all ethical issues (APS, 2007; NHMRC, 2007).

Protection and security of participants' information

The researcher must ensure that personal information is secure and protected from:

- misuse, interference and loss; and
- unauthorised access, modification or disclosure.

In addition, the researcher must make provisions for maintaining confidentiality in the collection, recording, accessing, storage, dissemination and disposal of personal information. If personal information about an individual is no longer needed, then the information should be destroyed or de-identified.

Confidentiality

Confidentiality refers to the obligation of the researcher not to use or disclose private information for any purpose other than that for which it was given to them. Participants have a right to privacy, so the researcher must avoid undue invasion of privacy by collecting only information that is needed. In addition, any information that may identify an individual or their involvement in research, such as personal data or test results, cannot be revealed unless consent has been obtained.

The right to privacy and procedures for establishing and maintaining confidentiality must be explained to participants before the study commences. As mentioned previously, the confidentiality requirement applies to the collection, recording, accessing, storage, dissemination and disposal of personal information.

Voluntary participation

The researcher must ensure participants voluntarily consent to be involved in a study. For example, participants must not be forced or pressured to take part. The researcher must also ensure that prospective participants do not experience negative consequences if they choose not to be involved in a study.

Withdrawal rights

Participants have an unconditional right to withdraw from a study at any time without giving a reason for doing so. This includes withdrawing their data after the study is finished regardless of the effect this may have on the overall results. **Withdrawal rights** must be explained to participants before the study commences and the researcher must ensure that participants suffer no negative consequences as a result of withdrawing from the study.

Informed consent procedures

Consent is a voluntary choice for participants and must be based on sufficient information and adequate understanding of both the proposed research and the consequences of participation in it. In order for this to be achieved, information should be given about the purpose, methods, demands, risks and potential benefits of the research.

This information must be presented in ways suitable for each participant; for example, it should be in plain language (with the least possible technical jargon) and the researcher should take account of personal characteristics such as age, educational background, cultural background and any other possible barriers to understanding the information. There should be an opportunity for prospective participants to ask questions about the research.

It is essential that participants have the competence to give informed consent. A wide variety of symptoms, diseases, injuries and other conditions can affect a person's ability to understand information and the researcher must take this into account when seeking informed consent and providing documents or information relevant to informed consent. For participants who are legally unable to give informed consent (e.g. children and individuals with an intellectual disability), the researcher must obtain appropriate consent from the persons who are legally responsible for participants' wellbeing (i.e. parent or guardian).

Consent may be expressed orally, in writing or by some other means that indicates consent (e.g. return of a questionnaire), depending on: (a) the nature, complexity and level of risk of the research; and (b) the participant's personal and cultural circumstances.

Often, researchers obtain informed consent using a document like that in Figure 2.78 on page 95. Two copies are made so that one can be kept by the researcher and one by the participant.

Use of deception

Deception occurs when participants are deliberately misled or not fully informed about the aim or some other aspect of the research. This is sometimes necessary to avoid unduly influencing their responses during the study and consequently the accuracy of the results.

By its nature, deception violates the ethical requirement of informed consent. Its use also means that the relationship between researcher and participant is not open and honest. However, deception is considered acceptable if the potential benefits of the research justify its use and there is no feasible alternative to its use.

Whenever deception is used, it is essential that all participants are debriefed at the conclusion of the study.

Debriefing

Debriefing involves clarifying each participant's understanding of the nature of the research as soon as possible after it has been conducted. This includes explaining the true purpose of the research and why it was necessary to deceive them, correcting any mistaken ideas and impressions participants may have, and providing an opportunity for questions about any aspect of the study, including the need for deception.

Another important requirement of debriefing is to check the wellbeing of the participant and address any harm that may have resulted from their participation in the study; for example, providing information about counselling services and how to access them to help treat any distress resulting from the study. In extreme cases, participant wellbeing may be monitored after the research; for example, participants may receive questionnaires, be asked to complete diaries and/or have follow-up meetings with the research team.

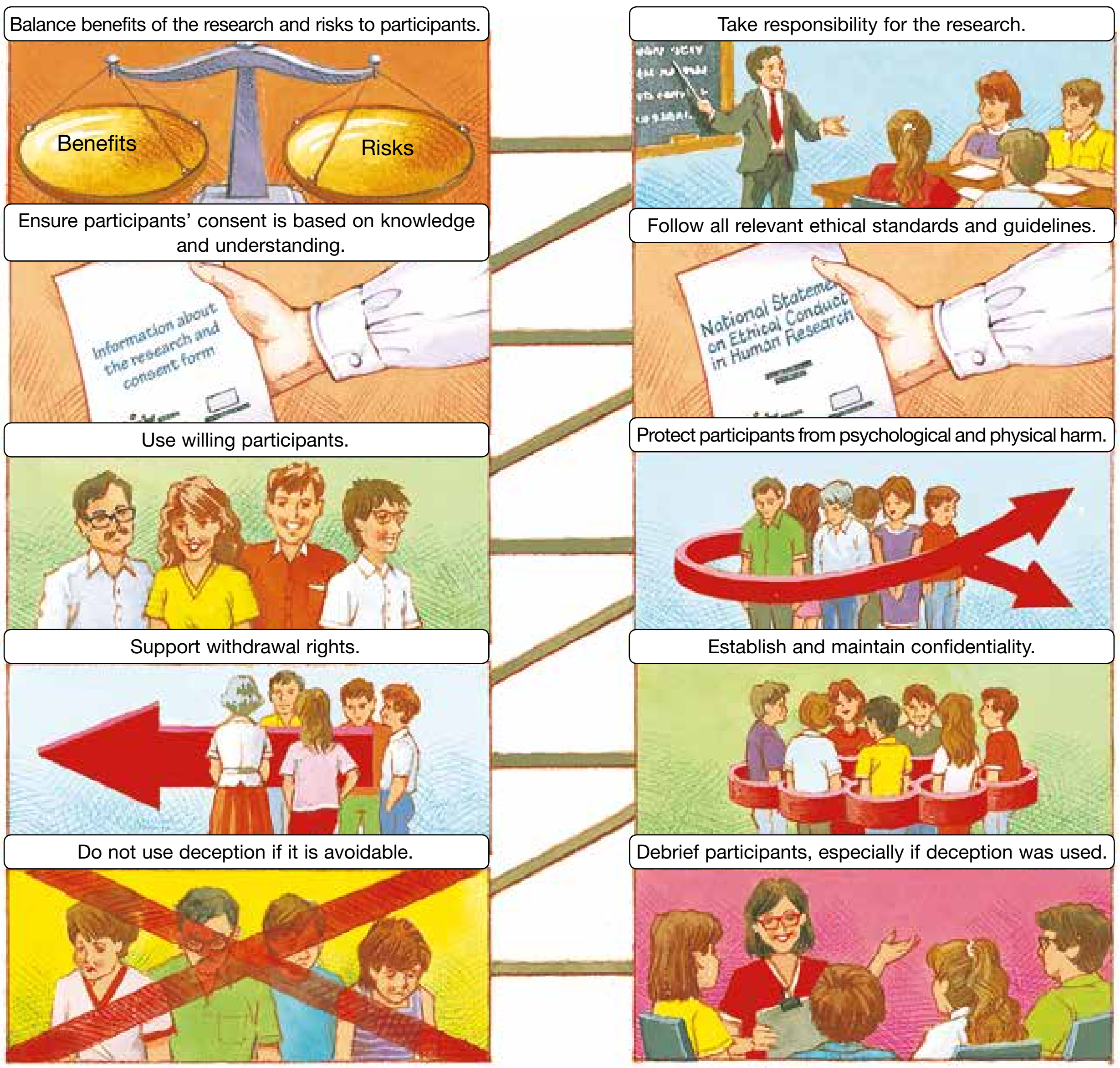

Figure 2.77 All ethical standards and guidelines must be followed when conducting psychological research.

SAMPLE ONLY

CONSENT FORM TO PARTICIPATE IN RESEARCH

TITLE OF RESEARCH: ....

DESCRIPTION OF RESEARCH: Insert an outline of the research and other relevant information. Include:
- aim/purpose/reasons for the investigation
- method used to collect data
- how the data will be analysed, described and presented
- what the participants will need to do and time commitment
- how confidentiality will be maintained
- whether the participant will have a chance to see and comment on the final report
- what will happen to the final report
- who will read the report and have access to it
- withdrawal right
- name(s) of researcher(s), supervisor/teacher and school
- status of the researcher(s).

I, ..., consent to taking part in the research investigation described above. I understand my rights as a participant in this research. The aim and procedures of the study have been explained to me and I understand them.

[*Where deception is used a clause such as the following should be included.*]
I understand that it is sometimes essential for the validity of research results not to reveal the true purpose of the research to participants. If this occurs, I understand that I will be debriefed as soon as is possible after my participation and, at that time, given the opportunity to withdraw from the research and have records of my participation deleted.

I have been advised the results of the research will be presented in a formal written report but that my personal details will remain confidential.

I voluntarily consent to participate but I understand that I may discontinue participation from the study at any time without giving a reason.

If you have any questions, comments or complaints to make on this research, please contact [*insert the researcher's name and/or the Psychology teacher's name*] at [*insert the researcher's and/or the Psychology teacher's contact details, including phone number(s)*].

Name of Participant: ....

Signature: ....

Name of Researcher: ....

Signature: ....

Date: ....

Figure 2.78 An example of a document for obtaining written consent to participate in research. Researchers often separate the study information from the consent form by using two separate documents — an Information Sheet and a Consent Form. In addition, a copy of the signed consent form is often given to the participant.

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Weblinks
Online templates for psychology research consent forms

BOX 2.15 Ethical practices and conduct in VCE Psychology

The VCE Psychology study design has advice on ethical conduct that must be followed by VCE Psychology students and teachers. This advice includes the following:

Ethical conduct of experimental investigations

As part of this study teachers and students will be involved in teaching and learning activities that include experimental investigations using human subjects. Teachers and schools have a legal and moral responsibility to ensure that students follow ethical principles at all times when undertaking such investigations. Teachers should refer to the following documents for detailed advice.

- *The National Statement on Ethical Conduct in Human Research* (2007), issued by the National Health and Medical Research Council (NHMRC) in accordance with the NHMRC Act 1992 (Cwlth), www.nhmrc.gov.au/publications/synopses/e72syn.htm
- The National Privacy Principles in the *Privacy Amendment (Private Sector) Act 2000* (Cwlth), www.privacy.gov.au/
- The Code of Ethics of the Australian Psychological Society (APS), www.psychology.org.au

It is not expected that animals will be used in the teaching of this study. If using animals in teaching, schools must comply with the current legislation including:

- the *Prevention of Cruelty to Animals Act 1986* and its Regulations 2008
- the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes 2014* (8th edition), www.nhmrc.gov.au/guidelines/publications/ea28.

Safety and wellbeing

This study may include potentially sensitive topics. Teachers should ensure that students have opportunities to consider topics systematically and objectively, and to become aware of the diversity of views held on such matters. Students should not be asked to disclose personal information about their own or others' health status and behaviours.

When dealing with sensitive mental health matters, students should be specifically advised that they are neither trained nor equipped to diagnose problems or offer any counselling or therapy. Students should be given information as appropriate about sourcing available treatment services within and outside school.

As part of this study teachers and students may consider different psychological assessments, including standardised psychological tests which are designed to be administered only by trained psychologists. Teachers must limit access to such tests and ensure that students understand that such tests should only be administered by a qualified psychologist.

It is the responsibility of the school to ensure that duty of care is exercised in relation to the health and safety of all students undertaking the study. Teachers and students should observe appropriate safety precautions when undertaking practical work. All laboratory work should be supervised by the teacher. It is the responsibility of schools to ensure that they comply with health and safety requirements.

Relevant acts and regulations include:

- *Occupational Health and Safety Act 2004*
- *Occupational Health and Safety Regulations 2007*
- Occupational Health and Safety Management Systems (AS/NZ 4801)
- *Dangerous Goods (Storage and Handling) Regulations 2012*
- *Dangerous Goods Storage and Handling Code of Practice 2000*
- *Hazardous Substances Code of Practice 2000*
- *Electrical Safety Act 1998.*

Legislative compliance

When collecting and using information, the provisions of privacy and copyright legislation, such as the Victorian *Privacy and Data Protection Act 2014* and *Health Records Act 2001*, and the federal *Privacy Act 1988* and *Copyright Act 1968*, must be met.

Source: © VCAA, VCE Psychology Study Design (June 2017 update), pp. 8–9.

USE OF ANIMALS IN PSYCHOLOGICAL RESEARCH

Although psychology is primarily interested in people, about 7–8% of psychological research involves the use of animals. About 90% of the animals used have been rodents and birds, mostly rats, mice and pigeons. About 5% of the animals are monkeys and other primates. Use of dogs and cats is rare (American Psychological Association, [APA], 2017).

Research with animals has and continues to have an important role in psychology. Discoveries through animal research have advanced understanding of human behaviour and mental processes in a diverse range of areas; for example, behavioural and bodily changes that occur when stressed; basic learning processes; the neurobiology of learning and memory; processes of recovery after neural damage; brain plasticity; mechanisms that control hunger and thirst; behavioural and psychological effects of medications used in the treatment of various mental disorders; addiction to illegal drugs; how the senses function and physiological influences on perception; the critical role of early experience in development; attachment; aggression; emotion and cognition (APA, 2017; Bennett, 2012).

Figure 2.79 About 7–8% of psychological research involves the use of animals.

The main reasons animals are used in psychological research to achieve the kinds of benefits described are:

- Some studies cannot be conducted with humans due to the risk of psychological and/or physical harm that may be caused, or because suitable human participants are unavailable. Various examples are included throughout this text.
- Bodily systems and/or behaviours of some animals are similar to those of humans; therefore, using animals can be a 'starting point' for learning more about human behaviour.
- Animals have practical advantages over people for use as research participants. For example, studying the effects of ageing from birth through to 'old age' is not generally practical in humans because most people live more than 75 years, compared with rats which have an average life expectancy of two years, or monkeys which live for 15–20 years. Another advantage is that some animal species breed a lot faster than humans. For instance, rats produce a new generation every three months and can be used to study the development of certain behaviours over successive generations within a relatively short period of time. Animals can also be kept for long periods of time in captivity in laboratories and it is easier to observe their behaviour under these conditions.
- The behaviour of animals can usually be controlled to an extent not possible with human participants. For example, a rat can be raised from birth in a cage. The rat can then be used in a learning experiment and the psychologist will have a good idea of what it has already learned before the experiment is conducted.
- When certain experiments require large numbers of participants who have, for example, the same genetic background, animals are more easily obtained than humans.
- Participant expectations can influence the results of an experiment; however, animals don't usually have expectations and they are not able to guess the purpose of an experiment.

Many arguments have been presented against the use of animals in psychological research. One argument is that it is not possible to generalise the results of animal studies to humans because the species are not the same even though there may appear to be similarities. An issue for researchers is how far they can generalise about human mental experiences and behaviour from the results of animal studies. If laboratory animals die after prolonged sleep loss, would humans? If a drug causes a brain disorder in animals, should it be banned for human use? Another argument is that humans should respect animals and protect them from harm rather than use them in research. It is also suggested that humans do not have the right to dominate other species.

In order to ensure that all reasonable steps are taken to minimise the discomfort, illness and pain to animals used in research, ethical guidelines have also been established for the use of animals in research. The use and care of laboratory animals must be directly supervised by a person competent to ensure their comfort, health and humane treatment. Importantly, the care and use of animals in research is governed by the NHMRC *Australian code for the care and use of animals for scientific purposes 8th edition (2013).*

The purpose of the Code is 'to promote the ethical, humane and responsible care and use of animals for scientific purposes'. An obligation to respect animals is central in the Code.

According to the Code (p.1), 'This obligation brings with it a responsibility to ensure that the care and use of animals for scientific purposes is ethically acceptable, balancing whether the potential effects on the wellbeing of the animals involved is justified by the potential benefits to humans, animals or the environment. The use of animals for scientific purposes must have scientific or educational merit; must aim to benefit humans, animals or the environment; and must be conducted with integrity. When animals are used, the number of animals involved must be minimised, the wellbeing of the animals must be supported, and harm, including pain and distress, in those animals must be avoided or minimised.'

Figure 2.80 Psychologists must ensure that research animals are well cared for, humanely treated and experience minimal pain and suffering.

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Weblink
NHMRC Code for research using animals

LEARNING ACTIVITY 2.29

Review questions

1. Define the meaning of ethics in relation to research.
2. What is the main purpose of ethical standards and guidelines for psychological research with human participants?
3. Name and describe the four values that should be reflected in all human research.
4. What are three essential informed consent procedures?
5. What is the ethical responsibility of a researcher who conducts research with human participants, but does not fully inform them of the true purpose of the research before the study begins because it may influence the participants' behaviour?
6. If a research participant became distressed during the research, what should occur?
7. Explain the ethical relevance of the Australian Privacy Principles.
8. (a) What is an ethics committee?
   (b) Give three examples of its roles and responsibilities.
9. List three reasons for the use of animals in psychological research.
10. List three ethical guidelines to be followed in research using animals.

LEARNING ACTIVITY 2.30

Applying ethical values

Which ethical research value — *merit*, *integrity*, *beneficence*, *justice* and *respect for human beings* — is relevant to each of the following statements?

Statement	Ethical value
1. The process of recruiting participants is fair.	
2. The researcher does not 'make fun' of a participant's unexpected responses.	
3. The researcher has a commitment to following all relevant ethical standards.	
4. The researcher does not put pressure on a participant to consent to study participation.	
5. The researcher is certain that what is likely to be learnt from their study justifies the risks of harm or discomfort to participants.	
6. Every single human being has value in himself or herself.	

LEARNING ACTIVITY 2.31

Applying ethical standards to human research

Suppose you have been asked to sit on an ethics committee. The following proposals for human research have been presented to your committee for approval. Your task is to evaluate the proposals in terms of whether they meet the standards, then write your recommendations, commenting on:

(a) whether the committee approves or rejects the proposal as it is presented

(b) if the proposal is rejected, on the basis of which ethical principle(s) it is rejected.

Proposal 1

Danielle Foster is a clinical psychologist who is interested in how parents cope with the death of a young child. She proposes to obtain qualitative data through research on grieving parents' use of support available through the internet.

Foster is particularly interested in chat rooms dedicated to parents who have lost a young child. In order to obtain realistic qualitative data, she intends to pose as a parent who has recently lost a child and participate in discussions in several chat rooms. In the course of her chat room participation, she will raise issues for discussion and make judgments about the quality and usefulness of chat room support.

Proposal 2

Dr Amir is interested in the effect of stress on performance on the McCord IQ Test. He feels that the test, which is very widely used in schools, gives misleadingly low scores to students under stress. He wants to divide his participants (VCE students) into two groups, with 20 participants in each group. All participants will take a fake pretest and will be given their 'results'. The experimental group will be told that they failed the test and that it is surprising that they were able to do well enough at secondary school to make it through to VCE. The control group will be told that they passed the test with flying colours. All of the students will then be given the real McCord IQ test.

Dr Amir hypothesises that the experimental group will not do as well on the IQ test as the control group. At the end of the experiment, all students will be debriefed and told that the pretest was not real, nor was the feedback following pre-testing. In addition, the true purpose of the study will be explained.

(Proposal 2 adapted from Herzog, H. (1996, Nov–Dec). Discussing Ethical Issues in Psychological Research. *Psychology Teacher Network*, p. 12.)

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Digital document

Applying ethical standards to animal research

REPORTING CONVENTIONS

The final and very important stage in the research process involves the following preparation of a report on the research and its findings. This is done for detailed written reasons:

- to communicate or 'share' the results with others, particularly other researchers interested in what was studied, and
- to enable replication of the study to test the validity and reliability of its results.

When reporting research, psychologists provide a detailed description of the study and its findings. The written report has two important characteristics:

- there is enough information to enable close examination of all stages of the investigation (including the results), and, if required, to replicate the study; and
- reporting conventions are used.

Reporting conventions are well-established and widely recognised standards, or 'rules', about how a report is written and presented. Reporting conventions determine aspects of the report such as writing style, its structure and organisation, headings, presentation of tables and graphs, and formats for referencing.

For example, the writing style used in a psychological research report is like that of all scientific reports. The language is formal, clear, concise, written in the past tense, in the third person and using the passive voice. Appropriate phrases that meet these language standards are: 'An experiment was conducted to test . . .', 'Each participant was . . .', 'The results show . . .', 'It can be concluded that . . .'. Scientific reports are not written using the first person, for example, 'I did . . .', 'We asked . . .', 'In my opinion . . .', 'I believe that . . .', '. . . and then we asked the participants to . . .'.

Conventions for psychological research reports are based on those described in the *Publication Manual of the American Psychological Association, Sixth Edition* (2010). This manual is commonly called 'the APA manual' and its conventions are often referred to as 'APA format'.

The APA format is widely recognised and used by psychologists throughout the world to guide their preparation and presentation of written and poster research reports. These conventions are also used by psychology students for reporting conducted as part of their university studies. VCAA does not mandate specific reporting conventions for VCE Psychology.

The following guidelines for preparing a written research report and referencing are based on the APA format. Guidelines for preparing a poster report are then outlined. The poster of report is less detailed and is commonly used to provide a summary of the key features of a research study for display and discussion at conferences or meetings with other psychologists likely to be interested in the research and its findings.

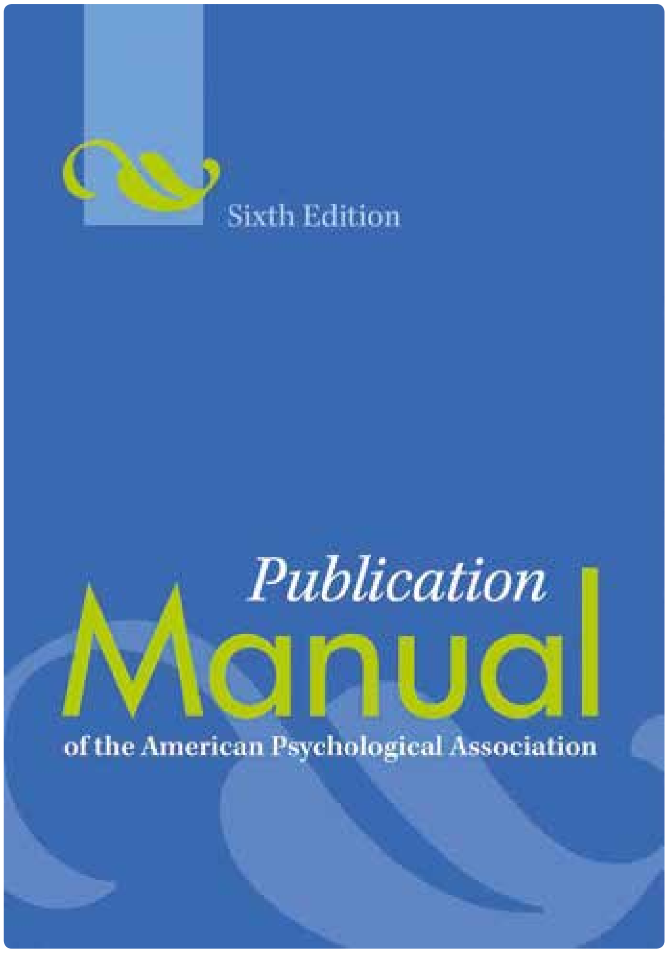

Figure 2.81 The cover of the APA manual

Written report

A standard research report is presented in sections that follow a set order. However, the structure of the report and organisation of the sections may sometimes be modified to suit the particular investigation.

Generally, the report is presented in a logical sequence that describes:

- what was done
- why it was done
- how it was done
- what was found
- what the findings probably mean.

Although the different sections of the report (described below) are usually presented in the order shown, they do not have to be prepared in that order. For example, the abstract which summarises the investigation appears first in the report but is usually easier to write last.

Title

This should be brief (usually one sentence) and indicate clearly what the research was about, e.g. 'Effect of practice on reading speed'. Quite often, researchers use a statement based on the hypothesis for a title. Words that have no useful purpose should be avoided, e.g. 'An experiment on . . .'

The title should be centred and positioned in the upper half of a cover page. The author's name is written under the title and centred on the page.

Abstract

This is a brief, comprehensive summary (about 120 words) of the entire report, usually presented as a single paragraph on a separate page.

It should include a description of what was investigated (in one sentence if possible), participants (specifying relevant personal characteristics such as age and sex), the key features of the research method, the main result(s) and the conclusion(s).

Considering the nature of its contents, the abstract is usually written last.

Introduction

This section gives the background to the research. It often summarises theory and results of other relevant research. If you are unable to find background information, or it is not required by your teacher, then you should explain the rationale ('reasoning') for conducting the research.

The introduction is often written in a way that leads the reader to a statement of the aim ('purpose') of the research and the hypothesis which was tested. The hypothesis is usually included in the last paragraph of the introduction and should be expressed as a specific statement which, for an experiment, refers to the independent and dependent variables.

In formal journal articles, the introduction does not have a heading because it is clearly identified by its position in a report.

Method

This section clearly describes how the research was conducted. There should be enough details for the reader to know exactly what was done so that the research could be replicated exactly in order to test the results.

The method is often divided into three sub-sections, each with the relevant heading — participants (or subjects), measures and procedure.

Participants

Includes details on how many participants were used, important characteristics that might have influenced the results (such as age, sex, educational background), the population (i.e. the larger group) from which they were drawn, and how the participants were selected (i.e. the sampling procedure) and allocated to groups. Details of the participants are often presented as a table.

Measures

Describes the test or other means used to collect data. A description of any questionnaire, observation checklist, test items, word lists and so on which were used in conducting the research should be included. For example, it may be stated that a 10-item questionnaire was used to measure attitudes towards violence in cartoons. Any evidence of the measure's validity and reliability should also be stated.

Examples or more detailed information about any measure should be included in an appendix at the end of the report.

Procedure

A detailed description of research method and design. This information should be presented in a way that another researcher could conduct the same study just by reading your description. Relevant information may include the roles of the researcher, how participants were recruited, whether they were placed into groups or whether this was achieved by using random allocation, what participants were asked to do, the setting and duration and so on.

Results

This section has a summary of the main results. There should be sufficient detail to justify the conclusion(s). All results should be accurate and displayed clearly. Tables, graphs, charts and other figures are used, depending what suits the type of data collected. The reader should be able to understand any table or figure without referring to another section of the report.

Only summary data should be presented in the results section. If relevant, raw data could be included in an appendix. Detailed comments on the results are included in the discussion.

Discussion

This is where the results are examined, interpreted and explained, especially with reference to the hypothesis. It is also where the researcher draws conclusions from the results.

The section usually starts with a clear statement about whether the hypothesis is supported on the basis of the results obtained. If the results do not support the hypothesis, then an explanation of why is given.

The general relevance of the results to the population from which the sample was drawn, and similarities and differences between the results and theory or other research (referred to in the introduction), is also described in this section.

In drawing conclusions, the researcher also considers and explains sources of potential bias and other limitations or weaknesses of the research. Then they suggest ways of effectively addressing these if the study were to be replicated.

Finally, practical applications of the findings to the real world are considered. Often, this section ends with suggestions for future research.

References

This section has a list of all sources cited in the report (but no others). Every quotation or summary of information from another source which is used in the report must be substantiated with a reference.

The list of references is presented in alphabetical order based on the surname of the first named author of a source. The formats for referencing in psychology are described in Box 2.16 (but no specific format is mandated in VCE Psychology).

Appendices (if any)

This is where materials which do not fit into the other sections of the report and are easily presented in print format are placed. There should be a different appendix for each set or category of materials. Each appendix should be numbered and have a title (e.g. *Appendix 1*. Test items for visual perception skills) and be presented on a separate page.

Materials included in an appendix should be referred to in the body of the report (e.g. Test items for visual perception skills (see Appendix 1)).

Poster report

A poster is another format for reporting research. In psychology, it is most commonly used for display and discussion at a meeting or conference. It may also be used for reporting research conducted by students in psychology courses.

Poster formats and their specific headers can vary. Generally, a well-constructed poster is less detailed than the written report, covers the key features of the research and is self-explanatory.

The VCE Psychology Study Design (p. 13) includes a VCAA 'template' to guide the headings and content of a poster report. This is shown opposite. More comprehensive information about the poster is available in the *VCE Psychology: Advice to Teachers* document at the VCAA website.

In Unit 4, there is a SAC requiring a student-directed practical investigation and all the VCAA poster sections *must* be used for the report. The poster may be produced electronically or in hard copy and should not exceed 1000 words. Scientific poster templates available on the internet may be used provided that the mandated poster sections (Title, Introduction, Methodology, Results, Discussion, Conclusion, References and Acknowledgments) are included. The production quality of the poster for the investigation is not assessed.

The poster template *may* be used in Units 1 and 2 but specific requirements can be varied by the teacher. For example, an additional 'Section' (such as an Abstract) may be included and/or some of the content may be excluded.

Section	Content and activities
Title	Question under investigation is the title
Introduction	Explanation or reason for undertaking the investigation, including a clear aim, a hypothesis and/or prediction and relevant background psychological concepts
Methodology	Summary that outlines the methodology used in the investigation and is authenticated by logbook entries
	Identification and management of relevant risks, including the relevant health, safety and ethical guidelines followed in the investigation
Results	Presentation of collected data/evidence in appropriate format to illustrate trends, patterns and/or relationships
Discussion	Analysis and evaluation of primary data
	Identification of outliers and their subsequent treatment
	Identification of limitations in data and methods, and suggested improvements
	Linking of results to relevant psychological concepts
Conclusion	Conclusion that provides a response to the question
References and acknowledgements	Referencing and acknowledgement of all quotations and sourced content as they appear in the poster

Source: © VCAA, *VCE Psychology: Advice to Teachers* (2016), pp. 72–74.

BOX 2.16 Referencing in psychology

The APA manual also describes conventions for citing and referencing sources of information used in a research report, essay or other psychological document. The conventions described in the APA manual are based on referencing styles commonly known as the 'author–date' or 'Harvard' system. There are numerous examples of the APA method within this text and in the references at the back.

Citations

Whenever another source is used to present evidence, give an example, develop an argument and so on, the source must be cited. This procedure helps the reader distinguish between your 'ideas' and 'work' and those of another person(s).

When writing a research report (or another document), it is sometimes necessary to cite within a sentence, and at other times at the end of a sentence (or paragraph).

Examples of how this is done are:

Within a sentence:

One author: In a study by Trotter (2016), participants were required . . .

Two authors: A similar result was reported by Trinh and Jones (2012), who found that . . .

Three to five authors: List all authors (separate the names with commas) and publication date, e.g. Black, White, and Yellow (2014) studied the effects of . . .

Six or more authors: First author + et al. + date, e.g. On the basis of their results, Franklin et al., (2016) proposed that . . .

Three or more authors cited again within a sentence: Black et al., (2014) concluded that . . .

Note that 'et al.' is a short form of 'et alia', which is Latin for 'and others'. In this text we prefer to use et al. for citations from journal articles or texts with four or more authors.

At the end of a sentence:

One author: The sex of the person in need of help was a factor that influenced whether or not the research participants would provide help (Willow, 1980).

Two authors: Our attitudes do not always match our behaviour (Pine & Chan, 2012).

Three to five authors: This behaviour is not unique to humans. It has also been observed in primates such as apes and gorillas (Cole, Schnell & Koumaki, 2005).

Six or more authors: On the basis of these results, the researchers concluded that visual perception is fallible (Black et al., 2014).

Three or more authors cited again at the end of a sentence: The primate's behaviour suggested it was capable of self-recognition when viewing its reflection in the mirror (Cole, et al., 2005).

Citing a reference used within another source

Sometimes you need to cite a source that was referred to by another author; for example, when you read about a study or research finding that was summarised and cited in a textbook. In this case, you would cite the source as follows:

Watson (as cited in White, 2015, p. 142) replicated the study using . . .

Quoting from a source

If you copy (word for word) information from another source instead of summarising the information using your own words, you should use quotation marks at the start and end of the quotation, use an ellipsis (. . .) when you omit words, and provide the reference and page number.

For example:
Tanaka and Young (2001) explained the observation in terms of " . . . the inability of a three-month-old child to recognise themself" (p. 18).

The reference list

The reference list includes all references used in compiling the report or other document. The references are presented in alphabetical order based on the surname of the first author (if there is more than one) using the formats in the following chart. There are some minor variations to suit VCE Psychology.

Type	Format	Example
Book	1. *Author*. (Surname of author then their initials. If more than one author, all names are presented in the order they appear on the title page of the book.) 2. *Year of publication*. (Enclosed in brackets, followed by a full stop) 3. *Title of book*. (Italicised and followed by a full stop) 4. *Edition.* (If a second or subsequent edition, 'edition' is abbreviated (e.g. 2nd ed.), enclosed in brackets and followed by a full stop.) 5. *City of publication* (and state if city is not well known, followed by a colon) 6. *Name of publisher*. (Followed by a full stop. Omit unnecessary terms such as Publishers, Co., and Inc. Retain the words Books or Press.)	*Book with one author:* Carr-Gregg, M. (2014). *Beyond cyber bullying*. Camberwell, Vic: Penguin. *Book with two or more authors:* Plomin, R., DeFries, J.C., McClearn, G.E., & Rutter, M. (2012). *Behavioural genetics*. New York: W.M. Freeman. *Book with another edition:* Grivas, J. (2017). *Psychology VCE, Units 1 and 2* (8th ed.). Milton, Qld: John Wiley & Sons. *Online book:* If available only online, the URL (full http address) takes the place of the publisher location and name but it is not underlined, active or followed by a full stop, e.g. Grivas, J. (2017). *Psychology VCE, Units 1 and 2* (8th ed.). Retrieved from http://www.jaconline.com.au/page/vce-psychology
Chapter or article in an edited book	1. *Author of chapter/article*. (Surname of the author then their initials. If more than one author, all names are presented in the order they appear on the title of the chapter/article.) 2. *Year of publication*. (Enclosed in brackets, followed by a full stop) 3. *Title of chapter/article.* (Not italicised, followed by a full stop and the word In) 4. *Author of book*. (Initials of author followed by their surname and Ed. in brackets. If more than one author, all names are presented in the order they appear on the title of the chapter/article and followed by Eds. in brackets.) 5. *Title of the book*. (Italicised and followed by the page numbers in brackets, then a full stop) 6. *City of publication* (and state if city is not well known, followed by a colon) 7. *Name of the publisher.* (Followed by a full stop. Omit terms such as Publishers, Co., and Inc. Retain the words Books or Press.)	*One author:* Kostas, M. (2016). Train your brain. In I. Smith & S. Battista (Eds.), *Advances in neuropsychology* (pp.103–115). New York: Academic Press. *Online:* If available only online, the URL takes the place of the publisher location and name, but it is not underlined, active or followed by a full stop, e.g. Kostas, M. (2016). Train your brain. In I. Smith & S. Battista (Eds.), *Advances in neuropsychology* (pp.103–115). Retrieved from http://www.store.elsevier.com/Academic-Press/IMP_5
Journal article	1. *Author*. (Surname of author then their initials. If more than one author, the names are presented in the order they appear in the article.) 2. *Year of publication*. (Enclosed in brackets, followed by a full stop) 3. *Title of article*. (Followed by a full stop) 4. *Title of journal*. (Underlined or italicised and followed by a comma) 5. *Volume number of journal*. (Italicised and followed by the issue number (if there is one) in brackets and not italicised, then a comma) 6. *Page numbers*. (Followed by a full stop)	*One author:* Caughy, M.O. (2015). Health and environmental effects on the academic readiness of school age children. *Developmental Psychology*, *32*, 515–522. *Two or more authors:* Bushman, B.J., & Huesmann, L.R. (2006). Efects of violent media on aggression in children. *Journal of Developmental Psychology*, *16*(4), 348–352.

(continued)

(continued from previous page)

Type	Format	Example
Pamphlet/ brochure/ fact sheet	1. *Author*. (Surname of author then their initials, or the organisation name, followed by a full stop) 2. *Year of publication*. (Enclosed in brackets, followed by a full stop) 3. *Title (Italicised)* 4. *Type*. Identify as a pamphlet, brochure or fact sheet. (In brackets, followed by a full stop) 5. *City of publication* (and state if city is not well known, followed by a colon) 6. *Name of the publisher*. (Followed by a full stop)	*Print copy:* Black Dog Institute. (2018). *Causes of depression* (Fact sheet). Randwick, NSW: Black Dog Institute. *Online:* SANE Australia. (2017). *Antidepressant medication* (Fact Sheet). Retrieved March 23, 2017, from http://www.sane.org/information/factsheets-podcasts/200-antidepressant-medication
Newspaper or magazine article	1. *Author*. (Surname of author then their initials. If more than one author, the names are presented in the order they appear in the article.) 2. *Date of publication*. (Enclosed in brackets, with the year before the month and day, followed by a full stop) 3. *Title of newspaper/magazine*. (Italicised and followed by a comma) 4. *Page numbers*. (Followed by a full stop)	*If you know the author:* Smith, K. (2015, July 10). Study shows busy minds good for health. *The Age*, p. 13. *If you do not know the author:* Personality types in the workplace. (2018, January 12). *Herald Sun*, p. 32. *Online:* If accessed online, the URL takes the place of the page number(s), but it is not underlined, active or followed by a full stop, e.g. Smith, K. (2018, July 15). Study shows busy minds good for health. *The Age*. Retrieved from http://www.theage.com.au
Internet (including YouTube)	1. *Author*. (Surname of author then their initials, or the organisation name, followed by a full stop) 2. *Date of website publication*. (If available and enclosed in brackets, followed by a full stop) 3. *Title of article*. (If specified) 4. Retrieved from 5. *When retrieved* if *date of publication is not available or if the material is not subject to frequent change* (Year, month, date followed by a comma and the word 'from'). *Otherwise simply state* Retrieved from 6. *URL*. (Not underlined, active or followed by a full stop)	*When publication date is known:* Mayo Clinic (2015). *Tests and procedures: Deep brain stimulation* (video file). Retrieved http://www.mayoclinic.org/tests-procedures/deep-brain-stimulation/basics/definition/prc-20019122 *When publication date is not known:* *Feral child found living in jungle (n.d.)*. Retrieved May 10, 2015, from http://www.news.com.au/national/child-found-living-jungleim story_13178.asp *YouTube:* The Royal Children's Hospital Melbourne (2016, December 18). *Having a CT scan of your head* (video file). Retrieved from https://www.youtube.com/watch?v=VaDILD97CLM
Motion picture (movie), TV program, DVD, audio	1. *Main contributors*. (Surname first, and, in brackets, the role of the main contributors, usually the director and/or writer) 2. *Year or date released*. (Enclosed in brackets and followed by a full stop) 3. *Title*. (Italicised) 4. *Type*. (Identify as a motion picture or other media type, in brackets and followed by a full stop) 5. *Origin*. (Give the place of origin, where it was primarily made and the name of the production company)	*Movie:* Howard, R. (Director) & Goldsman, A. (Writer). (2001). *A beautiful mind* (Motion picture). Beverly Hills, California: Imagine Entertainment. *DVD:* Howard, R. (Director) & Goldsman, A. (Writer). (2002). *A beautiful mind* (DVD). Beverly Hills, California: Universal Studios Home Video. *TV program:* Alexis, T. (Executive producer). (2018, March 20). *7.30* (Television broadcast). Melbourne, Vic.: ABC.
Personal communication or interview (e.g. class notes and data, letters, personal interviews, telephone conversations, email)	1. *Initials and surname of communicator* 2. *Type of communication* (in brackets) 3. *Date of communication* (in brackets and followed by full stop) *Note:* Personal communications are not included in an APA-type reference list because they are usually not recoverable/accessible.	L. Smith (interview, 10 January 2017).

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Weblink
Digital Object Identifier (DOI) number

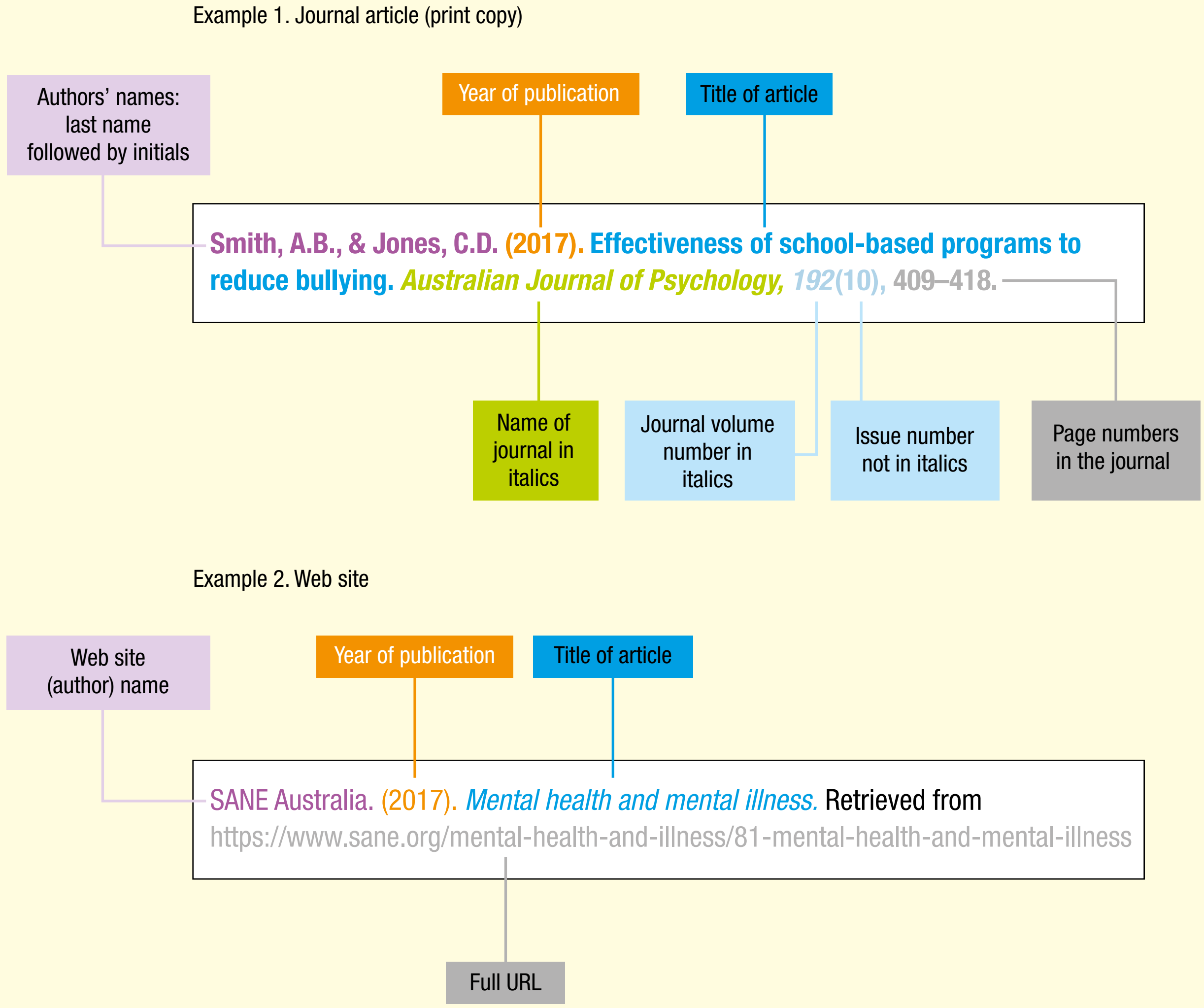

Figure 2.82 Examples of conventions used by psychologists for referencing. Note the use of commas, full stops and italics. Colour is used here for illustration purposes and is not a convention. Note also that researchers now include digital object identifier numbers for references that are available electronically. These have been excluded from references at the back of this text.

CHAPTER SUMMARY

- **RESEARCH METHODS IN PSYCHOLOGY**
  - **Steps in psychological research**
    - Sample and population
    - Research hypothesis
      - Research hypothesis versus theory and model
  - **Research methods**
    - Experimental research
      - Independent and dependent variables
      - Operationalising independent and dependent variables
      - Experimental and control groups
      - Extraneous variables
      - Confounding variables
      - Identifying potential extraneous and confounding variables
      - Ways of minimising extraneous and confounding variables
    - Advantages and limitations of experimental research
    - Cross-sectional studies
      - Advantages and limitations of cross-sectional studies
    - Case studies
      - Advantages and limitations of case studies
    - Observational studies
      - Natural and contrived settings
      - Participant and non-participant observation
      - Advantages and limitations of observational studies
    - Self-reports
      - Questionnaires
      - Interviews
      - Rating scales
      - Advantages and limitations of self-reports
  - **Types of data**
    - Primary and secondary data
    - Qualitative and quantitative data
  - **Organising, presenting and interpreting data**
    - Descriptive statistics
      - Tables
      - Graphs
      - Percentages
      - Mean as a measure of central tendency
      - Standard deviation as a measure of variation
    - Inferential statistics
      - Statistical significance and *p* values
    - Conclusions and generalisations
    - Reliability and validity in research
      - Reliability
      - Validity
        - Internal validity
        - External validity
  - **Ethics in psychological research and reporting**
    - National Statement on Ethical Conduct in Human Research
    - Role of ethics committees
    - Australian Privacy Principles
    - Role of the experimenter
      - Protection and security of participants' information
      - Confidentiality
      - Voluntary participation
      - Withdrawal rights
      - Informed consent procedures
      - Use of deception
      - Debriefing
  - **Use of animals in psychological research**
  - **Reporting conventions**
    - Written report
    - Poster report

KEY TERMS

beneficence p. 91
case study p. 58
chance p. 42
conclusion p. 85
confidentiality p. 93
confounding variable p. 34
control group p. 32
convenience sampling p. 44
counterbalancing p. 47
cross-sectional study p. 56
data p. 70
debriefing p. 94
deception (in research) p. 94
dependent variable p. 29
descriptive statistics p. 74
double-blind procedure p. 47
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ethics committee p. 92
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experimental condition p. 32
experimental group p. 32
experimenter effect p. 39
external validity p. 88
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LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 110–18. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about research methods in psychology	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Steps in psychological research			
Research methods			
• Sample and population			
• Research hypothesis			
– Research hypothesis versus theory and model			
• Experimental research			
– Independent and dependent variables			
– Operationalising independent and dependent variables			
– Experimental and control groups			
– Extraneous variables			
– Confounding variables			
– Identifying potential extraneous and confounding variables			
– Ways of minimising extraneous and confounding variables			
– Advantages and limitations of experimental research			
• Cross-sectional studies			
– Advantages and limitations of cross-sectional studies			
• Case studies			
– Advantages and limitations of case studies			
• Observational studies			
– Natural and contrived settings			
– Participant and non-participant observation			
– Advantages and limitations of observational studies			
• Self-reports			
– Questionnaires			
– Interviews			
– Rating scales			
– Advantages and limitations of self-reports			
Types of data			
• Primary and secondary data			
• Qualitative and quantitative data			

Key knowledge I need to know about research methods in psychology	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Organising, presenting and interpreting data			
• Descriptive statistics			
– Tables			
– Graphs			
– Percentages			
– Mean as a measure of central tendency			
– Standard deviation as a measure of variation around the mean			
• Inferential statistics			
– Statistical significance and *p* values			
• Conclusions and generalisations			
• Reliability and validity in research			
– Reliability			
– Validity			
◦ Internal validity			
◦ External validity			
Ethics in psychological research and reporting			
– National Statement values			
– Role of ethics committees			
– Australian Privacy Principles			
– Role of the experimenter			
◦ Protection and security of participants' information			
◦ Confidentiality			
◦ Voluntary participation			
◦ Withdrawal rights			
◦ Informed consent procedures			
◦ Use of deception			
◦ Debriefing			
• Use of animals in psychological research			

CHAPTER 2 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

The main purpose of ethical standards for research is to

A. ensure validity and reliability of the results.
B. ensure that the research proceeds scientifically.
C. safeguard the rights and wellbeing of participants.
D. keep problems with participants to a minimum.

Question 2

A researcher studied differences in the behaviour of newborn babies who are breast-fed and newborn babies who are bottle-fed. The psychologist conducted the research with 20 mothers and their newborn infants at the Royal Women's Hospital (RWH). The 20 mothers (and infants) were selected from a group of 45 mothers at the RWH who had all volunteered to participate in the experiment. There were another 50 mothers with newborn infants at the hospital, but these mothers did not volunteer to be in the experiment.

In this experiment, there were _____ mothers (and their infants) in the sample, and _____ mothers (and their infants) in the population.

A. 20; 95
B. 45; 50
C. 20; 45
D. 45; 95

Question 3

A researcher interested in the effects of anxiety on exam performance asked research participants to describe how they feel during an exam when they come across a question they know they will get wrong. The participants' responses were tape-recorded so that they could be analysed at a later time.

The type of data obtained by the researcher is best described as

A. secondary data.
B. quantitative data.
C. numerical data.
D. qualitative data.

Question 4

When the researcher replayed the tape of participants' responses to the questions asked in the experiment described in question 3, it was decided to summarise the data using a table which showed the number of times certain anxiety-related words, such as 'worried' and 'scared', and non anxiety-related words such as 'nothing' and 'didn't care', were used. This type of data is best described as

A. secondary data.
B. quantitative data.
C. qualitative data.
D. quantitative and qualitative data.

Question 5

To test the notion that 'two heads are better than one', a researcher measures how long it takes people working either in groups of two or working alone to solve a problem. The independent variable is

A. the problem.
B. the number of people working on the problem.
C. the time it takes to solve the problem.
D. whether or not the problem is solved.

Question 6

Minimising unwanted effects of variables other than the independent variable involves controlling

A. participant responses in the experimental condition.
B. participant responses in the control condition.
C. extraneous variables.
D. dependent variables.

Question 7

Which of the following procedures would be considered to be unethical when conducting research?

A. choosing only volunteers as participants in an experiment
B. disclosing a participant's extraordinary test results to the media without obtaining written consent to do so from the research participant
C. testing a child's ability to do algebra even though the child's ability to do algebra is already known
D. allowing a participant to discontinue being in the experiment, even though the experiment has started

Question 8

A research hypothesis is

A. a prediction about the results to be obtained for a study.
B. a very specific procedure the researcher must follow when conducting a study.
C. a statement about whether the results apply to the population of research interest.
D. a statement about the accuracy of the results of a study.

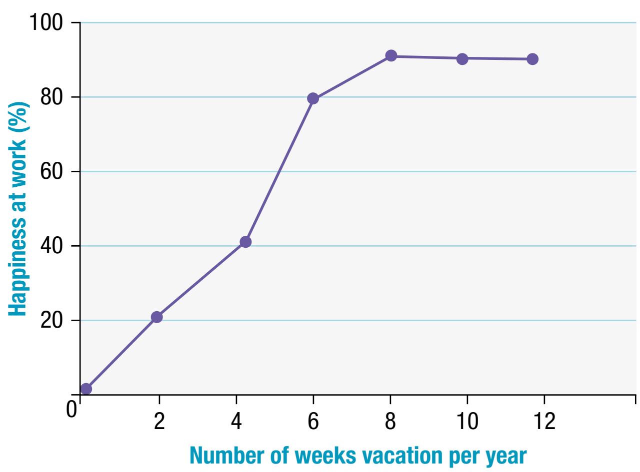
Question 9

In an experiment, the group of participants used for comparison purposes in order to measure any change caused by the IV is called a/an

A. independent variable group.
B. placebo group.
C. experimental group.
D. control group.

Question 10

A researcher collected data for a study on the amount of vacation time employees had and their happiness at work. The data were presented in the following graph.



The type of graph they used to show the results is called a

A. line graph.
B. bar graph.
C. chart.
D. measure of variability.

Question 11

The most important feature of a table is that

A. percentages have been calculated.
B. the data are displayed in an orderly arrangement of rows and columns.
C. means have been calculated.
D. all raw data are included and accurately reflect participants' responses.

Question 12

Which of the following series of steps is the most appropriate sequence for conducting psychological research using scientific method?

A. design the research, collect data, formulate hypothesis, analyse data, interpret data, report findings
B. formulate hypothesis, design the research, collect data, analyse data, interpret data, report findings
C. design the research, collect data, analyse data, interpret data, formulate hypothesis, report findings
D. formulate hypothesis, collect data, design the research, interpret data, analyse data, report findings

Question 13

To generalise from the results of a research study means

A. overstating the results.
B. stating whether the results can be replicated.
C. restricting the conclusion(s) to the results.
D. applying the results to the sampled population.

Question 14

Validity in research means that

A. the participants knew what they had to do.
B. the researchers knew what they were doing.
C. the research study produced results that accurately measured the behaviour or event that it claimed to measure.
D. the researchers obtained results that were consistent and dependable.

Question 15

A researcher evaluating their experiment asks the question: 'Did the IV actually cause the difference between the mean scores of the participants in the experimental and control conditions?' This question is most relevant to

A. debriefing.
B. reliability.
C. internal validity.
D. external validity.

Question 16

A researcher designs an experiment to test whether alcohol increases reaction time. Group A participants drink three orange-flavoured drinks containing a small amount of alcohol and Group B drink three orange-flavoured drinks that contain no alcohol. Both groups are told that the orange-flavoured drinks contain alcohol.

In this study, Group B is in the ______ condition.

A. experimental
B. single-blind
C. placebo control
D. stratified control

Question 17

A researcher conducted an experiment and concluded that the students who used the memory aid called Memco achieved significantly better results on a VCE Psychology test than students who did not use Memco.

The researcher proposed that this conclusion is likely to apply to other VCE subjects (e.g. to Biology and History as well as Psychology) and should also apply to people beyond the sample in the study (e.g. all students).

The researcher is proposing that their experiment has a high level of

A. control.
B. reliability.
C. internal validity.
D. external validity.

Question 18

One way of controlling an experimenter effect is to ensure that

A. the experimenter is unaware of the experimental conditions to which research participants have been allocated.
B. the experimenter explains the instructions clearly.
C. the experimenter is informed about which participants are in which groups.
D. only the research assistants know which participants are in the different experimental groups.

Question 19

Which one of the following is **not** an example of objective data?

A. an attitude towards a political party
B. speed in seconds to perform a complex task
C. number of words correctly recalled in a memory experiment
D. percentage of times traffic indicators are used to signal a turn when driving a motor vehicle

Question 20

An extraneous variable is linked to the lack of motivation by participants in an experiment. This type of extraneous variable is best described as a/an _____ variable.

A. experimental
B. experimenter
C. participant
D. motivational

Question 21

The standard deviation summarises the

A. differences in means of a set of scores.
B. scores that differ in variation.
C. most commonly occurring score in a set of scores.
D. spread of scores from the mean for the set of scores.

Question 22

In an experiment, the variable that is manipulated or changed in some way by the experimenter is called the _____ variable, whereas the variable that is measured to find out the effects of the treatment is called the _____ variable.

A. control; experimental
B. independent; dependent
C. experimental; control
D. dependent; independent

Question 23

A confounding variable is best described as

A. a second IV.
B. an extraneous variable that has become an IV.
C. an extraneous variable that may or may not affect the DV.
D. a variable other than the IV whose effects on the DV are mixed up with those of the DV.

Question 24

A researcher used a statistical procedure to determine the extent to which chance may have been responsible for the difference in mean scores obtained for two groups used in an experiment. The type of statistic used for this purpose is called a/an _____ statistic.

A. chance
B. descriptive
C. inferential
D. significance

Question 25

A researcher conducted an experiment on the effectiveness of a new study technique for memorising Chinese characters used in reading and writing. Two groups of participants were used.

Group A were given instructions on how to use the new study technique, then required to memorise a list of 20 Chinese characters. Group B were simply asked to memorise the list of 20 Chinese characters. All participants in each group were given a test of recall on the list of characters.

A mean score of 14 correct responses was obtained for Group A and a mean score of nine was obtained for Group B.

In this experiment, the independent variable is _____; whereas the dependent variable is _____.

A. use of the new study technique; the number of Chinese characters correctly recalled
B. Group A; Group B
C. the number of Chinese characters correctly recalled; use of the new study technique
D. Group B; Group A

Question 26

The results of a research study are said to be reliable when

A. consistent and dependable.
B. an appropriate research method is used.
C. the researcher has drawn conclusions that are accurate.
D. the researcher has conducted an experiment that established a cause–effect relationship.

Question 27

A researcher is interested in studying why some people willingly give up their personal time to help others. She has seen people operating a hot soup outlet for homeless people after midnight and decides to survey the operators. The researcher's sampling procedure is best described as _____ sampling.

A. random
B. convenience
C. stratified
D. situational

Question 28

When drawing a line graph for the results of an experiment,

A. the dependent variable is represented on the horizontal axis, whereas the independent variable is represented on the vertical axis.
B. the independent variable is represented on the horizontal axis, whereas the dependent variable is represented on the vertical axis.
C. a line of best fit can be used to illustrate the underlying relationship between the independent and dependent variables.
D. the trend line must always show a causal relationship between the independent and dependent variables.

Question 29

A researcher conducted a study on memory and found a significant difference between the number of words correctly remembered for the group using the free recall method and the group using the recognition method. The results of the study are likely to be expressed as

A. $p > 0.05$.
B. $p > 0.5\%$.
C. $p < 0.05$.
D. $p < 0.5$.

Question 30

In one experiment, researchers exposed children to a video clip showing aggressive and non-aggressive adult models and then observed the children to measure the amount of `imitative learning' of aggressive behaviour.

In order to control individual participant differences in pre-existing aggression, which could distort the results if any of the groups contained a disproportionate number of children who were normally quite aggressive, the researchers pre-tested the children for aggressiveness.

On the basis of their test scores, participants were organised into groups of three. One member of each group was then randomly allocated to either of two experimental groups or to the control group.

This experiment used a/an _____ design.

A. cross-sectional
B. independent groups
C. repeated measures
D. matched participants

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (4 marks)

(a) What is a case study? 1 mark

(b) In what way is a cross-sectional study different from a case study? 1 mark

(c) Describe one limitation of a case study. 1 mark

(d) Describe one limitation of a cross-sectional study. 1 mark

Question 2 (1 mark)

Explain a potential limitation of small sample size when drawing conclusions.

Question 3 (5 marks)

(a) Explain the meaning of the term order effect. 1 mark

(b) In which type of experimental research design is an order effect more likely to occur? 1 mark

(c) Explain your answer to (b) above. 2 marks

(d) Name the procedure used to minimise or control an order effect. 1 mark

Question 4 (2 marks)

(a) What is the placebo effect? 1 mark

(b) How is this effect best controlled? 1 mark

Question 5 (2 marks)

(a) What is experimenter expectancy? 1 mark

(b) Explain how experimenter expectancy can produce results due to a self-fulfilling prophecy. 1 mark

Question 6 (5 marks)

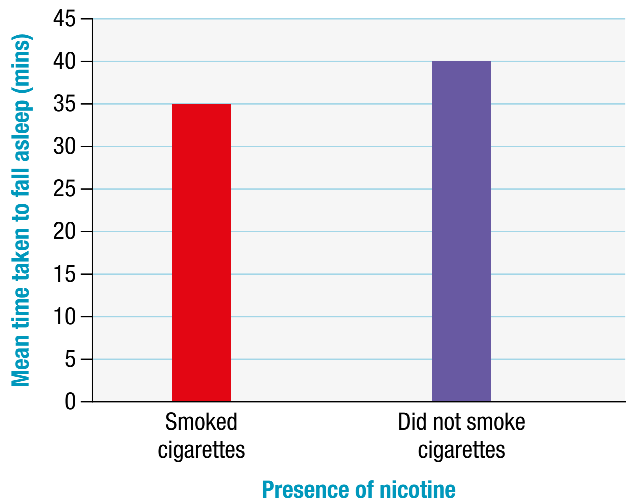
A researcher wanted to find out whether the presence of nicotine in the bloodstream is linked to sleep loss, specifically sleep loss resulting from spending more time trying to fall asleep.

To investigate this issue, one group of 15 volunteer students who were smokers and enrolled in the first year of the Psychology course at a Victorian regional university (Group 1) were required to attend the university's gym at 9.00 pm on Tuesday evening, smoke ten 8 mg cigarettes during a 90-minute period while listening to classical music, and then go to sleep as quickly as they could in one of the standard single beds at the other end of the gymnasium.

On Friday evening later that week, the procedure was repeated with another group of 12 volunteer smokers who were also enrolled in the first year Psychology course (Group 2). However, participants in this group were not permitted to smoke any cigarettes in the one-hour period before being asked to go to sleep in one of the beds.

Both groups were carefully observed from outside the gym by two research assistants through a monitor hooked up to infra-red cameras. The research assistants recorded the precise time when each participant was observed to fall asleep.

The results are presented in the graph below. The researcher concluded that neither smoking nor the presence of nicotine in the bloodstream cause sleep loss.



(a) Identify the operationalised independent and dependent variables. 2 marks

(b) Explain whether the conclusion made by the researcher is justified. 2 marks

(c) Describe one limitation of the research design used for the study. 1 mark

Question 7 (2 marks)

(a) Name the procedure used to control individual participant differences in an independent groups experiment. 1 mark

(b) Explain how this procedure minimises any unwanted influence of this variable. 1 mark

Question 8 (2 marks)

(a) What does it mean to standardise procedures for a research study? 1 mark

(b) Why are the research procedures standardised? 1 mark

Question 9 (1 mark)

Name a data collection method for obtaining self-reports.

Question 10 (1 mark)

Explain why volunteer participants are required to give informed consent.

Question 11 (2 marks)

Distinguish between random sampling and random allocation.

Question 12 (2 marks)

Explain what a psychology experiment is with reference to two key features that distinguish the experiment from other research methods.

Question 13 (1 mark)

What is a scientific benefit from reporting psychological research in a journal or other professional publication?

Question 14 (15 marks)

A psychologist conducted an experiment to investigate a new online method of teaching algebra called Algebratics. She wanted to find out whether teaching young children using Algebratics is more effective than the standard textbook approach to teaching algebra in many schools. The psychologist predicts that children who use Algebratics will score higher on an algebra test.

To test her hypothesis, one class of year 6 students in a local primary school was taught a new algebra topic through Algebratics. This took place for one hour at 9 am on the first four days of the school week. Their teacher was trained in Algebratics to ensure the method was used correctly. Another year 6 class at the same school was taught the same topic, at the same time by their teacher through the standard approach. Both classes had 24 students, each with 11 males and 13 females. Informed consent was obtained for all participants.

On Friday at 9 am, all participants were given 30-minute test on the topic. Their classroom teacher administered the test under strictly controlled test conditions. The results are shown in Figure 1 below.

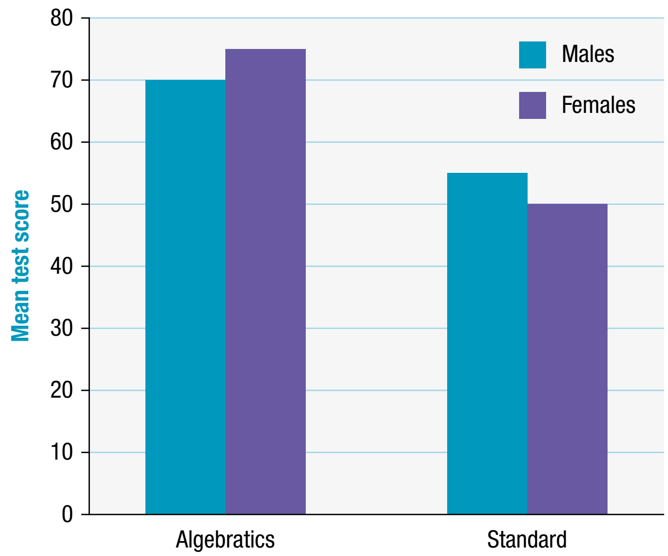


Figure 1 Test scores for algebra teaching methods

(a) Identify the experimental and control groups. 1 mark

experimental group: ______________________

control group: ______________________

(b) Operationalise the independent and dependent variables in the experiment. 2 marks

independent variable: ______________________

____

dependent variable: ______________________

____

(c) Write a research hypothesis for the experiment. 1 mark

____

____

____

(d) Name the experimental research design. 1 mark

____

(e) Construct a discussion containing 10 marks

- a description and analysis of the results
- the conclusion(s) based on the hypothesis
- an explanation of whether the results can be generalised with reference to external validity
- a description of a limitation or weakness of the experiment.

eBook*plus*

The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS. The answers to the Section B questions are in eBookPLUS.

Unit 1

How are behaviour and mental processes shaped?

AREA OF STUDY 1

How does the brain function?

CHAPTER 3 Role of the brain in mental processes and behaviour
CHAPTER 4 Brain plasticity and brain damage

AREA OF STUDY 2

What influences psychological development?

CHAPTER 5 The complexity of psychological development
CHAPTER 6 Atypical psychological development

On completion of this unit, the student should be able to:

OUTCOME 1

- describe how understanding of brain structure and function has changed over time, explain how different areas of the brain coordinate different functions, and explain how brain plasticity and brain damage can change psychological functioning

OUTCOME 2

- identify the varying influences of nature and nurture on a person's psychological development, and explain different factors that lead to typical or atypical psychological development

Source: ©VCAA, VCE Psychology Study Design (June 2017 update).

UNIT 1 KEY KNOWLEDGE

CHAPTER 3 **Role of the brain in mental processes and behaviour**	• the influence of different approaches over time to understanding the role of the brain, including the brain vs heart debate, mind–body problem, phrenology, first brain experiments and neuroimaging techniques • the basic structure and function of the central and peripheral nervous systems as communication systems between the body's internal cells and organs and the external world • the role of the neuron (dendrites, axon, myelin and axon terminals) as the primary functional unit of the nervous system, including the role of glial cells in supporting neuronal function • the basic structure and function of the hindbrain (cerebellum, medulla), midbrain (reticular formation) and forebrain (hypothalamus, thalamus, cerebrum) • the role of the cerebral cortex in the processing of complex sensory information, the initiation of voluntary movements, language, symbolic thinking and the regulation of emotion, including localisation of function.
CHAPTER 4 **Brain plasticity and brain damage**	• infancy and adolescence as periods of rapid development and changes in brain structure and function, including development of myelin, synaptic pruning and frontal lobe development • the impact of injury to the cerebral cortex on a person's biological, psychological and social functioning and the ability of the brain to undergo adaptive plasticity, illustrated by rehabilitation of people with brain injuries • the use of animal studies and neuroimaging techniques to develop understanding of human neurological disorders including Parkinson's disease.
CHAPTER 5 **The complexity of psychological development**	• the interactive nature of hereditary and environmental factors on a person's psychological development, illustrated through twin and adoption studies • the role of critical and sensitive periods in a person's psychological development • the importance of attachment on an individual's emotional development: genetics; temperament and early life experiences (with reference to the work of Harlow & Ainsworth) • the development of cognitive abilities from concrete to symbolic thinking (with reference to the work of Piaget) • psychosocial development across the lifespan as an influence on the development of an individual's personality (with reference to the work of Erikson).
CHAPTER 6 **Atypical psychological development**	• the conceptualisation of normality including typical and atypical behaviours; adaptive and maladaptive behaviours; and mental health and mental disorder as a continuum • mental health as a product of internal and external factors which assist individuals to cope with change and challenge • major categories of psychological disorder: addiction disorders; anxiety disorders; mood disorders; personality disorders; and psychotic disorders • the 'two-hit' hypothesis as an explanation for the development of particular psychological disorders, illustrated by schizophrenia.

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), pp. 14–15.

3 ROLE OF THE BRAIN IN MENTAL PROCESSES AND BEHAVIOUR

KEY KNOWLEDGE

- the influence of different approaches over time to understanding the role of the brain, including the brain vs heart debate, mind–body problem, phrenology, first brain experiments and neuroimaging techniques
- the basic structure and function of the central and peripheral nervous systems as communication systems between the body's internal cells and organs and the external world
- the role of the neuron (dendrites, axon, myelin and axon terminals) as the primary functional unit of the nervous system, including the role of glial cells in supporting neuronal function
- the basic structure and function of the hindbrain (cerebellum, medulla), midbrain (reticular formation) and forebrain (hypothalamus, thalamus, cerebrum)
- the role of the cerebral cortex in the processing of complex sensory information, the initiation of voluntary movements, language, symbolic thinking and the regulation of emotion, including localisation of function

Source: © VCAA, VCE Psychology Study Design (June 2017 update), p. 14.

CHAPTER CONTENT

Consider some of what your brain is doing as you read this passage of text. In order to read, symbols are seen on the page, organised into words, and the words are connected with meanings from memory. Then these meanings are combined to form thoughts. While you focus your attention on reading, you are less aware of any background sounds, perhaps the whispers of people around you, the footsteps of someone outside the room or the engines of an overhead plane. You are also less aware of other types of sensory information, such as the pressure of your bottom on the chair and where your arms and legs are. Once you pay attention to any of these, you will become fully aware of them and your brain will start processing that information.

In addition to processing the information you are reading, your brain is performing numerous other functions to keep you alive, such as ensuring that you breathe oxygen, your heart beats, your core body temperature remains within a suitable range and that your digestive system processes any food you have eaten. You are generally unaware of these activities.

Your brain sends and receives messages through its extensive nervous system via the spinal cord to control your breathing, maintaining just the right amount of oxygen in your bloodstream, as well as adjusting your blood pressure to keep fresh oxygenated blood flowing throughout your entire body. Your brain continuously monitors and regulates almost all of the internal conditions in your body. For example, it regulates the nutrient content in your bloodstream, which provides one of the signals to eat again. It also regulates the amount of water your body needs to stay in chemical balance and the activity of the endocrine system that secretes hormones into your bloodstream to help regulate the normal functioning of bodily processes.

Your brain is one of the less obvious features that distinguish you from primates and all other living things. Everything that makes you who you are comes from the way your brain cells interact and connect. It is the source of your consciousness — your awareness of who you are, your state of being and your external environment. It stores all your knowledge and memories, enables you to experience emotions and gives you your personality. Ultimately, it shapes your hopes and dreams for the future. It is the ability of our brain to perform these types of functions that makes us human. But our brain may not look or feel as if it does all this.

COMPLEXITY OF THE BRAIN

If you cupped a human brain in your hands it would feel soft and squishy, like firm jelly. After a couple of minutes, if you turned the brain upside down, you would see a flattened bit left in the tissue from the weight of the brain resting in your hands. This would give you an idea of how delicate it is.

To protect and keep this fragile organ in place, the brain is covered by three transparent, 'skin-like' membranes (the *meninges*) and encased in a hard, bony skull. Also protecting the brain is a watery-like liquid (*cerebrospinal fluid*) that circulates between the membranes. This provides a cushion against knocks to the head, protecting the brain from injury unless the knock is quite hard. The many arteries you can see carry nutrients and oxygen-rich blood throughout the brain. Without this blood, brain tissue quickly dies.

Figure 3.1 The human brain is a complex structure that is involved in virtually everything we think, feel and do.

If you peeled back the membranes you could touch the wrinkly looking surface and feel its many bulges and grooves. This outer layer of tissue (the *cerebral cortex*) covers the largest part of the brain (the *cerebrum*).

If you actually touched the brain of a living person they would not feel anything. Only if you stimulated some part beneath the surface with a low dose of electric current would the person react. The brain receives sensory messages from elsewhere in the body, but has no sensory receptors of its own. For example, there are no pain receptors in the brain tissue itself. That's why surgeons can perform brain operations on patients who are awake.

If you sliced the brain in half, downward through the middle from side to side, you would see its inner features. Although not all features are distinctive to the untrained eye, you would notice that the inside does not all look the same. Both dark and light areas of tissue are visible and these represent different brain parts.

The darker areas, called *grey matter*, are largely composed of nerve cell bodies and their local connections to each other. The outer cerebral cortex layer is entirely made up of grey matter, although it would look more pinkish than grey in a fresh or living brain because of the presence of very thin blood vessels (capillaries). The lighter areas, called *white matter*, are mostly nerve fibres that connect distant brain areas to one another. They have a fatty coating that produces the whitish appearance. White matter is found in abundance beneath the cortex.

Two wing-shaped cavities (*ventricles*) are also easily seen. These are in the cerebrum. They are the largest of the brain's four ventricles which together form an inner communication network. All are filled with cerebrospinal fluid that flows between them.

Despite its fragile look and feel, the brain is the most complex organ in the body and perhaps the most complex natural or artificial structure in the known universe. Its remarkable complexity is largely invisible to the naked eye. You cannot see that it is densely packed with structures, systems, functions, connections and interconnections, many of which are still not fully understood. Within the brain's tissue are roughly 86 billion individual nerve cells called neurons. Each neuron is connected to between 1000 and 15 000 or more other neurons, so there are trillions of connections.

These connections form numerous networks along which information is electro-chemically sent and exchanged. If there were no order to this complexity, it would be extremely difficult to understand brain function. Advances in brain imaging and recording technologies during the past 30 years or so have dramatically increased understanding of brain function. However, psychologists and neuroscientists still know only a fraction of what there is to know about how the brain works.

In this chapter we examine some of the approaches over time to understanding the brain and its role in mental processes and behaviour. We then examine the brain's basic structure and function at the cellular level followed by the roles of specific brain areas.

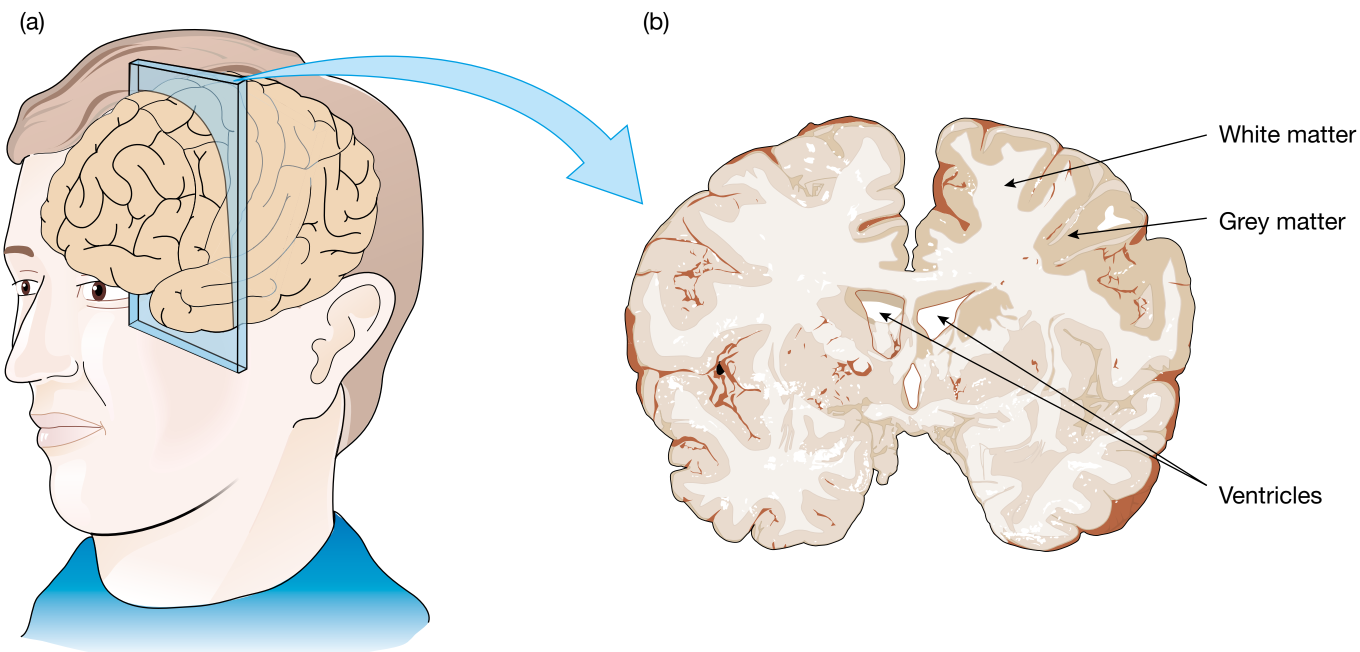


Figure 3.2 Slicing the brain as shown in (a) would reveal inner features such as those in (b).

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Weblink
World's largest brain bank

eGuide*plus*

Weblinks
- Ted talk on 'What is so special about the human brain?' 13 m 31 s
- Neuroanatomy tour of the brain 8 m 08 s

Figure 3.3 The human brain is often described as the most complex natural or artificial structure in the known universe.

LEARNING ACTIVITY 3.1

Reflection

If brain transplants were possible, the identity and personality of the person whose brain is transplanted may be given to another person.

Comment on whether brain transplants should be permitted and explain your view.

APPROACHES OVER TIME TO UNDERSTANDING THE ROLE OF THE BRAIN

The desire to understand ourselves and others has probably existed from the time our early ancestors developed the ability to reflect on their behaviour and that of others. It is possible that they were just as curious as we are today about why we think, feel and behave as we do. Our early ancestors, however, lacked the means to test their ideas and obtain the knowledge they sought.

There is evidence that philosophers in ancient Greece as far back as 2000 years ago spent considerable time contemplating the role of the brain in mental processes and behaviour. But these philosophers could advance understanding only to a certain point. Their ideas were mostly limited to personal observations, reflection, hunches and reasoning.

Although philosophers were good at reasoning, arguing and documenting their ideas, they rarely settled their differences of opinion. This is because their approach to understanding mental processes and behaviour, like our early ancestors, did not enable them to properly test their ideas by conducting scientific research to collect empirical evidence that could support their arguments.

By the nineteenth century, researchers were making progress in answering questions about the brain that philosophers could not. For example, researchers dissected the brains of dead animals or people whose bodies had been donated or sold to medical science. Autopsies were also conducted on people who had died from a brain injury.

Living people and animals were also studied. Valuable information was obtained from studying living people who had experienced a brain injury in an accident or as a result of disease. There were also animal experiments in which parts of the brain were intentionally injured or removed to study the effects on behaviour. Most of the researchers throughout the nineteenth century were physicians, physiologists or anatomists, so research predominantly reflected a biological perspective.

Although early research provided useful information about the brain, this information was mainly limited to the *structure* of the brain, such as which part controlled a specific function. Relatively little was known about the actual *function* of the brain, such as *how* and *when* different brain structures and areas 'work', their relationships to other brain structures and areas, and nerve pathways linking them.

None of the early techniques for studying the brain enabled researchers to directly observe and study the brain functioning as it normally does in a healthy, living person. Consequently, researchers had to mainly rely on making assumptions about underlying brain function based on observations of participants' responses in experimental tasks. In some cases, invasive medical procedures that would not be permissible according to the ethical standards all researchers must now follow.

The development of new technologies during the 20th century in particular helped advance understanding of the brain in significant ways. These technologies have become increasingly sophisticated over time. Researchers can now observe and record images of the brain 'at work' in a healthy, living person in a non-invasive way. For example, researchers have access to very sensitive brain scanning and recording equipment that can reveal the brain areas that are active (and inactive) while a participant responds to some kind of experimental manipulation.

There have been both scientific and non-scientific approaches to understanding the role of the brain in mental processes and behaviour. First, we briefly consider ideas and approaches that relied more on opinion than science, focusing on differing views about the nature and location of the body part believed to be the source of our behaviour. We then examine some of the early brain experiments and the new technologies that promoted scientific investigations of the brain.

Brain versus heart debate

Is our brain or heart the source of our thoughts, feelings and behaviour? The ancient Egyptians didn't think the brain had any role at all. When the pharaoh Tutankhamen was mummified more than 3300 years ago, four vital organs were carefully preserved in jars in his tomb — the liver, lungs, stomach and intestines. There was no jar for his brain or his heart.

The Egyptians believed the heart held the mind and soul and was the source of all wisdom as well as memory, emotion, personality and all life forces. So it was left in its place inside the body. Along with the organs in the jars, it was considered essential to fully take part in the afterlife. The brain, however, was removed with an iron hook through the nostrils and thrown out. It was not considered an asset.

The origin of the brain versus heart debate can be traced back to the writings of the ancient Greek philosophers. Amongst the earliest surviving documented records are those of Alcmaeon and Empedocles. Alcmaeon located mental processes in the brain and therefore took the brain side of the debate. This view is often called the **brain hypothesis**. Empedocles located mental processes in the heart and therefore took the heart side of the debate. This view is called the **heart hypothesis**. The pros and cons of each side were debated for the next 2000 years.

Alcmaeon (about 500 BCE) is widely regarded as the first person to identify the brain as the source of mental processes. He was interested in anatomy and sometimes dissected organs in dead animals. For example, he discovered the optic nerve connecting the eyes to the brain, probably by dissecting an eyeball. This led him to believe that all our senses are connected to the brain in some way. Therefore, the brain was the centre of understanding and played a vital role in perceptions, thoughts and other mental processes. It also followed that if the brain was injured then its functions could be disrupted or stopped (Celesia, 2012; Debernardi et al., 2010).

Empedocles (490–430 BCE) is best known for his proposal that every living and non-living thing in the world is made from four elements — earth, fire, air and water. He reasoned that the heart was the centre of the body's blood vessel system so the human soul

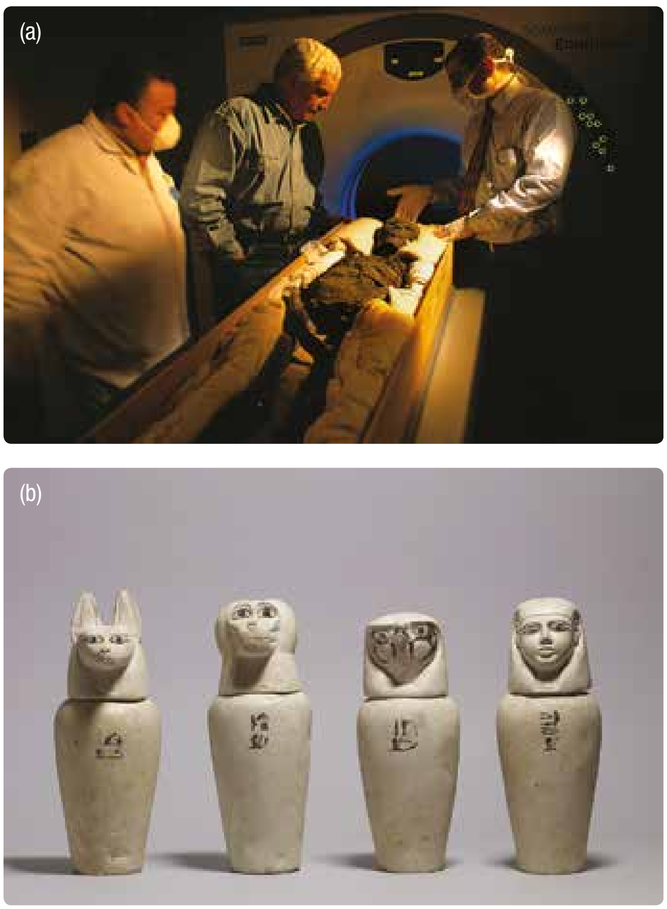


Figure 3.4 (a) A forensic medical expert conducting a CAT scan of the remains of Egyptian pharaoh Tutankhamen. (b) Jars in which the liver, lungs, stomach and intestines of mummified pharoahs were stored. The heart was left inside the body but the brain was considered useless in the afterlife so it was removed and thrown out.

Figure 3.5 The origin of the brain versus heart debate can be traced back more than 2500 years to the ancient Greek philosophers Alcmaeon (brain hypothesis) and Empedocles (heart hypothesis).

is blood and our thoughts must therefore be located in the blood, particularly around the heart. He also argued that our perceptions were formed in the blood and since blood was the means by which we all think (and feel pleasure and pain), the degree of someone's intelligence depended on the composition of the blood (Gross, 1995; Kahn, 2013).

The heart is also where Aristotle (384–322 BCE) located all mental abilities (and the soul) at around 350 BCE. This famous ancient Greek philosopher, who dissected animals to learn about anatomy, gave no role to the brain in behaviour. Instead, he believed that the brain was a cooling mechanism to lower the hot temperature of the blood.

Some well-known physicians (doctors) in ancient Greece, such as Hippocrates (460–370 BCE), who is now regarded as the 'father of medicine', and Herophilus (335–280 BCE), who is called the 'father of anatomy', took the brain side of the debate. They advanced knowledge of the brain and nervous system by scientifically dissecting bodies of people and animals then recording their findings in highly detailed ways for other physicians. For example, Hippocrates wrote that all our emotions 'arise from the brain, and the brain alone' and that with the brain 'we think and understand, see and hear'. However, his views and those of Herophilus about the brain's role were in the minority (Breedlove, Watson & Rosenzweig, 2010).

It was not until the second century that widespread attention was drawn to the brain being very influential in behaviour. This is largely attributed to the work of the Greek physician Galen (c.129–c.216 AD) who argued strongly for the brain hypothesis.

Galen worked as a 'doctor to the gladiators' in first century (AD) Rome where he treated their head injuries and recorded his observations of how their behaviour changed in relation to different wounds. He observed that nerves from sense organs went to the brain and not to the heart, and that brain injury adversely affected behaviour. He also reported on his experiences in attempting to treat wounds to the brain or heart. Galen noted that pressure on certain parts of the brain could affect behaviour such as movement, whereas similar manipulation of the heart did not directly affect behaviour. He also noted that gladiators who died from heart wounds 'keep their reasoning powers as long as they are alive, and this is clear proof that the rational soul does not live in the heart' (Scarborough, 2013).

These were accurate observations but Galen was mistaken with other observations. For example, he incorrectly argued that the important parts of the brain were in the fluid-filled cavities (ventricles) rather than its tissue and that all our physical functions and health depended on the distribution of these fluids along nerves to all body areas (Kolb & Whishaw, 2003; Stirling, 2002).

Galen was a prolific writer and his ideas remained largely unquestioned in medicine for nearly 1500 years until well into the 19th century. However, many of his specific ideas about the brain and its role in mental processes and behaviour were very inaccurate (Breedlove, Watson & Rosenzweig, 2010; Hankinson, 2008).

The brain hypothesis is now universally accepted. There is overwhelming empirical evidence that the brain controls mental processes and behaviour. But it is also known that the function of our heart can affect our thoughts, feelings and behaviour. So, the heart-centred view argued by most of the early philosophers cannot be entirely dismissed.

Figure 3.6 Galen argued strongly for the brain hypothesis on the basis of his work as a doctor to the gladiators in Rome during the first century (AD) where he treated their head injuries and recorded observations of the changes in their behaviour.

Mind–body problem

Another issue debated by the Greek philosophers is called the mind–body problem. This is about the relationship between the human mind and body. More specifically, the **mind–body problem** involves the question of whether our mind and body are distinct, separate entities or whether they are one and the same thing. For instance, is the mind part of the body, or the body part of the mind? If our mind and body are distinct and separate, do they interact? If they interact, how do they interact? And which of the two is in control?

Generally, most of the Greek philosophers believed that the mind and body were separate entities and that the mind could control the body, but the body could not influence the mind. This view was popular for almost 2000 years until it was challenged by French philosopher René Descartes in the seventeenth century.

In his version of a theory called *dualism*, Descartes agreed that the mind and body are two different things. He reasoned that the mind is a non-physical, spiritual entity (i.e. a soul), whereas the body is a physical, fleshy structure (i.e. matter). However, according to Descartes, the mind and body come into contact through the pineal gland, a tiny structure located deep in the brain. This enabled the mind and brain to interact to produce sensations, thoughts, emotions, self-awareness and other conscious experiences.

He identified the pineal gland because it is a single structure near the centre of the brain. The rest of the brain is split into right and left 'halves' enveloped by lots of layers intricately folded within one another. Consequently, it seemed logical that the pineal gland, in being centrally located and isolated from the rest of the brain, could be the centre of consciousness and control behaviour.

Descartes also argued that the mind could affect the body and the body could affect the mind. For example, he believed that mental processes such as memory and imagination were the result of bodily functions, and that emotions such as love, hate and sadness arose from the body and influenced mental states, which could in turn influence the body.

Descartes' understanding of the brain and the roles of its various structures was limited and, at times, wrong. It is now known that people who have a damaged pineal gland or have even had it surgically removed all display normal behaviour. Although located in the brain, the pineal gland is considered to be a part of the endocrine system. It secretes the hormone melatonin that contributes to the setting of the body's biological clock and promotes sleepiness. Thus, although it plays a role in human behaviour, it does not govern it. Nonetheless, Descartes brought the mind, brain and body closer together in a way that others had not previously considered possible.

(a)

Mind–brain problem

The different views on the mind–body problem exchanged among philosophers throughout many centuries laid the groundwork for a contemporary version of the problem that has not yet been satisfactorily resolved by psychologists. It is clear that the mind and body are intertwined and that mental processes may be triggered by events in the brain, or that mental processes may, in turn, trigger brain events and therefore influence our behaviour. However, the mind–body problem now tends to be more specifically described in psychology as the mind–brain problem.

The *mind–brain problem* essentially involves questions about the relationship between brain activity and conscious experience; that is, the relationship between what our brain does and our awareness of our own existence and our internal and external environments. For instance, is our mind separate from our brain? Is our mind basically brain activity or is it our inner, personal experience of what our brain does? Is consciousness just one aspect of our mind? Does our mind become aware of what our brain does? If so, is our mind dependent on brain activity in order to become aware? Does our brain trigger conscious experience? Is conscious experience a by-product of brain activity? What comes first, brain activity or conscious experience?

Although there is no universally accepted solution to the mind–brain problem, it is likely that the rapidly advancing discipline of neuroscience will eventually lead psychologists to a better understanding of the relationship between conscious experience and brain activity.

(b)

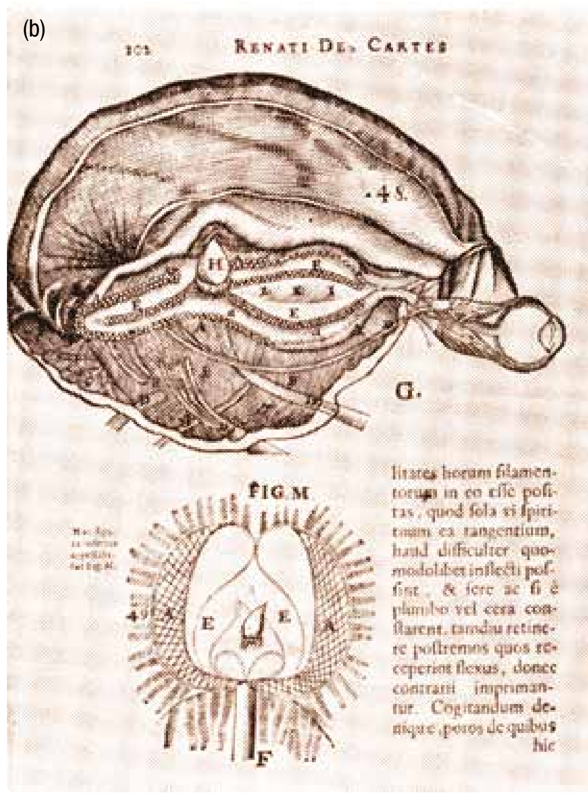


Figure 3.7 (a) French philosopher René Descartes (1596–1650) proposed that the human mind and body are separate but interconnected; (b) Descartes believed that the pineal gland connected the mind and body, enabling them to interact. This original drawing by Descartes shows the brain's pineal gland right in the middle of the brain (H), well located to serve as the centre of consciousness and control behaviour. Descartes is probably best known for his saying, 'I think, therefore I am'.

BOX 3.1 What comes first — conscious experience or brain activity?

The mind–body problem, or mind–brain problem as it is now known, has not yet been resolved in a way that is universally agreed to by contemporary psychologists. However, it is clear that the mind and body are intertwined and that mental processes may be triggered by events in the brain, or that mental processes may, in turn, trigger brain events and therefore influence our behaviour.

Research studies conducted by American psychologist Benjamin Libet in the 1980s showed how the mind–brain problem could be scientifically tested. These studies also provided evidence that activity in the brain may actually *precede* activity of the conscious mind.

Libet's (1985) procedure involved using an EEG (electroencephalogram, page 142) to record the electrical activity in the brains of volunteer participants through sensors placed on their scalps during a decision-making task involving finger movement.

As shown in Figure 3.8a below, participants observed a dot moving rapidly around the face of a clock. Whenever they consciously decided to move their fingers, they had to state the position of the dot at the precise moment of decision-making. An EMG (electromyograph) was used to record the precise moment of finger movement.

Usually, electrical activity is evident in the brain about half a second (535 milliseconds) before a voluntary movement. This is not surprising since brain activity is probably required to initiate a voluntary movement. Libet's results, however, showed that electrical activity was evident *before* each participant made a conscious decision to move. As shown in Figure 3.8b below, the brain became active in less than one quarter of a second (204 milliseconds), which is more than 300 milliseconds before participants reported that they were consciously trying to move their fingers.

According to American psychologist Daniel Wegner (2002), the feeling that we 'consciously will' actions may be a consequence of brain activity rather than a cause. It makes sense that we first consciously think of an action and then perform. However, Libet's research findings suggest that our brain starts the required activity before either the thinking or the doing, possibly preparing the way for both thought and action. It may appear to us that our mind is leading our brain and body, but the order of these events may be the other way around.

Many researchers have replicated Libet's experiments using the same procedures as well as variations with stimuli other than a clock; for example, using sounds. Some have obtained similar results, others have found that the timings of intention and action can actually be the same (which suggests that our intentions are the factors that cause our actions), and still others have found voluntary movement decisions can be initiated unconsciously (which suggests that our actions precede their conscious awareness). In sum, a growing body of evidence suggests that the relationship between neural activity and conscious awareness is more complicated than previously thought (Guggisberg & Mottaz, 2013; Miller, Shepherdson & Treyena, 2011).

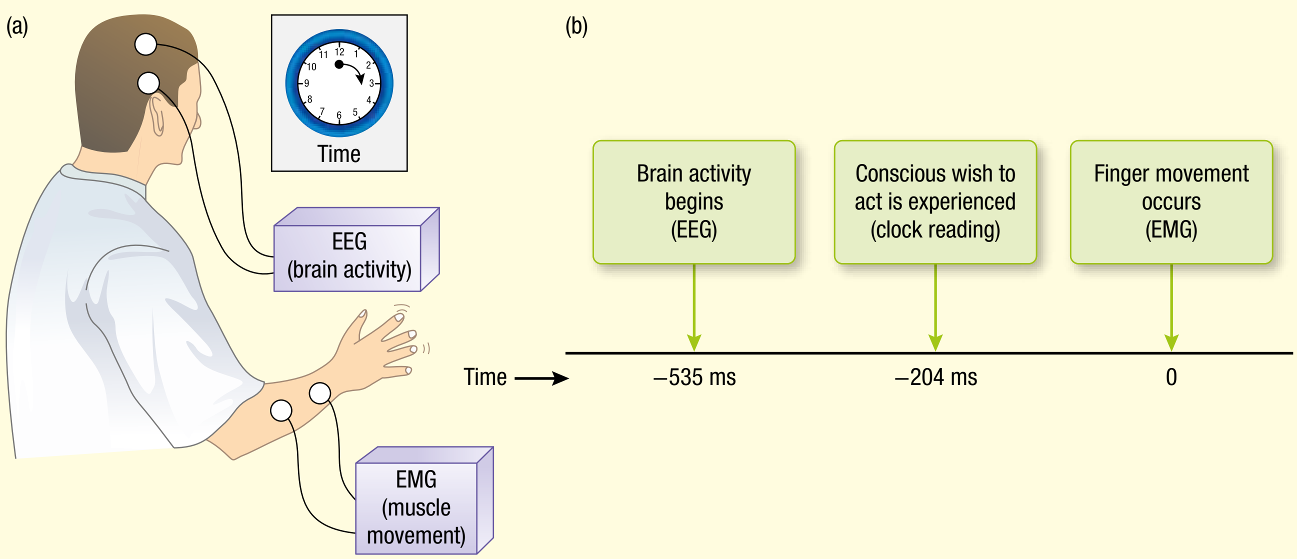


Figure 3.8 (a) In Libet's (1985) experiments, each participant was required to report the exact moment when they consciously made a decision to move their fingers; (b) EEG sensors that detect electrical activity of the brain timed the onset of brain activation and EMG sensors that detect muscular activity timed onset of finger movement.

Source: Adapted from Schacter, D.L., Gilbert, D.T., & Wegner, D.M. (2009). *Psychology*. New York: Worth. p. 297.

Phrenology

Towards the end of the eighteenth century, German physician Franz Gall (1758–1828) proposed that different parts of the brain had different functions. This concept is now known as *localisation of brain function*. Gall took an extreme position that the brain was composed of distinctive, separate parts and that each part had a different function.

Gall argued that personality characteristics and mental abilities were controlled by different parts ('brain organs') which were located on its outer surface. The size of each of these parts indicated how fully developed it was and therefore the strength of its influence. The more it was used, the more it would develop, and vice versa. In addition, the development of a particular part would push out the surrounding skull to the extent that it would cause a bump on the head that could be observed or felt externally.

Gall's view on the relationship between brain and behaviour originated with his observations of classmates when he was at school. He noticed that those with the best memories who achieved better marks than he did had large, bulging eyes. This observation led him to propose that there was a well-developed memory located on the part of the brain directly behind the eyes and this is what caused the eyes to protrude. He had also observed that some of his friends who had similar personality types also had similar shaped heads, with bumps in similar places.

Assisted by his colleague Johnann Spurzheim (1776–1832), Gall studied a large number of skulls and skull casts of people with particular talents and unusual or extreme personalities. These included great writers, poets and philosophers, as well as criminals and mentally ill people. They also collected and compared many human and animal skulls to test their theory.

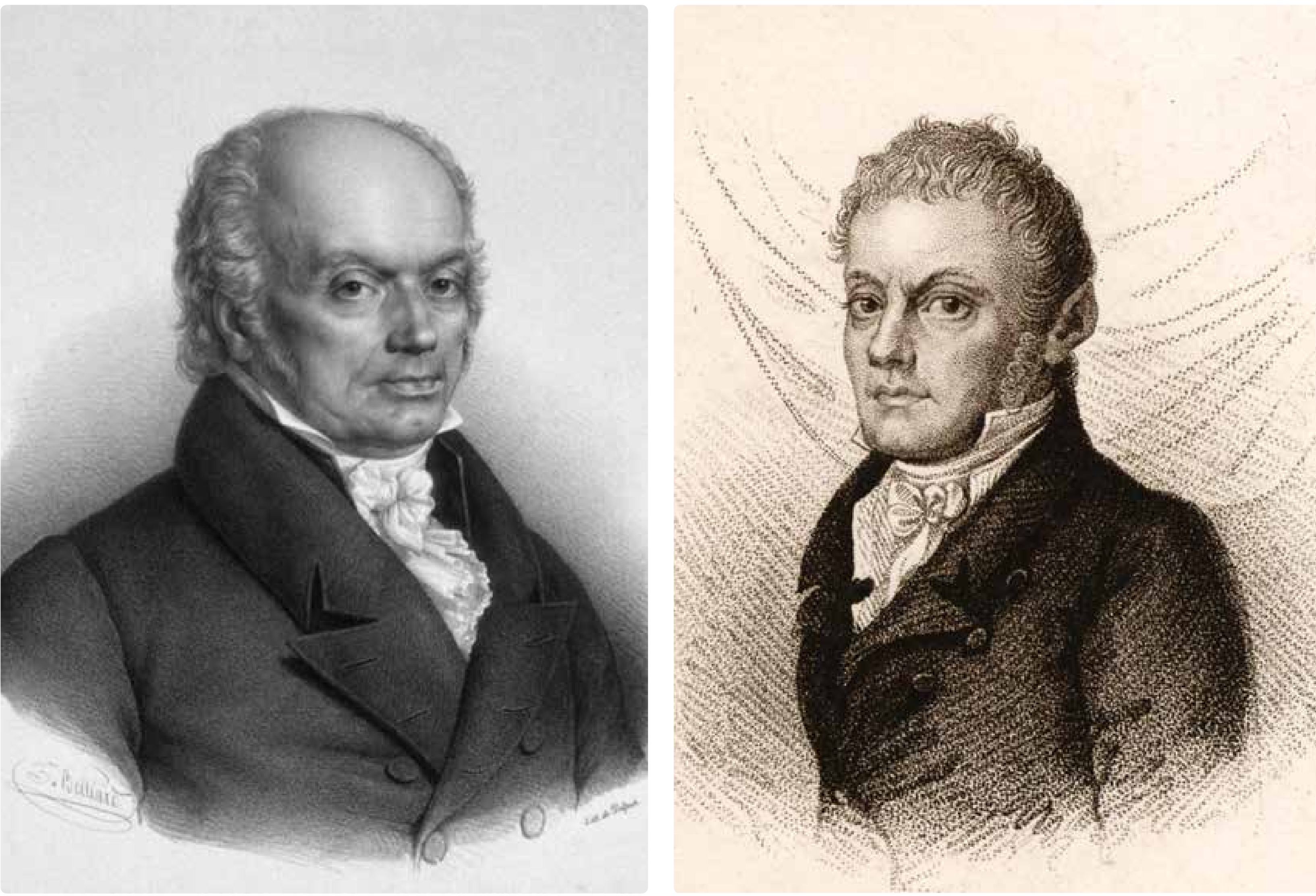


Figure 3.9 Franz Gall (1758–1828) and Johnann Spurzheim (1776–1832)

Their research led them to link various mental abilities, personality characteristics and behaviours, called **faculties**, to the skull and consequently underlying brain locations. Figure 3.10 below shows a map of the skull with the locations of 35 different faculties. There were originally 27 faculties and the others were added later by Spurzheim.

The faculties were grouped in two major categories — *affective* (feelings) and *intellectual* faculties, each of which had sub-categories. The sub-category of *propensities* indicated 'internal impulses', whereas the *sentiments* 'designate other feelings, not limited to inclination alone' (Spurzheim, 1827).

Among the faculties was amativeness ('physical love') in the cerebellum at the lower back part of the brain (location 1 in Figure 3.10). A person with a bump there would be expected to have a strong sex drive, whereas a person low in this faculty would have a depression in the same area. Other faculties included:

4. adhesiveness — love of friends and the company of others (bump) vs neglect of friends and avoidance of others (depression)

6. destructiveness — violence and desire to destroy (bump) vs tameness and want of resolution (depression)

8. acquisitiveness — craving for possessions and extremely selfish (bump) vs lavish and wasteful (depression)

17. hope — view the future with much confidence of success (bump) vs gloom and sadness (depression)

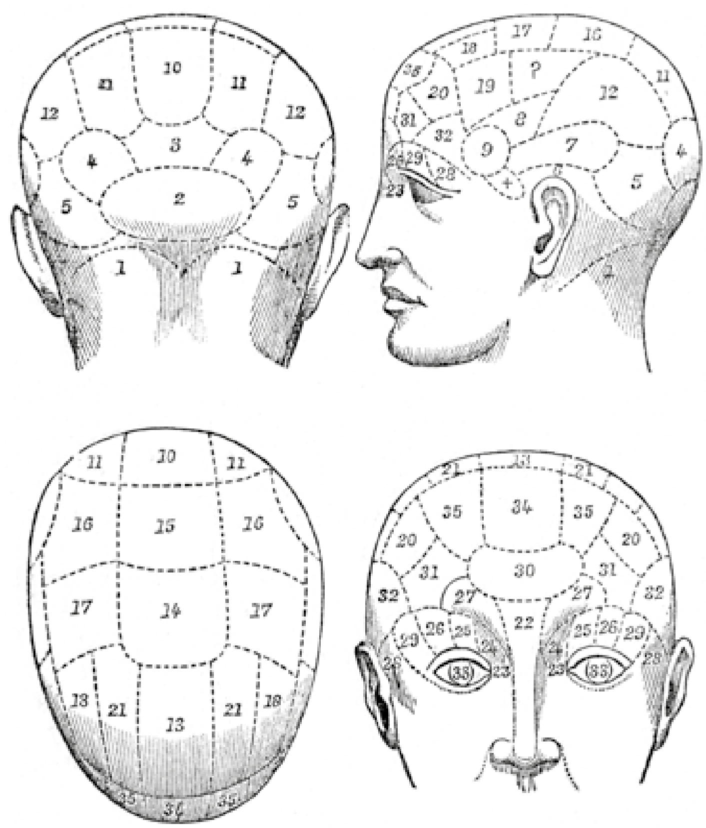
24. size — excellent judge of dimensions and space (bump) vs poor judge (depression)

32. melody — musical appreciation (bump) vs no appreciation (depression).

Gall called his approach *organology*. Spurzheim later renamed it, using the term **phrenology** to describe the study of the relationship between the skull's surface features and a person's personality and behavioural characteristics (faculties). The map showing the location of brain functions on the skull's surface is called a *phrenological map*. Spurzheim successfully promoted phrenology in the UK and the USA where it became very popular. Gall himself never approved of the term phrenology. He would later accuse Spurzheim of misrepresenting his ideas.

Phrenology was exploited by some people as a means of making personality and behavioural assessments. They used a method called *cranioscopy*, in which a device was placed around the skull to measure its bumps and depressions. The measurements were then analysed and linked to a phrenological map to determine the person's likely personality and behavioural characteristics.

Many who practised cranioscopy were 'quacks' and some created their own versions of a phrenological map. Vague or cleverly described interpretations were



AFFECTIVE FACULTIES

I — *Propensities*

1. Amativeness
2. Philoprogenitiveness
3. Inhabitiveness
4. Adhesiveness
5. Combativeness
6. Destructiveness
7. Secretiveness
8. Acquisitiveness
9. Constructiveness

II — *Sentiments*

10. Self-esteem
11. Love of approbation
12. Cautiousness
13. Benevolence
14. Veneration
15. Firmness
16. Conscientiousness
17. Hope
18. Marvellousness
19. Ideality
20. Gaiety or Mirthfulness
21. Imitation

INTELLECTUAL FACULTIES

I — *Perceptive*

22. Individuality
23. Configuration
24. Size
25. Weight and Resistance
26. Colouring
27. Locality
28. Calculation
29. Order
30. Eventuality
31. Time
32. Melody
33. Language

II — *Reflective*

34. Comparison
35. Causality

Figure 3.10 A map used in phrenology to show the relation between the skull's surface features and a person's personality and behavioural characteristics. This map shows the location of 35 'faculties' according to Spurzheim's system published in 1815.

made to sound believable, as with other pseudosciences like astrology and palmistry. Cranioscopy was eventually ridiculed and, by association, so was phrenology. By the 1850s, phrenology had lost credibility, especially within the scientific community (Kolb & Whishaw, 2003).

There is no scientifically obtained evidence supporting a relationship between bumps on the skull and the underlying brain tissue, nor a relationship between bumps and personality or any other human attribute. Gall and Spurzheim's evidence was biased. It seems that they went looking for and found evidence to confirm their ideas. They also largely ignored other evidence that was available at the time, especially from patients with a brain injury that showed clear links between certain brain areas and functions. This meant that their phrenological map was largely inaccurate.

While Gall and Spurzheim's 'bump model' linking the brain and behaviour lacked scientific merit and was ridiculed by many physicians, Gall in particular had a lasting influence on thinking about the brain. For example, a key assumption of phrenology (or 'organology', as he called it) involves localisation of function. His ideas stimulated scientific interest in finding out more about which parts of the brain do what. Localisation is now considered a basic principle of brain function, but not Gall's extreme view. There is now a more holistic view. Multiple parts of the brain are usually involved whenever we think, feel or voluntarily do something. No part operates in isolation to provide a specific function.

Figure 3.11 Although phrenology had lost credibility by the mid-18th century, some people continued to exploit it. In the 1930s, this 'psychograph' device was promoted as a 'phrenology machine' that could 'examine the head' and use the 'measurements of the shape of the head' to report personality and behavioural characteristics. The device was used for 'readings' to paying audiences and was also commercially available. Some were installed in theatre lobbies and department stores for customers to use.

LEARNING ACTIVITY 3.2

Review questions

1. Suggest a reason to explain why it is generally believed that contemporary psychology has its roots, or origins, in philosophy.
2. (a) Briefly describe the brain versus heart debate.
   (b) Why would brain and/or heart dissection alone *not* provide substantial evidence of the role of either in mental processes and behaviour?
   (c) Galen documented evidence supporting the brain hypothesis yet the brain versus heart debate persisted for many more years. Suggest a reason to explain this persistence.
3. (a) Briefly describe the mind–body problem.
   (b) What three key ideas proposed by Descartes influenced thinking about the relationship between the mind and body?
   (c) What do you believe is the relationship between the mind and brain? Give an example that helps explain your belief.
4. (a) What is phrenology?
   (b) On what evidence was it based?
   (c) Explain a limitation of this evidence.
   (d) Explain why phrenology can be viewed as an early theory of brain localisation.
   (e) Was Gall an early proponent of the brain's plasticity? Explain your answer.
   (f) Give two examples of 'faculties' that are easy to operationalise and two that may have been too vague to operationalise for research purposes.
   (g) Outline the research design of an investigation that could be conducted to test whether phrenology can be used to assess personality or behaviour.

FIRST BRAIN EXPERIMENTS

The 'first' brain experiments were dominated by two main approaches — the use of *ablation* or *electrical stimulation* of the brain to observe the effects. By the end of the nineteenth century, these techniques had enabled researchers to assign functions to large areas of the brain.

In this section, we examine influential experiments that used each of these approaches. Then, we examine a series of Nobel Prize winning experiments conducted in the 1960s that enhanced understanding of the specialised functions of the brain's left and right cerebral hemispheres ('halves').

Brain ablation experiments

In experimental research, brain **ablation** involves disabling, destroying or removing selected brain tissue followed by an assessment of subsequent changes in behaviour. This is most often done surgically with scalpel cuts. Ablation is sometimes called *lesioning* because it involves brain injury, usually irreversible. For obvious reasons, experiments using brain ablation are considered unethical on humans (though ablation may be used for brain tumour removal).

Pierre Flourens pioneers experimental ablation

French physiologist Pierre Flourens (1794–1867) is often credited as introducing brain ablation experiments. He did so in the 1820s in controlled laboratory experiments with animals. Working mainly with rabbits and pigeons, he developed techniques of damaging or removing small areas of brain tissue to observe the effects on behaviour. His research also provided the first scientific evidence that challenged the value of phrenology.

Figure 3.12 French physiologist Pierre Flourens (1794–1867)

To search for different functions in the brain, Flourens varied the location from which he removed brain tissue. He found, for example, that the brain stem, located deep within and at the base of the brain, had specialised functions. Injury (intentional damage) to one part caused animals to stop breathing so he assumed the brain stem was responsible for respiration. Furthermore, the cerebellum, which is connected to the brain stem, appeared to coordinate movement (and had nothing to do with phrenology's 'amativeness'). Many attribute discovery of both of these localised brain functions to Flourens (Yildrim & Sarikcioglu, 2007).

Flourens also found that removal of small bits of tissue in a specific area of the cortex would result in loss of movement. However, animals could eventually recover this function, possibly the first evidence of neuroplasticity. Flourens used this finding to argue a 'holistic' view of brain function — that the cortex worked as a whole. He believed that recovery from injury to cortical brain tissue was possible because the remaining cortex could do the same things that the missing cortex had done, so it could take over. The holistic view of the brain remained prominent for the next 40 years until localisation theory once again became prominent (Kolb & Whishaw, 2003).

Despite his significant findings, Flouren's research was criticised. For example, his surgical procedure was believed to be imprecise, which left open the possibility that behavioural changes he observed were caused by injury to brain parts beyond the cortex. Flourens was also criticised because he did not write detailed reports on his research, so his findings were difficult to test (Stirling, 2002).

Karl Lashley's search for the location of learning and memory

The value of the ablation technique was recognised and used by other brain researchers. Some used it extensively. For example, beginning in the 1920s, eminent American psychologist Karl Lashley (1890–1958) used ablation throughout the next 30 years in experiments to search for the location of learning and memory in the brain. Rats, monkeys and chimpanzees were taught various tasks and then bits of their cortical tissue were removed with the goal of producing amnesia for memory of the learnt tasks. Lashley failed to produce amnesia and concluded that learning and memory were located throughout the brain rather than in a single place.

Lashley's ablation experiments led him to develop two principles of brain function that became very influential for many years — mass action and equipotentiality. *Mass action* is the idea that the large areas of the brain function as a whole in complex functions and that if a part is destroyed then loss of function will depend on the amount of cortex that is destroyed. *Equipotentiality* is the idea that any healthy part of the cortex can take over the function of an injured part (Lashley, 1963). Both of these principles reflect the holistic view and can be traced back to the ideas of Flourens.

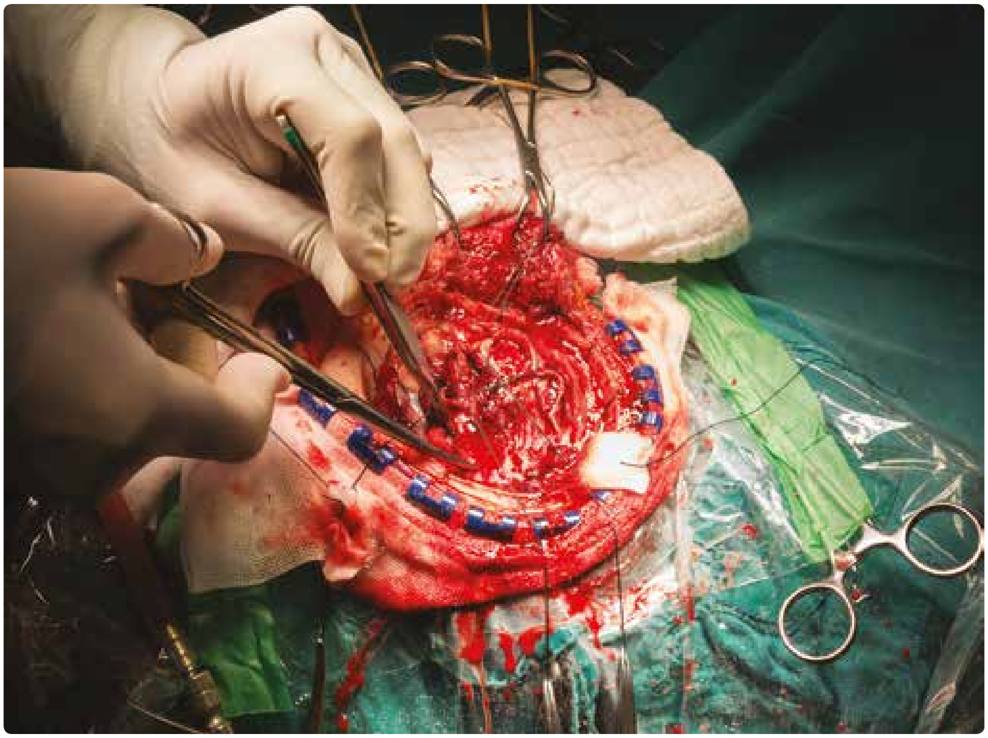


Figure 3.13 Ablation involving surgical removal of a harmful brain tumour is ethically acceptable, whereas removal for research purposes would be unacceptable.

Electrical stimulation of the brain

Weak electrical signals are generated continuously by neurons throughout the brain. This type of activity continues for as long as the brain is alive. Electrical activity in the brain can either be stimulated or detected using an electrode — a small, electrified fine wire (or disc) that can be inserted into or placed onto a specific area of the brain. The technique is called **electrical stimulation of the brain (ESB)**. It is assumed that if electrical stimulation of a specific brain area initiates a response, such as the movement of a body part, then that area controls or is involved in the response.

ESB may not only initiate a response, it may also interfere with the functioning of a specific brain area, thereby inhibiting ('blocking') a response. For example, it may stop speech 'mid-sentence' while someone is talking. The inhibitory effect of ESB will only be apparent when a person is actively engaged in the behaviour that it blocks, and is most evident in complex functions such as language and memory.

Gustav Fritsch and Eduard Hitzig discover the motor cortex

The first reported use of ESB dates back to the 1870s when German physician Gustav Fritsch (1838–1927) and his colleague Eduard Hitzig (1838–1907) used recent improvements in the control of electricity to stimulate movement by a dog.

Fritsch and Hitzig found five sites that, when stimulated, triggered distinctive movements — on the opposite side of the body. As well as successful ESB, their experiments demonstrated **contralateral** (opposite side) function of limb movement. The brain area where these voluntary contralateral movements are initiated is now called motor cortex (Gross, 2007).

Wilder Penfield maps the cerebral cortex

Some experiments were also conducted with humans despite the limitations and risk of the technology at the time. It was not until the 20th century that ESB procedures were perfected. This was achieved in the 1940s by Canadian neurosurgeon Wilder Penfield (1891–1976) who used ESB to map the cerebral cortex with his patients as research participants.

Working with colleague Herbert Jasper, Penfield invented a new treatment for patients with severe epilepsy. *Epilepsy* is a condition involving unprovoked spontaneous bursts of electrical activity that start and spread from somewhere in the brain. These bursts disrupt the normal electrochemical activity of the brain and result in seizures that occur unexpectedly. Seizures can vary widely. They often involve the sudden contraction of the entire body's muscles, followed by a period of alternating jerks and relaxation of the body.

In some cases, people experiencing an epileptic seizure lose consciousness. If breathing stops, the seizure can be life threatening. In the 1940s, anti-epilepsy medications were not as effective as those available today.

Penfield's treatment specifically involved surgically removing the area believed to be the source of epileptic seizures, but only as a last resort for patients whose seizures were poorly controlled by medications. During the surgery, Penfield had to take considerable care to avoid damaging normally functioning areas of the cortex. In order to do this, it was important to first precisely identify the location of both the abnormal brain tissue as well as the areas that were functioning normally to avoid damaging them during surgery. The patient needed to be conscious during the procedure (under local anaesthesia) so that they could react to or report their experiences during the electrical stimulation.

When the cerebral cortex was exposed, Penfield was able to stimulate different areas using an electrode, and to ask his patients to report their experiences. He used this technique with hundreds of patients who had previously given their consent for him to undertake this exploratory procedure while their brains were exposed for surgery.

During his research, Penfield used tiny numbered tags to mark the areas of the cortex that he electrically stimulated as he developed his brain 'map' (see Figure 3.14 below). Then he recorded the responses of his awake and alert patients.

As Penfield touched one cortical area after another with the tip of the electrode, the conscious patient reacted in various ways. For example, when Penfield stimulated an area at the back of the brain, patients reported seeing flickering lights, spots, colours, stars and other images. In this instance, Penfield was stimulating parts of the cortex he subsequently tagged as being responsible for vision. When Penfield shifted the electrode to stimulate an area across the top of the brain, he found that his patients responded by moving specific body parts. As he moved the electrode along this cortical area, a different part of the body moved. This enabled him to pinpoint cortical areas involved with very specific actions, such as jaw or tongue movement (Penfield & Jasper, 1954).

Over a period of more than 20 years, Penfield and various colleagues pooled the data of nearly 300 patients with epilepsy they had carefully studied using direct stimulation. The data was used to map cortical areas and related functions, particularly the sensory and motor areas. These maps are still used today, practically unaltered.

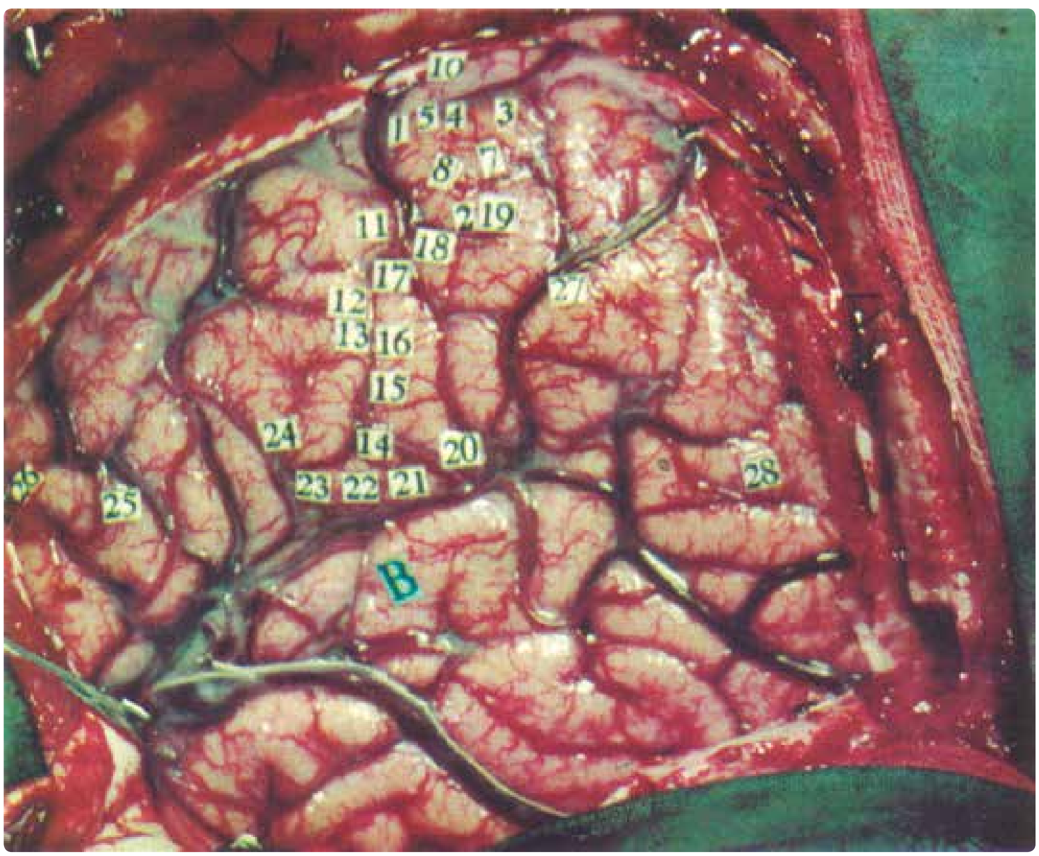


Figure 3.14 Brain mapping by Penfield during ESB. The numbers correspond to points of the cortex, stimulated electrically in a conscious patient.

Electrical stimulation of the brain in the manner conducted by Penfield and his predecessors is now rarely used in research studies involving human participants. It is an extremely invasive technique and potentially harmful. The risk of either physical or psychological harm would now be unacceptable according to current ethical standards for human research. However, a contemporary form of electrical stimulation deep in the brain may be used for therapeutic reasons, for example, to treat motor symptoms of Parkinson's disease (see pages 205–6).

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Weblink
Video: Penfield outlines and demonstrates his procedure 2 m 54 s

BOX 3.2 Electrical stimulation of animal brains

In the early 1950s, Walter Hess, a Swiss neuroscientist and Nobel Prize winner, pioneered the use of electrodes to stimulate structures located deep within the brain. This type of research is unethical with humans, so Hess used cats because they are mammals with brains like ours, but with far less cerebral cortex.

Hess (1957) carefully recorded the behavioural consequences of stimulating each of 4500 brain sites in nearly 500 cats. For example, Hess inserted a radio-controlled electrode into a cat's hypothalamus, a tiny structure located just above the brain stem. By pressing a button, he could send a weak electrical current to the hypothalamus at the point of the electrode.

Hess found that, when the hypothalamus was electrically stimulated, an otherwise gentle cat made aggressive responses, observed when fearful or threatened. As shown in Figure 3.15 above, the cat spat and growled, lashed its tail, extended its paws, and its fur stood on end. Hess concluded that neuronal activity arising from the hypothalamus appeared to produce fear-provoked aggression. The press of a button would instantly turn on the aggression, and would turn it off just as abruptly.

An even more dramatic exhibition of electrical stimulation apparently affecting aggressive behaviour was staged by José Delgado, a Spanish physiologist.

Delgado (1969) implanted a number of radio-controlled electrodes in the brain of a bull bred specifically to be aggressive in the bull ring. Delgado claimed stimulation would stop the charging bull. Standing in the bull ring himself at the moment of the bull's charge, Delgado activated the electrode, which made the bull stop abruptly.

Although the mass media emphasised that Delgado was able to control the bull's aggression, Delgado had actually implanted the electrodes in motor cortex areas. When activated, this forced the bull to stop moving forward and then caused it to turn to one side.

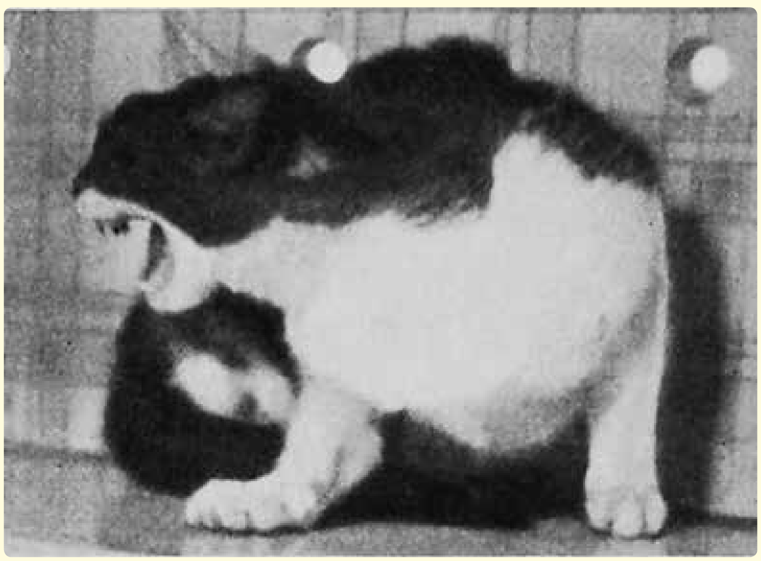

Figure 3.15 With an electrode implanted in its hypothalamus, this cat postures aggressively when electrical stimulation is applied.

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Weblinks
- Video on bull and cat tests conducted by Delgado in the 1960s 1 m 2 s
- Video (Spanish) showing ESB with animals, including the Hess and Delgado experiments 7 m 24 s

LEARNING ACTIVITY 3.3

Review questions

1. (a) What is brain ablation?
   (b) What is a key assumption of ablation when used in experimental research on the brain?
   (c) Give two examples of research findings about the brain that can be attributed to brain ablation experiments.
   (d) What is a significant limitation of these findings?
2. Explain the difference between the localisation and holistic views of brain function.
3. Explain the difference between invasive and non-invasive brain research techniques.
4. (a) What is electrical stimulation of the brain (ESB)?
   (b) What is the key assumption of ESB when used to study brain structure and function?
   (c) Briefly describe an advantage and a limitation of the use of ESB for brain research.
5. Briefly describe two key ethical issues relevant to the use of brain ablation and ESB for brain research.

LEARNING ACTIVITY 3.4

Reflection

ESB research, which has its origins in animal studies, resulted in accurate mapping of the entire human cerebral cortex.

Comment on whether the research should have been prohibited on ethical grounds and explain your view.

Split-brain experiments

American neuropsychologist Roger Sperry (1913–1994) was awarded a Nobel Prize in 1981 for his pioneering research on the relationship between the brain and behaviour. His experiments clearly demonstrated that the brain's two cerebral hemispheres specialise in different tasks.

Sperry studied patients who had undergone split-brain surgery as a radical treatment for their epilepsy. **Split-brain surgery** involves cutting the main band of nerve tissue connecting the two hemispheres. This tissue is called the corpus callosum (see Figure 3.16). Disconnecting the hemispheres, either partially or completely, was found to reduce the incidence and severity of epileptic seizures. However, the procedure is performed only in very serious cases of epilepsy where drugs and other medical procedures have not been effective.

Sperry and his student, Michael Gazzaniga, designed a series of experiments to test for neuropsychological side-effects of the split-brain condition. Medical reports of split-brain patients indicated that they suffered no loss of, or impairment to, brain functions as a result of the split-brain procedure. However, Sperry obtained results that indicated otherwise.

Under controlled laboratory conditions, Sperry (1965) used the apparatus shown in Figure 3.17 to test the abilities of 11 split-brain patients and compare their responses with

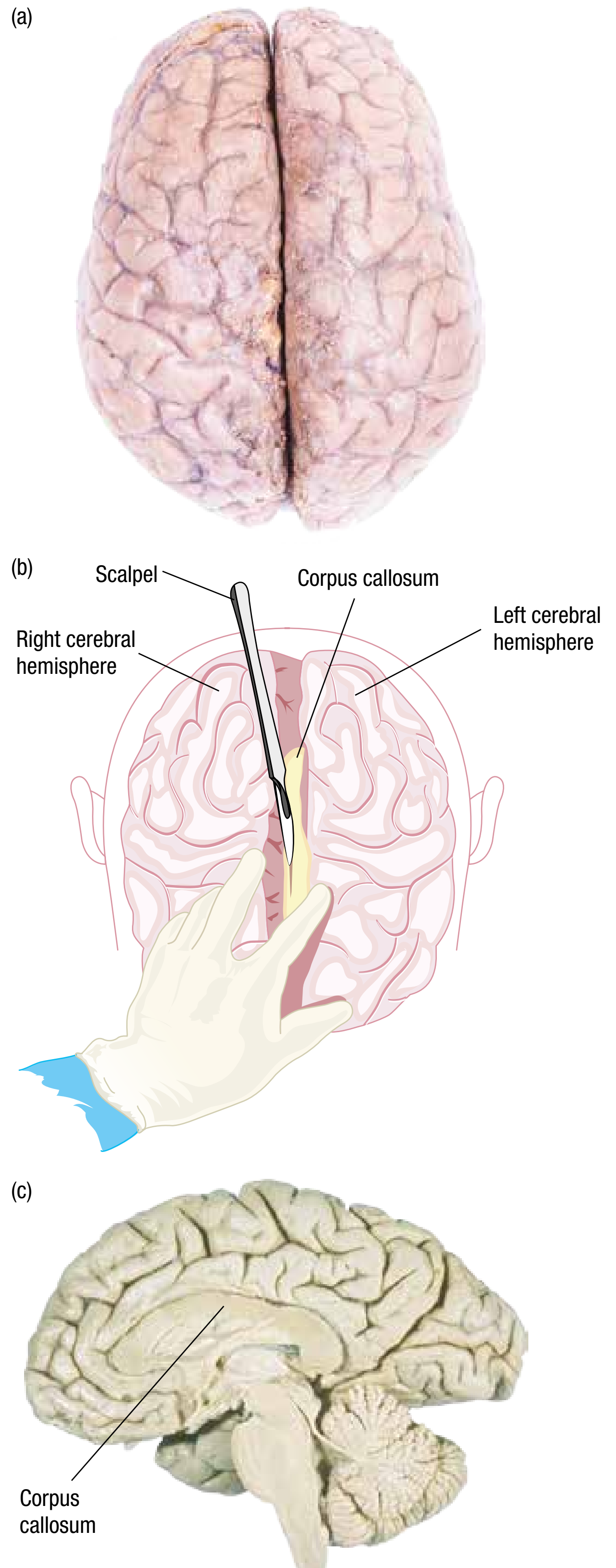

Figure 3.16 (a) The human brain has two almost symmetrical 'halves' called cerebral hemispheres. (b) Split-brain surgery involves cutting strands of the nerve tissue to disconnect the two hemispheres. (c) The hemispheres are primarily connected by a large band of nerve tissue called the corpus callosum. There are also sub-cortical connections.

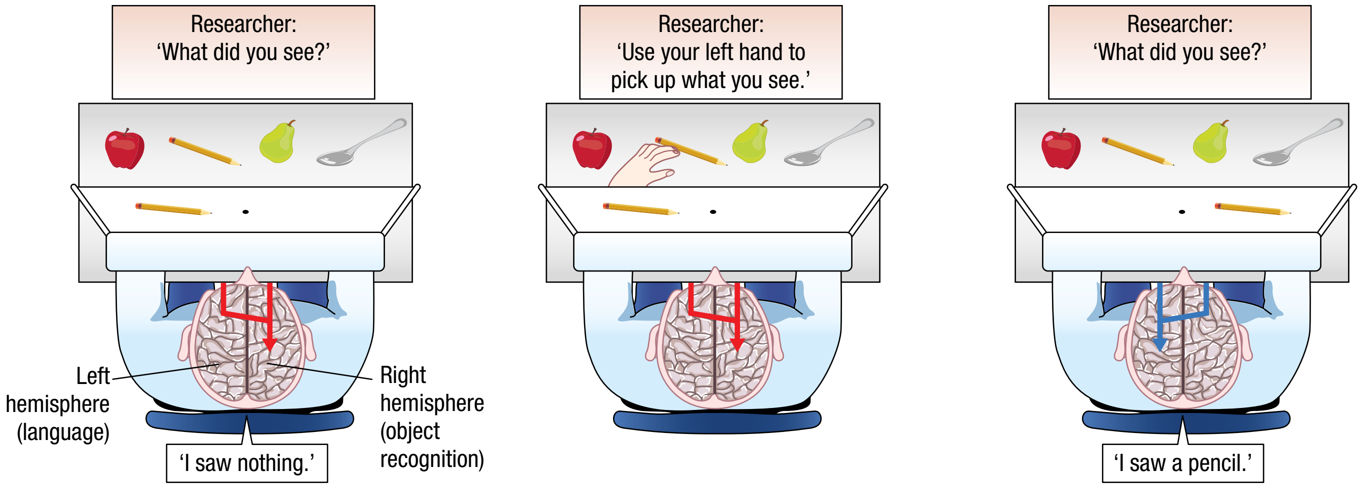

Figure 3.17 Apparatus used by Sperry in the split-brain experiments

those of participants with no hemisphere disconnection. Tested one at a time, each participant is seated behind a screen. The screen is used to flash a word or picture for a fraction of a second while the participant focuses on a black dot in the middle of the screen. The word or picture is flashed either to the left or right of the black dot.

In this procedure, visual information flashed to the left of the black dot is in the participant's left visual field and would therefore be sent to the participant's *right* hemisphere, while visual information flashed to the right of the black dot is in the right visual field and would therefore be sent to the participant's *left* hemisphere (see Figure 3.18). Behind the screen and hidden from the participant are several objects such as an apple, a spoon and a pencil. Although the participant cannot see the objects, they are able to reach through a gap below the screen to touch them and therefore respond to tactile sensations, if these are experienced.

In a typical experiment, Sperry (1968) asked a 'split-brain' female patient, referred to as N.G. for confidentiality reasons, to focus on the black dot. As she did so, he flashed a picture of one of the objects to either the left or right of the black dot. Each time an object's image was flashed onto the screen, Sperry asked her 'What did you see?' In response to the images flashed in the right visual field (and therefore sent to the left hemisphere), N.G. named the objects. But to images flashed in the left visual field (and sent to the right hemisphere), N.G. could not *say* what she saw and often denied that anything had been flashed on the screen.

Why was N.G. unable to identify images flashed to the left visual field? If the visual information sent to the right hemisphere cannot cross back to the left hemisphere (because the corpus callosum has been cut), then the person is unable to *say* what they saw. This occurs despite the fact that they still actually see the image, because the area of the brain responsible for speech is in the left hemisphere.

In order to check that N.G. *did* actually see an object when it was presented in the left visual field, Sperry asked N.G. to use her left hand to reach under the partition for the object. N.G. could correctly locate the object shown in the image because her left hand was controlled by the right hemisphere that also saw the image of the object. The message from the motor cortex in the right hemisphere for the left hand to move does not use the corpus callosum.

It was evident that the right hemisphere had processed information about the object because N.G. could correctly select it by feeling it with her left hand, but she could not say what it was, because only the left hemisphere could convert the information into the spoken word. Other split-brain participants responded in the same ways.

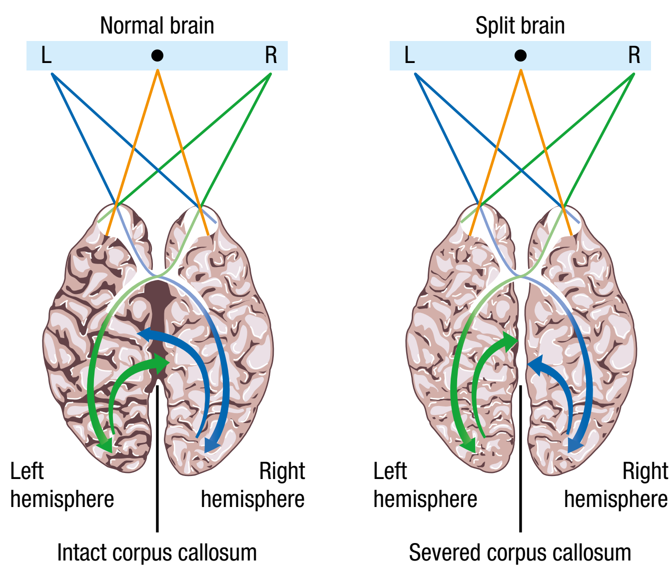

Figure 3.18 Pathways of information from the left and right visual fields to the brain in patients with and without the split-brain condition

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Weblinks

- Video on early split-brain research narrated by Gazzaniga 10 m 43 s
- Video on a recent split-brain experiment by Gazzaniga 4 m 35 s

LEARNING ACTIVITY 3.5

Review questions

1. What is a 'split-brain' experiment?
2. What medical procedure is used to achieve a 'split-brain'?
3. Why was a control group used in the Sperry experiments?
4. What are two key findings about brain function from the split-brain experiments?
5. (a) If a doctor injected a sedative drug into an artery leading to your left hemisphere just before a friend visits you in hospital, in what way(s) would you be able to greet your friend?
   (b) What abilities normally used to greet someone would you be unable to use?
6. Would split-brain experiments be ethically permissible today according to National Statement guidelines? Explain your answer.
7. Draw a flowchart to briefly summarise the Sperry and Gazzaniga experimental design for their split-brain studies. Your flowchart should refer to a research hypothesis, the IV and DVs, the experimental design, key results and a possible limitation of the research.

Neuroimaging techniques

In the second half of the 20th century various neuroimaging techniques were developed for medical diagnostic purposes. These have been adopted for psychological research. As the name suggests, **neuroimaging** is a technique that captures a picture of the brain.

When used in research studies, participants are typically given an experimental task for which they are required to think, feel or behave in a particular way so that images of their live, intact brain can be obtained. For example, a participant may be asked to perform a problem-solving task, listen to music, speak aloud or react to some other stimulus while changes that occur in one or more brain areas are observed and recorded.

Generally, the different neuroimaging techniques can be divided into two categories — structural and functional techniques. As suggested by the term, structural techniques are primarily used for brain structure imaging and functional techniques for brain functioning imaging. The various neuroimaging techniques can be used alone or in combination.

One important aspect of neuroimaging is that it helps overcome significant ethical constraints in studying the live, intact brain as well as the injured brain. Techniques that preceded neuroimaging were often invasive and carried unacceptable risks to research participants. Neuroimaging is relatively *non-invasive* — it can be used by researchers without entering ('invading') the brain. Therefore, the risk of harm to participants is minimal, if not negligible.

Structural neuroimaging

Structural neuroimaging (sometimes called *static neuroimaging*) refers to techniques that produce images, or 'scans', showing brain structure and anatomy, such as the CT and standard MRI.

Computerised tomography (CT)

Computerised tomography (CT), also called *computerised axial tomography* (*CAT*), uses x-ray equipment to scan the brain at different angles. A computer builds up a picture and creates an image showing a horizontal cross-section of the brain, as if it has been sliced through.

For a CT scan of the brain, the research participant (or patient) must be given a substance called contrast. This is used to highlight the brain's blood vessels and enable interpretation of the resulting images.

First used in the early 1970s, CT provided a new way of looking at a live, intact human brain without using invasive or risky procedures. It is very useful for locating and identifying brain abnormalities and injury. For example, a CT scan can help identify the location and size of a tumour and the location and extent of damage caused by a stroke or injury.

CT has also been used in research to look for and identify possible brain abnormalities in brain structures in people with a mental health disorder such as schizophrenia and depression. CT has also enabled observation of physical changes in the brains of patients with Parkinson's disease, Alzheimer's disease and many other brain-related disorders.

Although CT has been valuable for brain research, it has significant limitations. The black and white images show only brain structure, and not as well as other scanners that do not rely on x-ray technology. X-rays emit radiation and are not particularly good for imaging tissue.

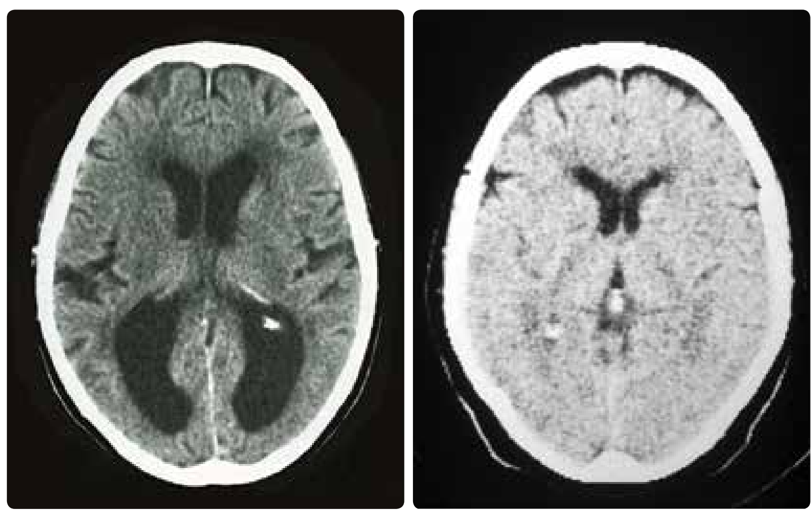

Figure 3.19 (a) CT scan of a brain of a person with Alzheimer's disease. Note the size of the black areas showing abnormal tissue compared to (b) the image of a healthy brain.

Figure 3.20 A researcher is shown reviewing CT scans of a participant's brain.

Magnetic resonance imaging (MRI)

Magnetic resonance imaging (MRI) uses harmless magnetic fields to vibrate atoms in the brain's neurons and generate a computer image of the brain. Like CT, scans are taken within a long, metal cylinder in which the participant must lay very still.

The MRI technique is more sensitive than CT. Consequently, MRI images are clearer and more detailed than CT. They can also be produced in full colour.

Like CT, MRI has primarily been used for diagnosing structural abnormalities of the brain. However, MRI can be used to detect and display extremely small changes in the brain's anatomy. For example, MRI is more sensitive and can more clearly distinguish between brain tissue that is cancerous and noncancerous. The image can also reveal tissue degeneration and blood clots and leaks that may indicate a stroke.

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Video on MRI brain scan procedure 1 m 14 s

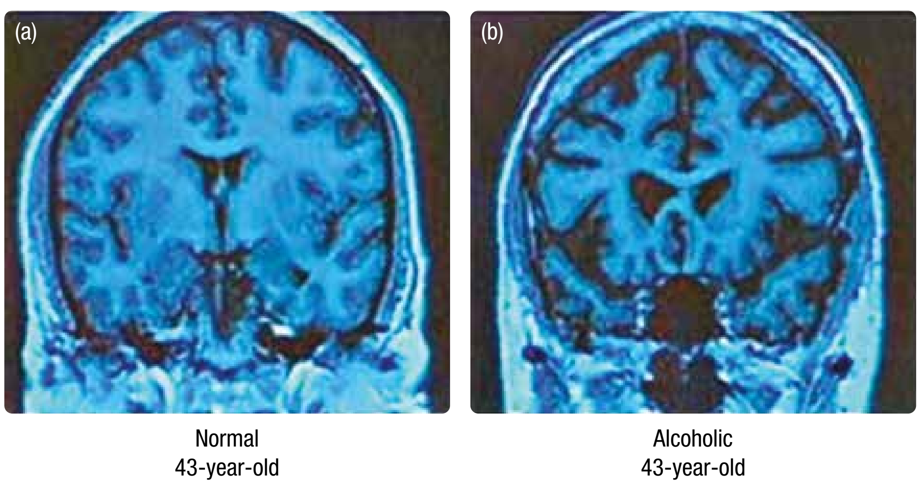

Figure 3.21 MRI images showing areas of (a) normal and (b) abnormal brain tissue

Functional neuroimaging

Functional neuroimaging (sometimes called *dynamic neuroimaging*) refers to techniques that provide views of some particular aspect of brain function by showing images of the brain 'at work'. They also provide information about brain structure. PET and fMRI are two examples of functional neuroimaging.

Positron emission tomography (PET)

CT and standard MRIs produce useful images of brain structures. They can give information on what brain areas look like but do not reveal their activity during any given mental process or behaviour. This limitation was overcome in the late 1970s through PET.

Positron emission tomography (PET) produces colour images showing brain structure, activity and function. In brain research, PET is used to record the level of activity in different brain areas while the participant engages in some kind of mental activity or a low level physical task, such as imagining, remembering, listening, talking or moving a body part. The type of task given to participants is limited by the size of the chamber, which is like a CT and MRI scanner.

PET provides images of the 'working brain' by tracking a glucose solution containing a short-lived radioactive tracer. This is usually injected into the bloodstream before scanning. When it reaches the brain, the amount used during a given task is recorded. It is assumed that brain areas that require increased blood flow have increased neuronal activity (and vice versa). About 20% of the blood flowing through the heart is pumped to the brain.

Each PET scan uses a colour code to indicate areas of high and low activity brain activity. In ascending order, the colours violet, blue, green, yellow and red each represent different amounts of activity. For example, if a person is listening to someone talking during the PET procedure, the areas of the brain involved with speech comprehension will be activated and highlighted in the PET scan by red and yellow. This enables the researcher to identify the level of activity of different brain areas in speech comprehension.

As shown in Figure 3.22 below, a PET scan looks like a coloured 'map' of the brain's activity, with different colours indicating areas of greatest and least activity. PET scans show brain activity, whereas MRI scans do not. However, PET images in themselves are less detailed than MRI images. PET scans are therefore often performed using a chamber that is a combined PET and CT scanner to achieve a more detailed image.

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Video on PET use to study language processing in the brain 6 m 25 s

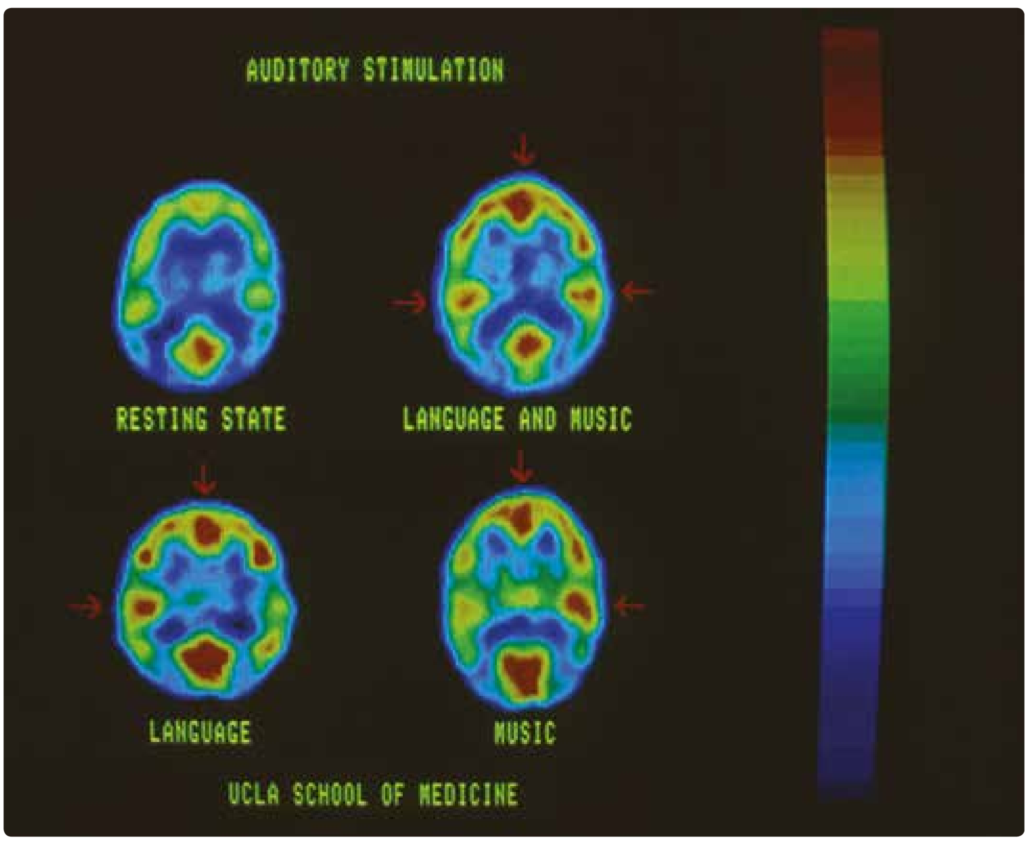

Figure 3.22 PET scans comparing brain activity when listening to speech and music. Red indicates the highest level of activity, with yellow next, followed by green and then blue.

Functional magnetic resonance imaging (fMRI)

PET scanning was the preferred neuroimaging technique for brain research before fMRI technology became available in the early 1990s. Like PET, **functional magnetic resonance imaging (fMRI)** detects and records brain activity by measuring oxygen consumption across the brain. However, it does not expose participants to radioactive tracers. The technique exploits the fact that blood is more oxygenated in highly active parts of the brain. Brain areas that are more or less active during a given task are identified by detecting changes in oxygen levels in the blood as it flows through the brain.

fMRI uses standard MRI technology, producing images like those of a PET scanner, but better. As with the PET, the colour variations reflect the level of activity of different brain areas and structures while a participant engages in an experimental task.

fMRI is preferred in psychological research because it can take numerous pictures of the brain in rapid succession and can therefore detect brain changes as they occur from moment to moment. Consequently, it can provide an image of brain activity averaged over seconds, rather than the several minutes required by PET. This also means that fMRI images of brain structures and activity are more highly detailed and more precise.

Other functional neuroimaging techniques

There are other functional neuroimaging techniques which researchers can access. These include:

- *single photon emission computed tomography* (SPECT),
- *magnetoencephalography* (MEG),
- *diffuse optical tomography* (DOT),
- *near infra-red spectroscopy* (NRIS) and
- *functional near infra-red spectroscopy* (fNIRS).

All have strengths and limitations.

Although functional techniques have a distinct advantage for psychological research on the brain, an image of more or less blood flow does not necessarily mean more or less brain activity. Similarly, just because a brain area is active (or inactive), it does not necessarily mean that it is actually engaged (or not engaged) in the mental process or behaviour under investigation.

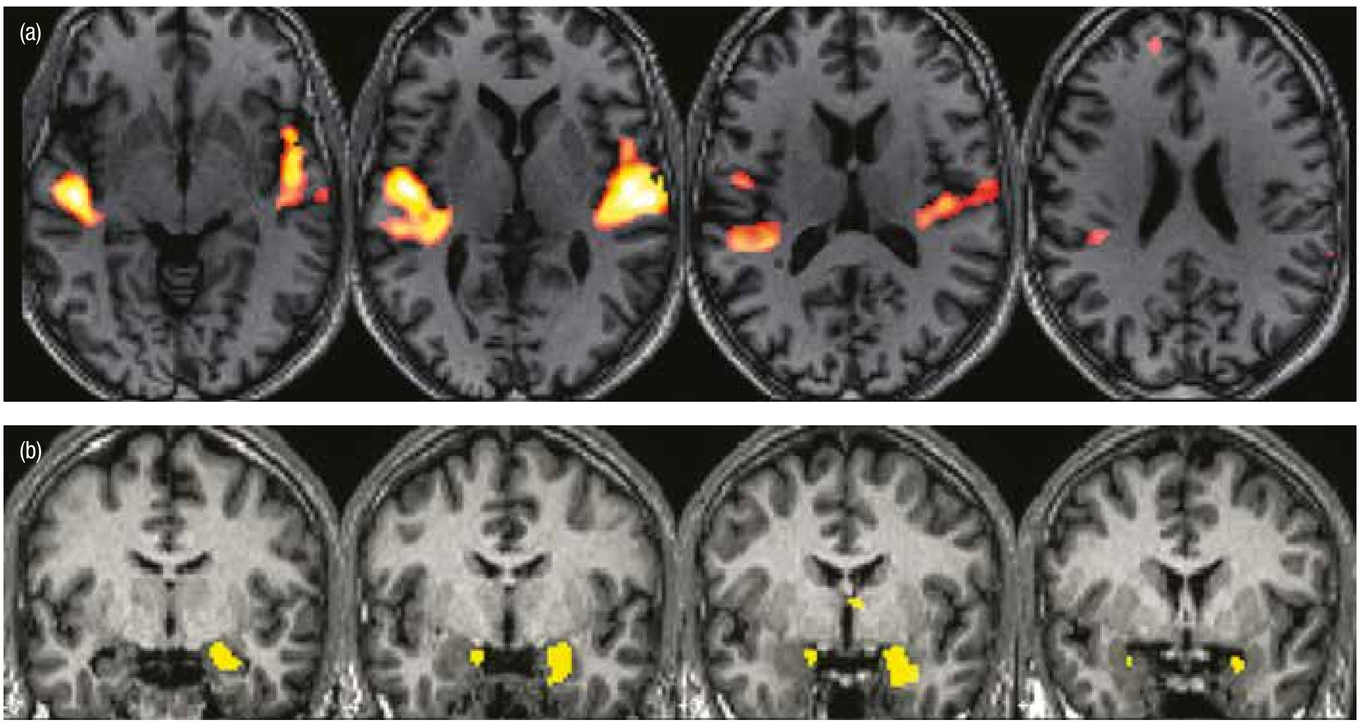

Figure 3.23 Examples of fMRI images from scans of healthy human brains. (a) Brain activity when listening to the sounds of classical music. Highlighted areas show activity mainly in auditory cortex within the temporal lobes. (b) Brain activity when smelling. Highlighted areas show activity mainly in the olfactory cortex within the frontal lobes.

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Video on fMRI use for decision-making research 6 m 41 s

BOX 3.3 Electroencephalography (EEG)

First used in the 1920s, electroencephalography preceded all the current neuroimaging techniques. Even though it cannot produce an image of the brain, it is still in common use.

The *electroencephalogram* (EEG) detects, amplifies and records general patterns of electrical activity in the brain over a period of time. The electrical activity is spontaneously and continuously produced by the brain's neurons, particularly neurons in the cerebral cortex just below the scalp. This is detected by electrodes attached to multiple areas of the scalp, usually through an 'EEG cap'.

The EEG translates the electrical activity into a visual pattern of brain waves. The brain waves are displayed as squiggly lines on a chart (see Figure 3.24). The lines correspond with different cortical areas. The different types of brain wave patterns are named after Greek letters of the alphabet such as alpha, beta, delta and theta. For example, the alpha pattern is apparent when a person is resting quietly with their eyes closed, beta when wide awake and alert, and delta when in a deep sleep.

The EEG has been widely used in all kinds of experiments, particularly to study different states of consciousness such as when awake or sleeping. It is also useful in the diagnosis and study of various brain disorders such as epilepsy and Parkinson's disease. More recently, the EEG has identified distinctive brain wave patterns often occurring in people with schizophrenia. Different types of brain waves are seen as abnormal only in the context of variations from what would normally be expected for the individual whose brain is being assessed.

A limitation of the EEG is that it can't detect neural activity deep inside the brain very well. Nor does it provide detailed information about which particular structures of the brain are activated and what their specific functions might be, especially areas beneath the cortex. The electrodes detect information from relatively large areas of the brain and there is also a lot of 'background' brain activity detected as well, so it can be difficult to pinpoint the specific area of the brain that is the source of the activity.

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Video on EEG use for psychological research 6 m 41 s

(a)

(b)

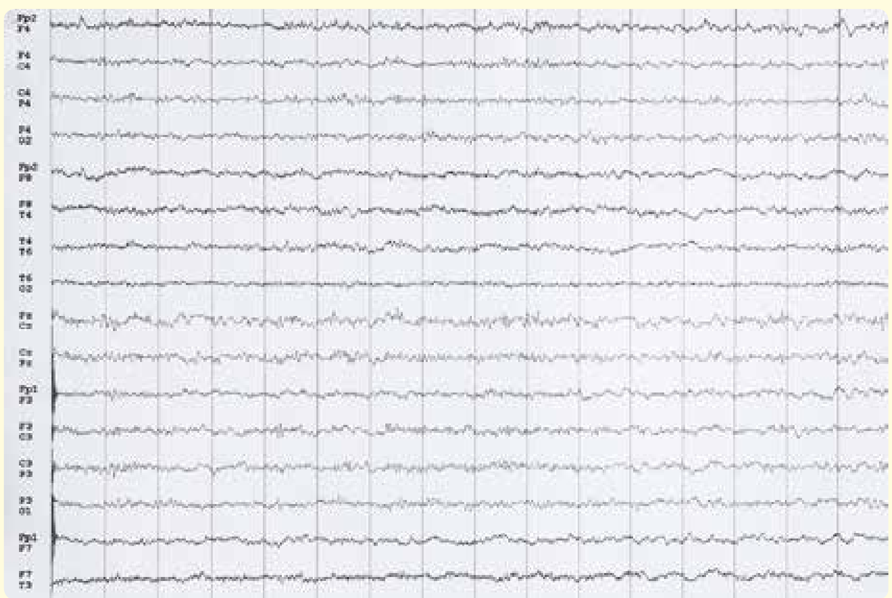

Figure 3.24 (a) This infant's electrical activity in the brain is being recorded during research on facial perception. (b) An EEG recording showing the brain's normal electrical activity in the form of distinctive brain wave patterns.

BOX 3.4 Transcranial magnetic stimulation (TMS)

If you've ever held a magnet under a wooden tabletop and used it to drag a needle or pin across the table's surface, you know that magnetic fields can pass relatively unimpeded through insulating material (non-conductors of electricity). The human skull is no exception.

Transcranial magnetic stimulation (*TMS*) is a general term for a direct brain stimulation technique that delivers a magnetic field pulse through the skull and temporarily activates or disrupts the normal activity of neurons in a specific area of the cerebral cortex. The magnetic field induces a harmless electric current in time-varying charges ('pulses'). While receiving stimulation, the person is fully awake and alert.

TMS is a non-invasive procedure and there is no need for any substance to be taken or for anaesthetic to be administered. When TMS is used in procedures involving delivery of a single pulse, it is called *single pulse TMS* or *non-repetitive TMS*. This is in contrast to *repetitive TMS* (*rTMS*) which is used in procedures involving repeated, but not necessarily rapid, delivery of a pulse.

As shown in Figure 3.25, the magnetic field pulse is transmitted from a small copper electromagnetic coil that is enclosed in plastic and placed next to the scalp. An electric current is sent through the coil, which induces a magnetic field around the coil and creates the pulse. The single pulse is then directed through the skin and scalp to underlying clusters of neurons. This activates the neurons and they send a burst of neural impulses ('electrical activity') to adjacent neurons, activating them, which in turn activates other adjacent neurons.

Using this procedure, a specific area of the cerebral cortex can be activated for a short period. A brief single pulse can cause a burst of brain activity. For example, when the coil is placed just above the skull over an area of visual cortex in the occipital lobe, the participant usually detects flashes of light. If placed over the motor cortex in the frontal lobe, the result is a brief muscle twitch somewhere in the body, depending on which part of the cortex is activated. The pulse does not directly affect the whole brain. It affects only that part of the brain that lies immediately below the skull, about 2–3 cm into the brain directly beneath the coil. In this way, researchers can use TMS to study functions of specific areas of the cerebral cortex.

TMS can also be used in clinical settings for diagnostic purposes to help pinpoint specific areas of critical brain damage and to track patient recovery.

When rTMS is used, the consecutive pulses cause the neurons to lose their ability to fire. This results in suppression of their activity and consequently brain activity in the stimulated area. Essentially, this is 'turning off' a small area of the brain without causing and damage or unwanted side effects. For example, if the coil is held over Broca's area the person is unable to speak fluently while the current is on but will resume fluent speech as soon as the current is stopped. Using this kind of procedure, researchers can temporarily create brain 'malfunction' and simulate brain damage, permitting them to perform experiments with human participants that would otherwise not be possible.

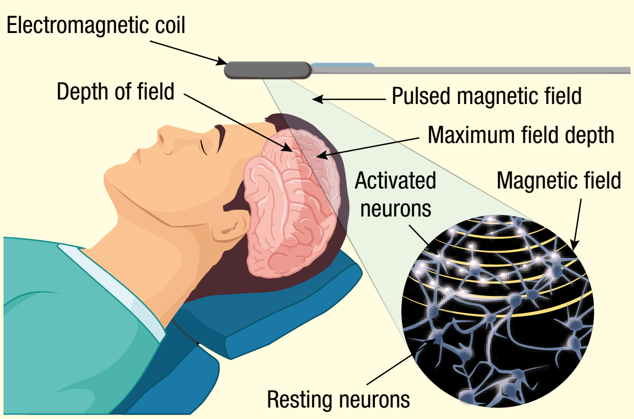

Figure 3.25 In TMS, a magnetic field pulse is directed through the skin and scalp to the cortical surface for a short period to activate or disrupt neuronal function in a specific area of the cerebral cortex.

Figure 3.26 TMS can be used for brain research and in clinical settings for diagnostic purposes to help pinpoint specific areas of cortical brain damage and to track patient recovery.

LEARNING ACTIVITY 3.6

Review questions

1. Distinguish between structural and functional neuroimaging.
2. In what way has neuroimaging advanced brain research compared with research that did not have access to the technology?
3. In what way does the use of neuroimaging overcome ethical constraints in studying the live, intact human brain?
4. Complete the following table. For 'Other', include an example and information about a more recently developed neuroimaging technique that may be used in brain research.
5. Explain which neuroimaging technique(s) would be best to test a research hypothesis for three of the following topics.
   (a) Determine the extent of structural injury (damage) caused by a stroke resulting from internal bleeding.
   (b) Identify brain areas involved in visual perception.
   (c) Examine the role of the cerebellum, located at the lower, rear part of the brain, in speech production.
   (d) Identify specific brain areas affected by a tumour.
   (e) Observe sex differences in brain functioning while reading a map.
   (f) Determine whether a specific area at the front of the brain receives information from other lobes during a problem-solving task.

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Technique	Name	Type of information obtained	Advantage	Limitation
CT				
MRI				
fMRI				
PET				
Other				

LEARNING ACTIVITY 3.7

Ethics of brain research using neuroimaging techniques

Identify and briefly describe significant ethical considerations relevant to one of the following fictitious brain research studies.

You should refer to information about ethical principles and guidelines for research described on pages 90–96.

Task descriptions	
Study 1 on aggression A researcher proposes to conduct a brain study using PET with two groups of children from local kindergartens. One group will be the experimental group. This group will consist of children identified as 'aggressive' by their teachers. The control group will consist of children identified as 'not aggressive' by their teachers. The researcher will investigate whether the children identified as 'aggressive' have any area of their brain that is more or less active when viewing a violent cartoon, as compared with the brains of children identified as 'not aggressive'. A radiologist will be in attendance to give the required radioactive substance, operate the PET machine and help interpret the PET scans. Parents will be refused entry to the research area so that the children are not distracted during the experimental procedure.	**Study 2 on lie detection** Following a terrorist suicide bombing that killed many innocent people in a major European city, a researcher decides that there is a need for a reliable and effective means of detecting lies and deception. The researcher proposes to conduct a series of neuroimaging studies to test the effectiveness of different neuroimaging techniques in lie detection for security purposes; for example, to screen individuals at airports. The researcher also believes that neuroimaging techniques could be used by police, courts and parole boards for lie detection purposes and by juries to assist with decision making. Volunteer adult males who are devout members of a religious cult will be compared with adult males who are not members of this cult, and also with a group of adults who are atheists (do not believe in God). To encourage participation in the research study and compensate participants for inconvenience over a three-month period, all participants will be paid.

LEARNING ACTIVITY 3.8

Reflection

Suppose a brain scan of a volunteer participant in an experiment unexpectedly revealed an abnormality in the brain. It looks like a tumour.

Comment on whether the researcher should tell the participant and explain your view.

NERVOUS SYSTEM: STRUCTURE AND FUNCTION

What causes 'butterflies' in our stomach when we feel anxious? Why do we cry when we feel upset? What influences our responses when we are angry? How do we know which muscles to move when cleaning our teeth? Why do we automatically move our hand away from a scorching flame? Why does our heart continue to beat while we sleep? What enables a driver to put their foot on the brake and swing the steering wheel to avoid a dog that runs across the path of their car? The answers to these questions and many others about our behaviour are linked to aspects of our biology, in particular, the role of the nervous system.

Most living organisms have nervous systems. Simple organisms such as jellyfish and worms have very simple nervous systems consisting of only a few neurons. This enables them to perform basic survival actions such as eating, eliminating waste and moving, but little else. We need a more sophisticated nervous system so we can perform complex activities such as planning, reasoning, studying, socialising, talking, texting, drawing, bike riding, playing tennis and using social media.

The human nervous system is responsible for all aspects of what we think, feel and do. It achieves this by serving as a communication system between the body's internal cells and organs and the external world. Through its vast network of nerves distributed throughout the body, the nervous system enables the brain to obtain information about what is going on inside and outside the body and to respond appropriately. Its three main functions are to:

- *receive* information
- *process* information, and
- *coordinate a response* to information.

Sensory information is received from the external environment through neurons located within sense organs such as the eyes, ears and skin. The nervous system also receives information from within various parts of the body (the internal environment), such as the muscles, joints and tendons, which it communicates to the brain.

When detected, the information is sent to the brain where it is processed; for example, by interpreting the information and enabling its storage in memory. The brain will also coordinate a response by initiating appropriate action; for example, by sending messages to muscles, glands and other internal organs. This, in turn, enables muscles to move, causes glands to secrete (release) hormones and initiates the responses of particular internal organs.

Consider reception, processing and response functions when your mobile phone unexpectedly rings. You often react to your ring tone by reaching for it, checking the incoming number on the screen, accepting the call and speaking.

Your nervous system *receives* the vibrating air molecules representing the ring tone through receptor cells in your ear. This raw sensory information is sent to the brain via the auditory nerve, a specific nerve pathway formed by interconnected neurons. The brain *processes* this information, identifying the sound as your mobile phone's ring tone. The brain *responds* to the tone by sending messages to activate the muscles in your arm and hand to enable you to reach for the phone and form the hand shape and other movements required to pick it up and look at the screen. It also initiates and coordinates the activity of several hundred other muscles in your chest, neck, face, jaw, lips and tongue to enable you to check the screen, accept the call and speak.

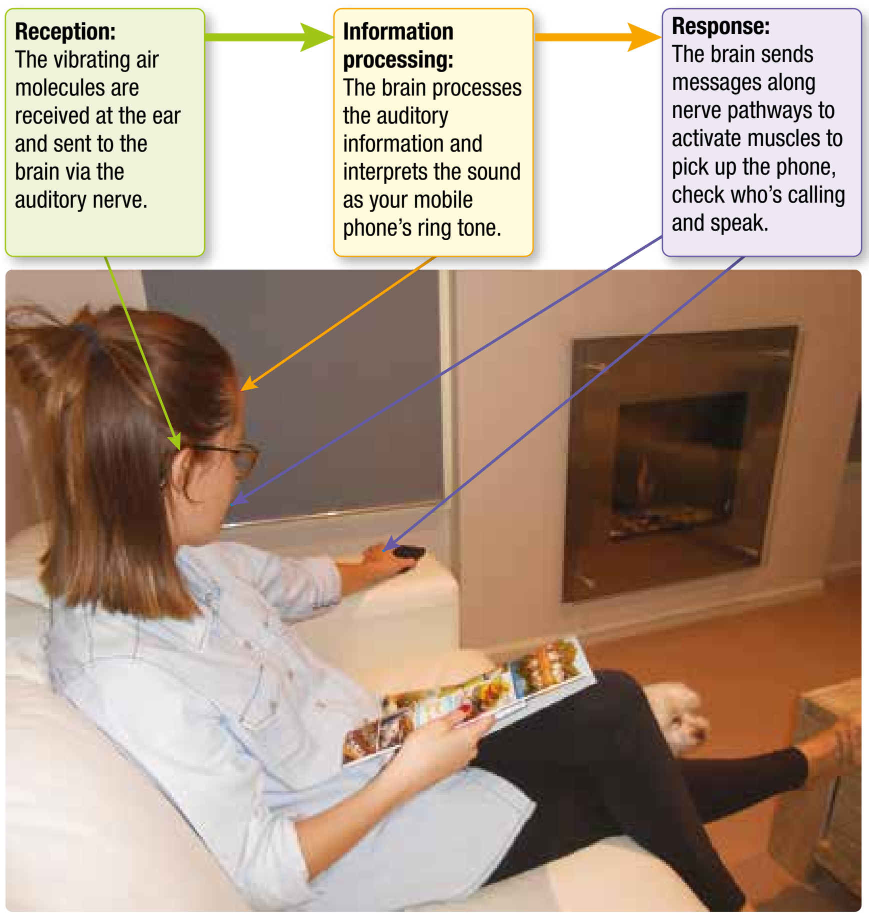

Figure 3.27 The three main functions of the nervous system are to receive, process and coordinate a response to information.

Organisation of the nervous system

The human nervous system spreads throughout the entire body, from the tips of your toes and fingers to the top of your head. Although it is a single system, it is made up of different sub-systems, commonly referred to as 'divisions' or 'branches'. Although each division carries out identifiable functions, the nervous system functions as a coordinated whole.

As shown in Figure 3.28, there are two main divisions in the human nervous system — the central nervous system and the peripheral nervous system.

The central nervous system comprises the brain and the spinal cord. The spinal cord connects the brain and the peripheral nervous system. The peripheral nervous system includes all parts of the nervous system that lie outside the brain and the spinal cord. It links the central nervous system to all other parts of the body, carrying messages to and from the central nervous system. Thus, the central and peripheral nervous systems are connected and interdependent. They work together every moment of our lives in maintaining communication throughout the entire body, thereby enabling us to think, feel and act as we do.

Central nervous system

The **central nervous system (CNS)** consists of the brain and spinal cord. Its main function is to process information received through the sensory systems and other parts of the body and to activate appropriate actions. Although many other animals can see, hear, smell, run and move better than we can, our CNS processes information in ways that enable us to adapt to the environment in ways that no other animal can.

The central nervous system is so named because it is located in the centre of the body. It is also central to all our mental processes and behaviours. Everything you think, feel and do is processed through this system. This includes the regulation of all the basic bodily processes that keep us alive. The CNS is so important to our ability to function that it is entirely protected by bone — the brain by the skull and the spinal cord by the spinal column. Both the brain and spinal cord are also covered by the meninges and suspended in cerebrospinal fluid to cushion blows.

Brain

The **brain** is an intricate network of cells that plays a vital role in processing information from the body's external and internal environments and in directing responses. It is kept continually informed of both the ever changing environments through sensory information detected

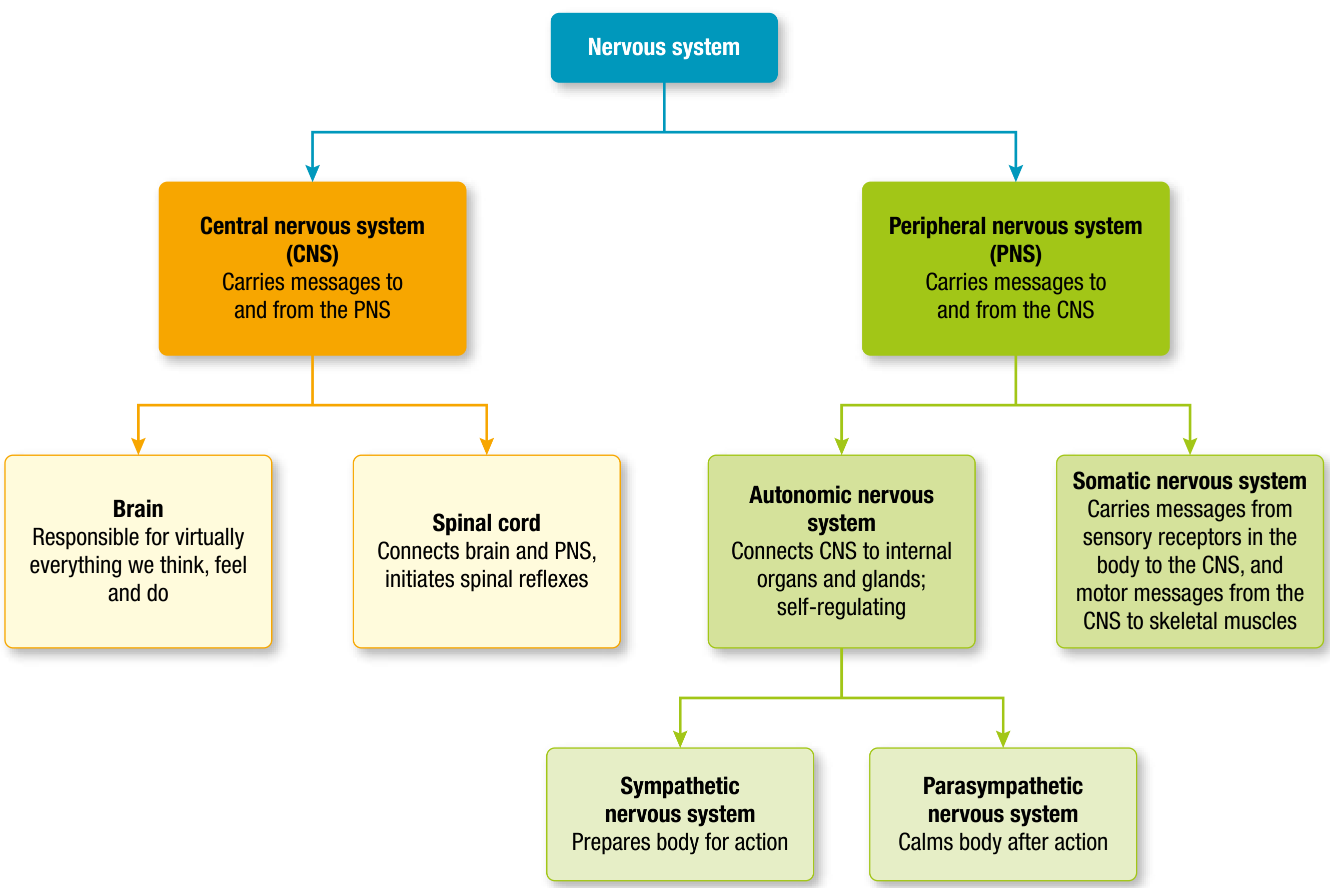

Figure 3.28 Organisation of the human nervous system

and sent to it by the many and varied sensory receptor cells located at or near the surface of the body and also deep within the body. Because of its role in overseeing almost everything we think, feel and do, it is sometimes called the 'control centre' or 'master regulator'.

The brain is more than a mass of networked cells. Brain cells are organised into many identifiable areas (or 'regions') and structures that have specialised functions. For example, some parts are dedicated to sensory or motor functions. Most parts, however, have integrating and overlapping functions. What seems to be a simple task, such as naming a familiar object, will trigger activity in multiple structures and areas throughout your brain. These include parts at the back and side to process visual information received from your eyes, parts at the front, at the sides and near the centre to recover information from memory and to identify the object, and parts at the front involved in language and speech production to state the name of the object.

Many brain functions involve the activation of interconnected nerve cells that form *neural pathways* which link different brain areas and structures. Within the brain, these pathways are often referred to as neural *circuits* or *tracts*. Some span short distances and others extend from one side of the brain to the other. Neural pathways also connect the brain to other parts of the nervous system and the body. We examine key brain areas, structures and their functions later in the chapter.

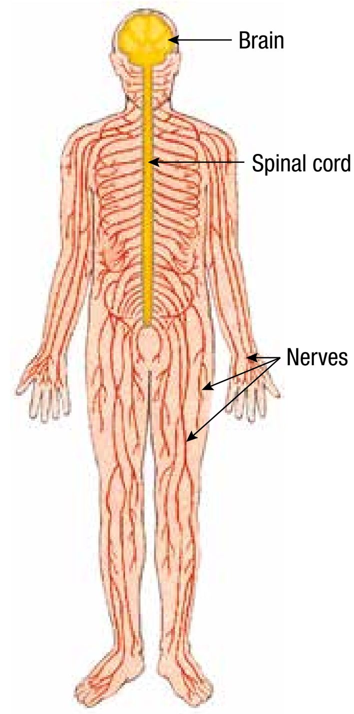

Figure 3.29 The central nervous system is shown in yellow and the peripheral nervous system is shown in red. These two systems are connected and interdependent.

Spinal cord

The **spinal cord** is the long, thin bundle of nerve tissue that extends from the base of the brain to the lower back. It is encased in a series of bones called *vertebrae*, that extend further than the actual spinal cord. The spinal cord links the brain and the parts of the body below the neck.

Two major functions of the spinal cord are to:

- receive sensory information *from* the body (via the peripheral nervous system) and send these messages to the brain for processing
- receive motor information from the brain and send it *to* relevant parts of the body (via the peripheral nervous system) to control muscles, glands and internal organs so that appropriate actions can be taken.

For example, suppose that you are picking up some snow with an ungloved hand to throw at a friend. The sensory receptors in the skin on your hand detect the change in temperature and transmit the sensory information to your brain via the spinal cord and the PNS. Your brain will quickly analyse and interpret the sensory information and decide what to do. If the brain decides the snow should be dropped because holding it is interpreted as unpleasant, perhaps even painful, a message will be sent, via the spinal cord and the PNS, to the muscles in the fingers holding the snow, causing them to move so that the snow is released. This two-way interaction between the brain and the body, via the spinal cord, occurs in a highly coordinated way.

The transmission of information along the spinal cord, to and from the brain, occurs through neural pathways organised as 'nerves'. When the spinal cord is injured, the brain loses both sensory input from and control over the body. The severity of feeling loss and paralysis depends on where the spinal cord is injured. The higher up on the spine the injury is, the greater the number of nerve connections between the brain and body that are severed.

The spinal cord has a relatively simple organisation but does more than provide pathways for messages to and from the brain. It can also initiate some simple responses independently of the brain. These *spinal reflex* responses are involuntary and occur automatically in response to certain stimuli without any involvement of the brain.

A spinal reflex response occurs, for example, when you touch something hot and automatically withdraw your hand. The nerves in your hand send a message to the CNS. The message from the hand reaches the spinal cord first. Its immediate response serves an adaptive function to protect you from potential harm, by immediately sending a return message to the muscles in your arm and hand to contract, to move away from the source of the potential harm.

While this is happening, the message is being sent on to the brain which may trigger another reaction when you become aware of the stimulus (and may experience pain). The immediate response at the spinal cord enables a faster reaction time, a fraction of a second before the sensory information reaches the brain.

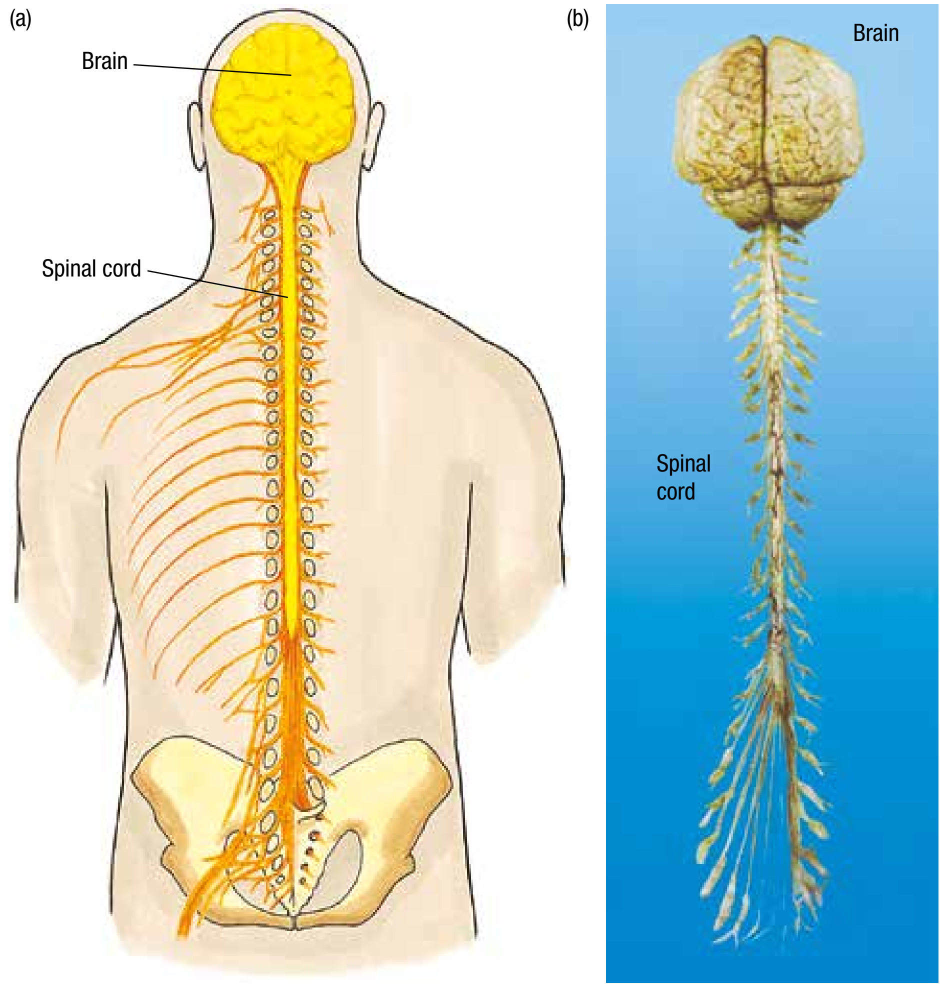

Figure 3.30 (a) The CNS is surrounded by cerebrospinal fluid, the meninges and bone (skull and spinal column) for protection. (b) The spinal cord links the brain and peripheral nervous system.

Peripheral nervous system

The term peripheral refers to 'outskirts' or 'outlying'. The **peripheral nervous system (PNS)** is the entire network of nerves located outside the CNS that transmits information to and from the CNS. Thus the PNS carries information to the CNS from the sense organs, muscles and glands. It also carries messages from the CNS to the rest of the body.

The fact that the PNS is called 'peripheral' does not mean that it is less important than the central nervous system. Its role in the communication of information around the body and in the body's normal functioning is just as important as the CNS.

The CNS depends on the PNS to provide it with information from the sense organs about the external environment and information about the internal environment from other parts of the body. Likewise, the PNS depends on the CNS to process the information it sends and to initiate a response that the PNS carries to various parts of the body.

The PNS has two subdivisions called the somatic nervous system and the autonomic nervous system.

Somatic nervous system

The **somatic nervous system (SNS)** is a network of nerves that carries sensory information *to* the CNS and motor information *from* the CNS. Sensory information is received at sensory receptor sites in the body (skin, muscles, joints and tendons) and carried along sensory neural pathways. Motor information is carried along motor neural pathways to skeletal muscles to control their activity.

The *sensory* function of the SNS is demonstrated when someone touches your hand. The SNS sends the information about touch from the skin to your brain, resulting in you experiencing the sensation of touch (or pressure on the skin). The *motor* function of the SNS is demonstrated whenever you voluntarily move a body part. For example, when you text, frown, brush your hair, walk up stairs or ride a bike, your somatic nervous system is active.

The somatic nervous system is also called the *skeletal nervous system* because it connects the skeletal muscles with the CNS. Skeletal muscles are the body parts that produce movement under the control of the brain and spinal cord. Most of these muscles attach to points on the skeleton at one or more joints. The close relationship of these muscles to the skeleton gives them their name — skeletal muscles.

Unlike skeletal muscles, *cardiac muscles* the *smooth muscles* that power visceral organs such as the lungs, liver, kidneys, bladder, intestines and various glands are involuntary in their actions and under the control of the autonomic nervous system.

Figure 3.31 The motor function of the somatic nervous system is apparent in any voluntarily movement of a body part.

Autonomic nervous system

The **autonomic nervous system (ANS)** is a network of nerves that carries messages between the CNS and the heart, lungs and other internal organs and glands. The ANS regulates, or controls, the functioning of internal organs automatically, without you having to consciously think about it. For example, the ANS regulates heart rate, breathing, digestion, salivation and perspiration, actions that occur continuously and involuntarily without your conscious control. Thus, the ANS is a system that functions fairly independently of the CNS in maintaining the body's internal states and processes.

Suppose, for example, that you are crossing the road and a speeding car just misses you. You feel your heart race, your skin may perspire and your mouth can dry. These involuntary responses, initiated by your ANS, would occur without you deliberately or consciously sending messages to activate those parts of your body. The autonomic nervous system is particularly active when we experience an emotion in an extreme form, such as fear, anger and exhilaration.

The ANS is not completely self-regulating. It is linked to the brain's cerebral cortex where decision making and other more sophisticated information processing occurs, so we can voluntarily control a few autonomic responses at certain times. For example, with conscious effort, you could control your breathing rate right now.

Sympathetic and parasympathetic nervous systems

The autonomic nervous system has two divisions called the sympathetic nervous system and the parasympathetic nervous system.

The **sympathetic nervous system** arouses the body when we experience an extreme emotion, feel threatened or suddenly experience stress, such as when riding a roller coaster or unexpectedly approached by a vicious-looking dog as we walk along the street. This system can very quickly arouse the body for an immediate response in an emergency. For example, it can instantly mobilise the body in readiness for *fight* to confront and fight off a threat, *flight* to escape a threat by running away to safety, or to *freeze* by keeping absolutely still and silent to avoid detection. This is an adaptive reaction called the *fight–flight–freeze response* (which is studied in depth in Unit 3).

Figure 3.32 If you are confronted by this vicious-looking dog, your sympathetic nervous system will automatically activate your body so that you can respond in an appropriate way. After you take action, such as running away, or the threat passes because the dog's owner arrives, the parasympathetic nervous system will return the body to its normal state of functioning.

In everyday situations in the absence of threat and when there is minimal stress, the **parasympathetic nervous system** helps to maintain the internal body environment in a steady, balanced state of normal functioning. The parasympathetic nervous system generally has the effect of counterbalancing the activities of the sympathetic nervous system. It restores the body to a state of calm, once the need for sympathetic nervous system activation has passed.

LEARNING ACTIVITY 3.9

Review questions

1. Describe three main functions of the human nervous system, with reference to examples not used in the text.
2. Which part of the nervous system coordinates the activity of the entire nervous system?
3. Explain why injury to the spinal cord can result in loss of brain–body control.
4. Describe the relationship between the central nervous system and the peripheral nervous system, with reference to key functions of each division.
5. (a) In what main way is the functioning of the autonomic nervous system different from other divisions of the nervous system?
   (b) Distinguish between the roles of the parasympathetic and sympathetic nervous systems with reference to bungee jumping or parachuting by someone who has never engaged in either activity.
6. Explain what the somatic nervous system does with reference to an example involving both sensory and motor activity.

ROLE OF THE NEURON

The human nervous system consists of billions of cells, the most important of which is the neuron. A **neuron** is an individual nerve cell that receives, processes, and/or transmits information to other cells. It is commonly described as a 'building block' of the nervous system because the entire nervous system is comprised of neurons organised into complex chains and networks that form neural pathways through which information continuously travels.

Neurons are also described as the 'primary functional units' of the nervous system because of their vital role in enabling the nervous system to function as it does. They carry information ('messages') in the form of an *action potential* (or *neural impulse*) to the appropriate part of the nervous system, or interpret the message and enable a response.

Neurons have specialised functions. Some neurons specialise in carrying information from sensory receptors, sense organs, tendons or muscles *to* the CNS. Other neurons specialise in carrying information to cells in bodily organs, muscles or glands *from* the CNS. Some neurons serve as communication links and carry information *between* neurons that cannot communicate directly with each other.

Figure 3.33 The entire nervous system is comprised of neurons which interconnect to form neural pathways, enabling the continuous communication of information around the body.

Structure of a neuron

Not all neurons look the same. They vary in shape and size depending on where they are located in the body and on their specific function. However, most neurons have some features in common — dendrites, a soma, an axon, myelin and axon terminals. These are shown in Figure 3.34 below.

Dendrites

A **dendrite** is a thin extension of a neuron that detects and receives information from other neurons. Each dendrite separates out like the branches of a tree. Some dendrites have very little growths called *dendritic spines*. These are little bumps or knobs and are attached by small necks to the surface of the dendrites. Each spine provides a site where a neuron can connect with and receive information from a neighbouring neuron. A single neuron can have thousands of connections to other neurons through its dendritic branches and spines. Information received by dendrites is passed to the soma.

Soma

The **soma**, or cell body, integrates (combines) the neural information received from the neuron's many dendrites and sends it to the axon. Within the soma is the *nucleus* which contains the biochemical information that maintains the neuron and keeps it functioning.

Axon

An **axon** is a single, tubelike, extension that transmits neural information away from the soma to other neurons or cells (via the axon's terminal buttons). Most neurons have only one axon, but many axons have branches that allow a message to be sent to multiple cells. Axons vary in length; for example, some axons extend over a metre from your spine to your big toe, others are smaller than the width of a single hair.

Myelin

The axons of many, though not all, neurons are myelinated. **Myelin** is a white, fatty substance that coats and helps insulate the axon from the activity of other nearby axons. Without the coating, called the *myelin sheath*, interference may occur, like that which can be experienced when a hair dryer is being used while the television is on.

The myelin sheath is not a continuous coating extending along the full length of the axon. It occurs in segments that are separated by small gaps (called *nodes of Ranvier*) where the myelin is missing. Neurons wrapped in myelin communicate their messages much faster than unmyelinated neurons.

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Animation on structure and function of a neuron 3 m 55 s

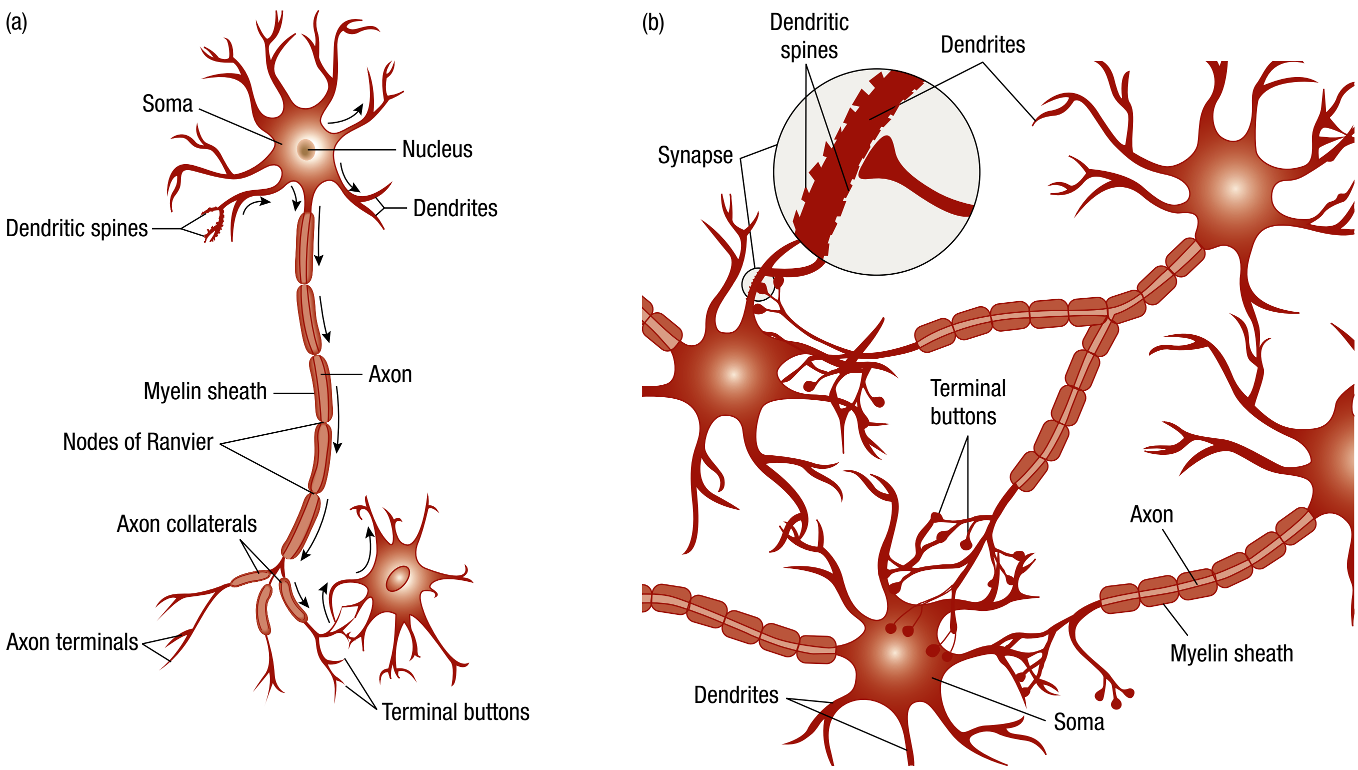


Figure 3.34 (a) Incoming neural messages are received by the dendrites and transmitted to the soma. Outgoing information is transmitted from the soma to the axon terminals and on to dendrites of other neurons. The direction in which the message travels is indicated by the arrows. Within all types of neurons, information (as an *action potential*) travels in one direction only. (b) Neurons do not link together like a chain. The branches of an axon almost touch the dendrites of the next neuron, leaving a tiny space called a synaptic gap.

Axon terminals

There are small branches at the end of an axon. These are called *axon collaterals*. At the end of the collaterals are **axon terminals**. Each axon terminal has a small knob-like swelling at its tip called a *terminal button* (sometimes called a *synaptic vesicle*, *synaptic knob* or *synaptic button*). The terminal button is a small structure like a sac that stores and secretes a chemical called *neurotransmitter* that is manufactured by the neuron and carries its message to other neurons or cells.

Information always travels in one direction through a neuron. It is received by dendrites, passes through the soma and exits from the axon. When it reaches the axon terminals, it stimulates the release of neurotransmitter from the terminal buttons. The neurotransmitter carries the message to other neurons. The neurons do not actually touch. There is a very tiny space between an axon terminal and a dendrite. This area is called a *synaptic gap* (or *synaptic cleft*).

The synaptic gap is one component of the *synapse* — the place where communication actually occurs between a neuron sending information and a neuron receiving information. The other two components of the synapse are the terminal buttons of the sending neuron and the dendrites of the receiving neuron.

Both the spinal cord and the brain consist of neural tissue made up of grey matter and white matter. *Grey matter* is composed of unmyelinated neuron cell bodies and the dense network of dendrites and their connections to adjacent neurons (synapses). *White matter* is composed of axons coated with myelin that are grouped into bundles (forming 'nerves') that make connections with other groups of neurons over longer distances through the brain. In the human brain, grey matter occupies the surface area (cerebral cortex) and white matter the inside area (see Figure 3.2 on page 123). In the spinal cord, the pattern is reversed.

Types of neurons

There are three main kinds of neurons and each has different functions. These are called sensory neurons, motor neurons and interneurons. Sensory neurons and motor neurons are found primarily in the peripheral nervous system, whereas interneurons are found only in the CNS.

Sensory neurons

Sensory neurons (also called *afferent neurons*) receive and carry sensory information. This is received from both our external and internal environments then transmitted *to* the CNS. Their main

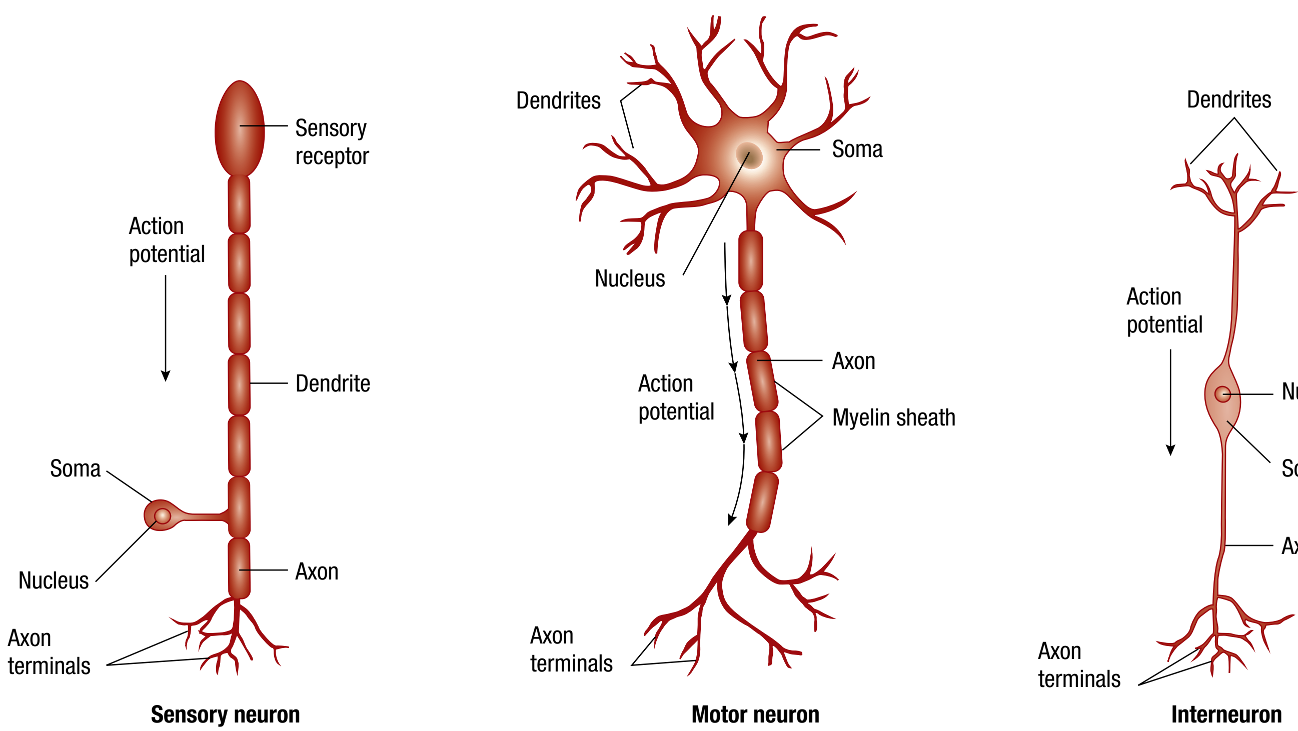


Figure 3.35 A sensory neuron, a motor neuron and an interneuron

role is to help us sense the external world and monitor changes within our bodies. Information is received from the external environment via sensory receptors in sense organs, and internally, within the body, from the muscles, joints, tendons, organs and glands.

There are different types of sensory neurons, each of which is specialised to respond only to a particular type of stimulation. For example, the sensory neurons in the ears respond to sound waves detected by receptors within the cochlea (inner ear), but not to light. The sensory neurons in the skin that respond to heat would not respond to chemical energy, which would stimulate the sense of smell. You are able to read the words on this page because sensory neurons specialised for visual information are transmitting information from your eyes to your brain.

Sensory receptors are the specialised cells that convert physical signals into neural messages that can be received by sensory neurons for transmission to the CNS, primarily to the brain for interpretation.

Motor neurons

Motor neurons (also called *efferent neurons*) carry messages *from* the CNS to the cells in skeletal muscles, organs and glands to stimulate activity. They enable muscles to move so we can walk or speak, cause glands to secrete chemicals and help control the function of internal organs such as the heart, lungs and intestines. Skeletal muscles respond to messages from the CNS to start, stop or change movement.

Motor neurons are located in the lower brain stem and spinal cord. All outgoing neural information must pass through them to reach the muscles. Motor neurons essentially control all actions and therefore all forms of behaviour.

Interneurons

Interneurons (also called *connecting* or *association neurons*) act as a link between sensory and motor neurons, relaying information from one to the other (because sensory and motor neurons rarely ever connect directly). They enable simple reflexes as well as being responsible for the most sophisticated functions of the brain.

For example, consider the spinal reflex. If you touch an extremely hot object, such as the handle in Figure 3.36, sensory neurons will carry the sensory information from the PNS to the spinal cord of the CNS where interneurons will receive and process the information and pass on a message to motor neurons. This message will be sent back to your hand through motor neurons to move your fingers so that you release the handle.

Similarly, you will be able to recall the information you read on this page because the interneurons in your brain converted the words (received initially by sensory neurons) into a form that can be stored in memory for retrieval at a later date. Interneurons exist only within the CNS and are by far the most abundant type found there. Interneurons also carry messages to and from other interneurons.

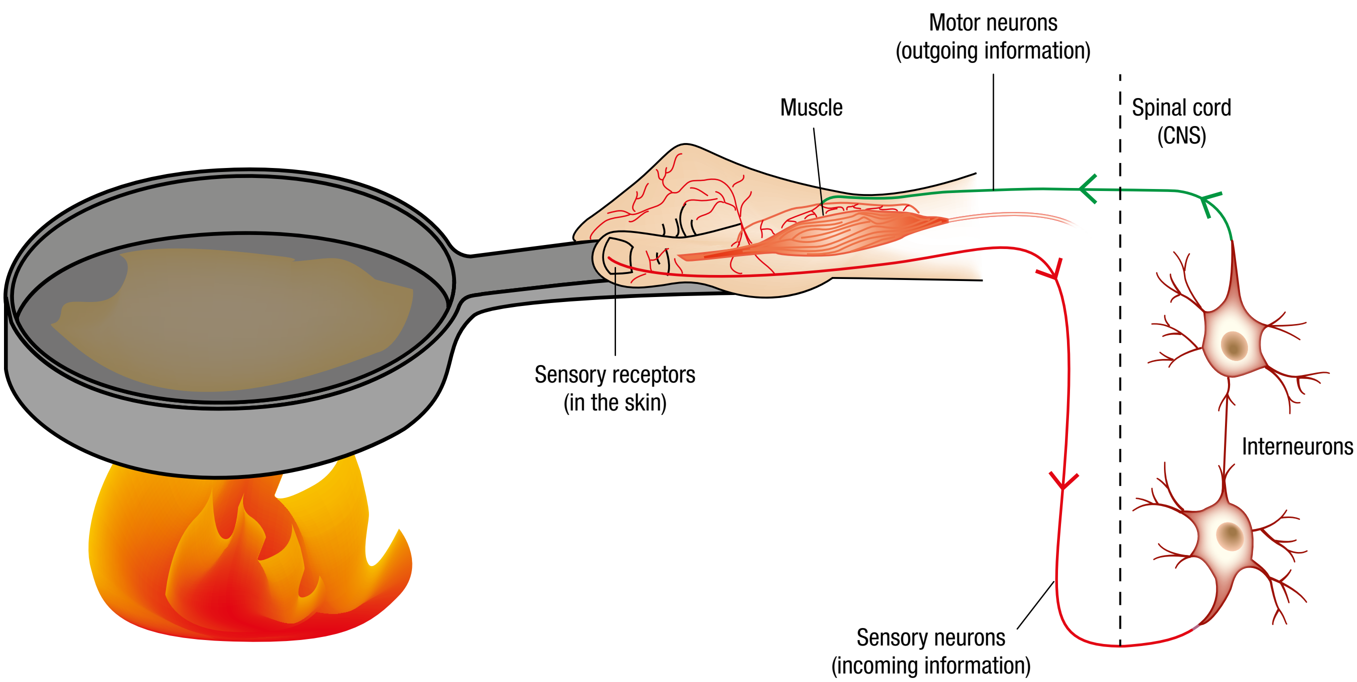


Figure 3.36 Interaction between three types of neurons

GLIAL CELLS

While the nervous system consists mainly of neurons, other types of specialised cells are also found there in abundance. **Glial cells** (sometimes called *glia* and *neuroglia*) provide support for neuronal function. For example, they surround neurons and hold them in place, supply nutrients and insulation, and aid in the repair of neurons and elimination of waste materials.

In contrast to neurons, glial cells tend to be smaller and can readily multiply and divide, but they cannot generate or carry an action potential so they are not directly involved in the transmission of messages between neurons. However, without glial cells neurons could not function.

As with neurons, there are different types of glial cells depending on the work they do. Among those that are better understood are astrocytes, oligodendroglia, microglia and Schwann cells.

Astrocytes

These star-shaped cells (also called *astroglia*) have numerous roles and are the largest and most numerous of the glial cells. They provide structural support for neurons by holding them in place, nutritional support by regulating local blood flow to provide more supplies to neurons when they are active, secrete chemicals that keep neurons healthy, assist recovery of damaged neurons and are also involved in the formation of new connections between neighbouring neurons.

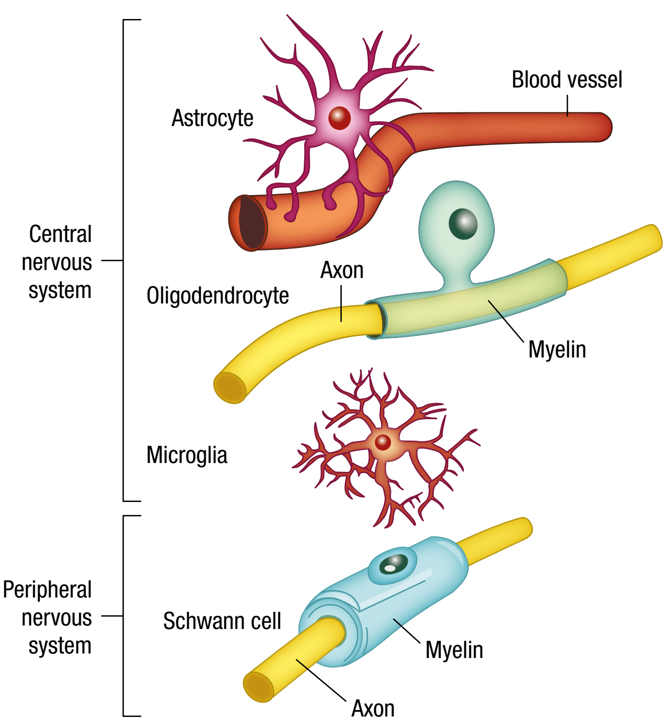


Figure 3.37 Types of glial cells

Astrocytes also play a protective function in the brain by helping form the blood–brain barrier which blocks entry of various substances, including toxins that may injure the brain.

Microglia

These extremely small cells act like immune system cells elsewhere in the body by protecting neurons from intruders. They monitor the health of brain tissue and identify and devour foreign substances.

When brain cells are damaged, microglia invade the area to help repair it. They also help clean up the nervous system by eliminating foreign matter and debris such as the remains of dead neurons.

Oligodendroglia

These insulate neurons in the CNS by forming and maintaining the myelin sheath surrounding the axon, thereby preventing adjacent neurons from 'short-circuiting' and also speeding up the process of communication.

They also absorb chemicals that the neuron secretes and secrete chemicals that the neuron absorbs, roles that are believed to contribute to a neuron's nutrition and function.

Schwann cells

Schwann cells predominantly have functions similar to those of oligodendroglia, except they form the myelin sheath around axons in the PNS.

LEARNING ACTIVITY 3.10

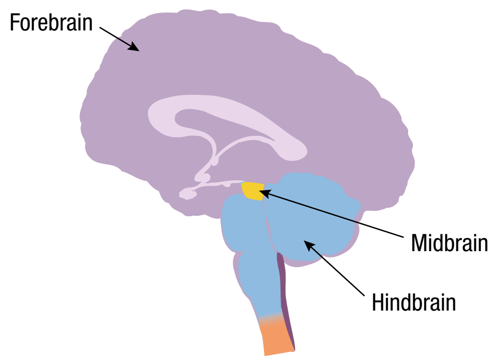
Review questions

1. What is a neuron?
2. Explain the meaning of the statement 'Neurons are the primary functional units of the entire nervous system'.
3. In what way are the structure and functions of a dendrite different from those of axon terminals?
4. Draw and label a diagram of a neuron, identifying and briefly summarising the main function of each of its key structures.
5. (a) Explain what sensory neurons, motor neurons and interneurons are in terms of their specific functions.
   (b) Describe the interactive nature of these three types of neurons, with reference to an example not used in the text.
   (c) Suggest two possible consequences of damage to significant numbers of each of these three types of neurons.
6. (a) What are glial cells?
   (b) Name and briefly describe the function of two different types of glial cells.
   (c) Explain the difference between neurons and glia in terms of function.

STRUCTURE AND FUNCTION OF BRAIN AREAS

Neuropsychologists often describe the brain using a basic structure comprising three main areas — the hindbrain, midbrain and forebrain. This is based on how the brain develops early in life. Each area is associated with identifiable mental processes and behaviour. The more basic survival mechanisms develop earlier than the more ‘higher order’ functions and are located deep within the brain.

When looking at the brain, however, the cerebral cortex is the most prominent part. But despite its important and sophisticated functions and the complex information processing it performs, this is essentially an outer layer when considered from a purely anatomical perspective. We examine the cerebral cortex and its functions in the next section. First, we consider structures beneath the cortex.



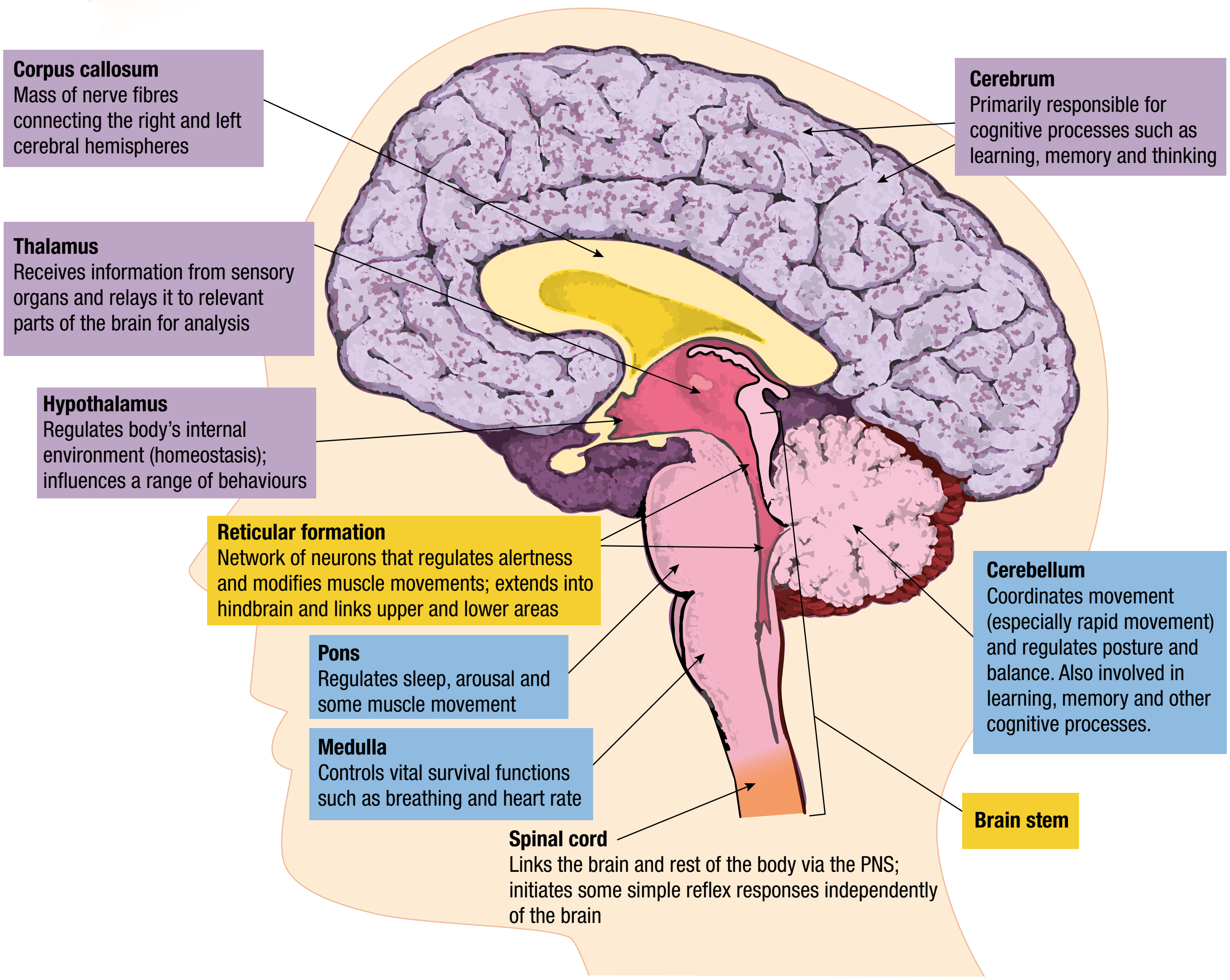


Figure 3.38 The brain is often described as having three main areas called the hindbrain, midbrain and forebrain.

Hindbrain

The hindbrain is located at the base of the brain around the brain stem. The **hindbrain** is a collection of lower level brain structures that include the cerebellum, medulla and pons. These control or influence various motor functions and vital, automatic ('autonomic') responses such as breathing and heart rate, as well as sleep and arousal ('alertness').

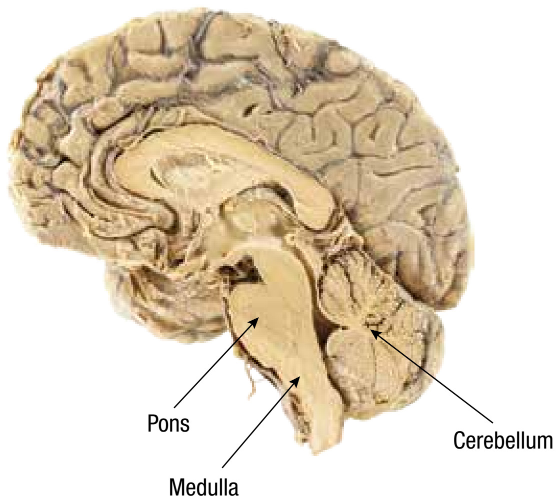
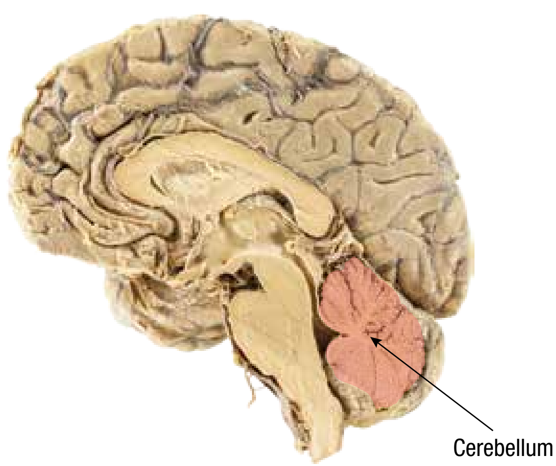


Figure 3.39 The main structures of the hindbrain are the cerebellum, medulla and pons.

Cerebellum

The **cerebellum**, located at the base of the brain (attached to the brain stem), is a cauliflower-shaped structure about the size of a tennis ball in adult brains. It is the second largest part of the brain with 10% of the brain's mass, yet contains about 80% of the brain's neurons (Herculano-Houzel & Lent, 2005).



The cerebellum coordinates fine muscle movements and regulates posture and balance. Although the commands for movement are initiated higher up in the brain, the cerebellum organises and adjusts muscle activity to help ensure movement is smooth and precise so that it's performed more or less automatically. The cerebellum makes rapid-fire calculations about which muscles must be activated and by exactly how much.

The cerebellum is involved in activities requiring a rapid and skilled sequence of movements, such as when speaking and touch-typing. It is particularly active when you learn a new movement or when you perform a sequence of movements where the next movement cannot be predicted in advance. It is also involved when you make everyday voluntary, purposeful movements, such as when reaching to pick up a cup of coffee, so that your arm and hand make one continuous movement.

Damage to the cerebellum makes it difficult to coordinate muscle control for everyday activities such as reaching, walking, throwing a ball or riding a bike. There are problems with balance, and damage can also contribute to difficulties with speech, which involves intricate movement control.

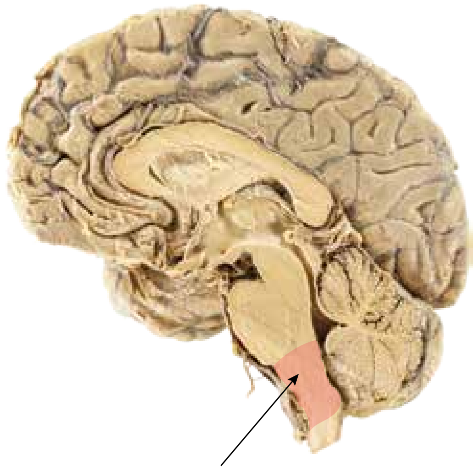
The cerebellum is also involved in learning and memory associated with movement in particular. For example, when we learn to walk, speak, or play a musical instrument, the necessary, detailed control information is believed to be processed and temporarily stored within the cerebellum, before it is transferred to the cerebral cortex for more permanent storage. Research findings suggest that the cerebellum may also play a role in other mental processes, including spatial learning, navigation and spatial memory (Bergland, 2015).

Figure 3.40 The cerebellum coordinates fine muscle movements and regulates posture and balance.

Medulla

The medulla is the lowest part of the brain and a continuation of the spinal cord, so it connects to the brain.

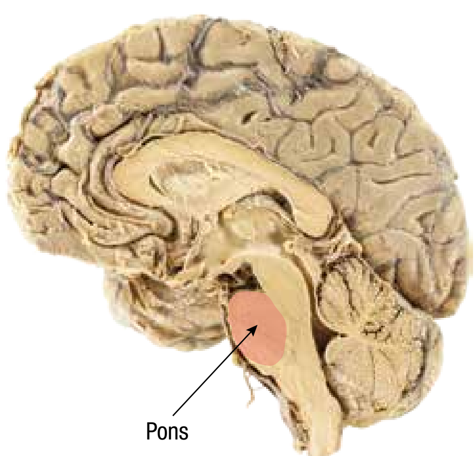
The **medulla** controls vital bodily functions such as swallowing, breathing, heart rate, blood pressure, vomiting, salivating, coughing and sneezing, all of which occur automatically and are essential for survival. This is why a serious injury to the medulla, as could occur through a blow to the back of the head, is often fatal. Some parts of the medulla are also involved in sensations such as touch, pressure and vibration.



Pons

Just above the medulla is the pons, a small bundle of neural tissue about 2.5 cm long. The **pons** is involved in sleep, dreaming and arousal from sleep ('waking'), as well as helping control breathing and coordination of some muscle movements.

The pons also serves as a 'bridge' that connects parts of the brain with one another by relaying messages between the cerebral cortex and cerebellum and between the medulla and midbrain. For example, information from the ear first enters the brain from the pons, and messages for voluntary movements are passed on from the motor areas of the cerebral cortex to the cerebellum.



Midbrain

As the name suggests, the midbrain is in the central part of the brain. It is about 2.5 cm long and contains neural pathways connecting upper and lower brain areas. The **midbrain** is a collection of structures involved with movement, processing of visual, auditory and tactile sensory information, sleep and arousal.

The midbrain receives a large amount of information from the eyes and ears and processes this to help produce orienting movements. For example, if you are walking and hear a car braking suddenly and loudly, the sound registers in your midbrain, which then triggers muscles in your neck and for eye movements to enable you to turn your head to look in the direction of the sound. This is coordinated movement, but not as complex as coordination by the cerebellum.

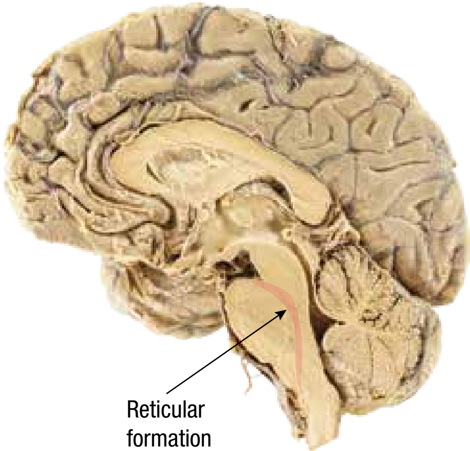
Other structures are also involved with movement, particularly limb movement. For example, the *substantia nigra*, which has an important role in the control of voluntary limb movements, is located in the midbrain and connects to the forebrain. Movement disorder symptoms of Parkinson's disease are related to damage to the substantia nigra (particularly the neurotransmitter produced there).

Figure 3.41 The midbrain is a collection of structures involved with movement, processing sensory information, sleep and arousal.

Reticular formation

Running through the centre of the midbrain and the hindbrain (which includes the brain stem) and upward to the forebrain is the reticular formation, a network of neurons, about the thickness of your middle finger. When viewed through a microscope, it resembles white netting or lacing, which is why it is called reticular (reticular means 'like a network').

The **reticular formation** helps screen incoming information so as not to overload the brain, alerts higher brain centres to important information, helps maintain consciousness, and regulates arousal (such as awakening from sleep) and muscle tone (tension).



A part of the reticular formation is called the *reticular activating system* (RAS) that extends in many directions from the reticular formation to different parts of the brain and to the spinal cord. The RAS looks something like a bicycle wheel hub, with spokes running in all directions. Its ascending pathways (upward 'tracts') extend to the cerebral cortex and its descending pathways (downward 'tracts') extend to the spinal cord (see Figure 3.42).

The RAS regulates arousal by either increasing or dampening arousal in response to feedback from upper and lower brain areas. It influences whether we are awake, drowsy, asleep or in some state in between. When our RAS is less active, we go to sleep. Many general anaesthetics work by reducing the activity of the RAS, making the patient unconscious. Damage to the RAS will seriously disrupt the sleep–waking cycle and can result in coma or a chronic vegetative state (Stirling, 2002).

In regulating arousal, the RAS also influences what we pay attention to. Neurons of the RAS send out a steady stream of impulses that keep upper brain areas (cerebral cortex) active and alert, taking account of the incoming flow of sensory and motor information. The RAS can 'highlight' information of potential importance, directing attention towards potentially significant events. For example, the sleepy driver in outback Australia who snaps to attention when a kangaroo appears in the middle of the road can thank the RAS for arousing the rest of their brain.

Through its descending pathways the RAS influences muscle tone and consequently the degree of muscle movement. The extent of muscle tension or relaxation affects how much the muscle will move; that is, a relaxed muscle will produce less movement than a tense muscle. The RAS does not cause or initiate muscle movement; rather it modifies movement once it has begun.

Forebrain

The forebrain is the largest and most prominent part of the brain. It is located above the midbrain and extends across the top of the brain. Its numerous neural pathways connect with structures in the midbrain and hindbrain to coordinate brain activity. The **forebrain** is a collection of upper level structures that include the hypothalamus, thalamus and cerebrum. Together with other structures, the forebrain regulates complex cognitive processes such as thinking, learning, memory and perception, as well as various aspects of emotion and personality.

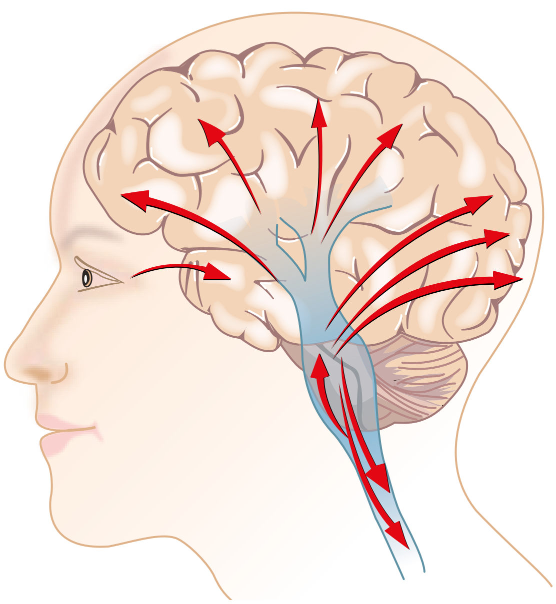


Figure 3.42 The reticular activating system (RAS) is a part of the reticular formation within the midbrain. It has both ascending and descending pathways through which arousal and muscle tone are regulated.

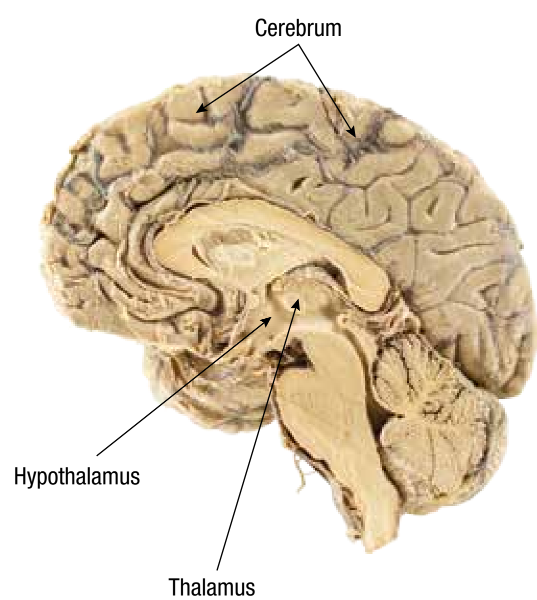
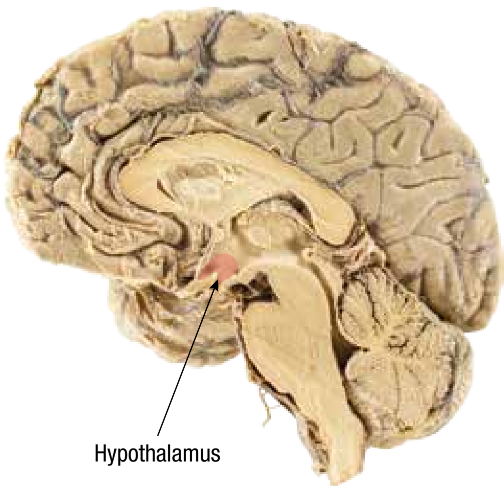


Figure 3.43 Structures of the forebrain include the hypothalamus, thalamus and cerebrum.

Hypothalamus

Although only about the size of a sultana grape, the **hypothalamus** has a vital role in maintaining the body's internal environment (i.e. homeostasis) and takes part in numerous behaviours. Its main functions include regulating the release of hormones from various glands in the body (through its control of the *pituitary gland*) and influencing behaviours associated with basic biological needs, such as hunger, thirst and sleep.



The hypothalamus is a part of the limbic system so it is also involved in emotions such as anger and fear. The *limbic system* is an interconnected group of forebrain structures located along the base of the cerebral cortex and includes the amygdala, hippocampus and hypothalamus.

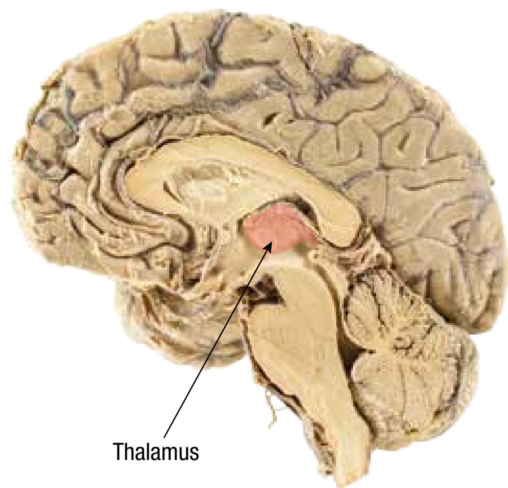
The limbic system generally controls emotional and motivated behaviour and certain forms of memories, but its specific structures have more prominent roles in these functions. For instance, the *amygdala* is involved in the production and regulation of emotions and the *hippocampus* in the formation of new long-term memories.

The amygdala is often described as the 'emotion centre of the brain' but it does not have exclusive control of emotions. The experience of emotion usually has a cognitive component underlying the way in which it is expressed, so other forebrain areas are also involved.

Damage to the hypothalamus can have a very significant effect on a person's lifestyle. Depending on exactly where and how severely the hypothalamus is damaged, it could result in an inability to regulate internal body functioning (such as maintaining a constant body temperature), problems with the normal sleep and waking cycle, an overwhelming urge to eat, uncontrollable anger, or the degeneration of sex organs and a significant reduction in sex drive (in males only).

Thalamus

Imagine sticking an index finger in each of your ears and pushing inward until they touch. That is where you would find the thalamus. It is about 3 cm in length and comprises two parts that look like oval-shaped footballs. Each one of these lies within a different hemisphere. Given its location and functions, the thalamus is often described as the gateway from the lower part of the brain to the cortex in the upper part.



The **thalamus** filters information from almost all the sense receptor sites (except the nose), then passes it to relevant areas of the brain for further processing. For example, one part of the thalamus receives visual input from the eye via the optic nerve and sends this information to the visual cortex for processing and interpreting. Thus, the thalamus functions like a 'relay station' in the brain.

A considerable amount of information from the cerebral cortex also passes through the thalamus to lower brain structures, the spinal cord and out to the peripheral nervous system. For example, the thalamus has neurons that relay messages between motor cortex areas and movement control centres in the brain stem (such as the cerebellum).

The thalamus appears to play a role in attention as well. Its function is not just to route messages to the appropriate brain areas and structures. The thalamus actively filters the vast amounts of incoming to-be-attended-to sensory information, highlighting and giving more weight to some inputs and de-emphasising or giving less weight to others.

Areas of the thalamus also have a crucial role in regulating arousal through their connection to the reticular formation and nerve pathways that form the reticular activation system. Damage to these areas results in lowered arousal, ranging from lethargy to coma. Damage to the thalamus may also result in visual or hearing impairment, or an inability to feel sensations when touched.

Neural activity involved with the sense of smell completely bypasses the thalamus. This perceptual system has its own individual 'relay station' called the *olfactory bulb*, which is located near the area of the brain that controls emotion. This may help explain why certain smells, such as the odour of a particular perfume or the smell of a cake cooking, may bring back certain emotions or memories of particular experiences in your life (Wade & Tavris, 1990).

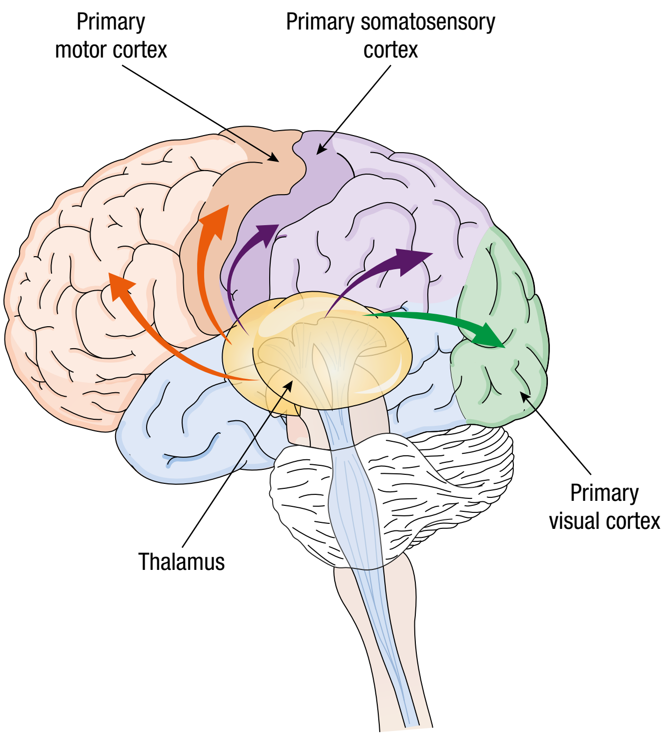


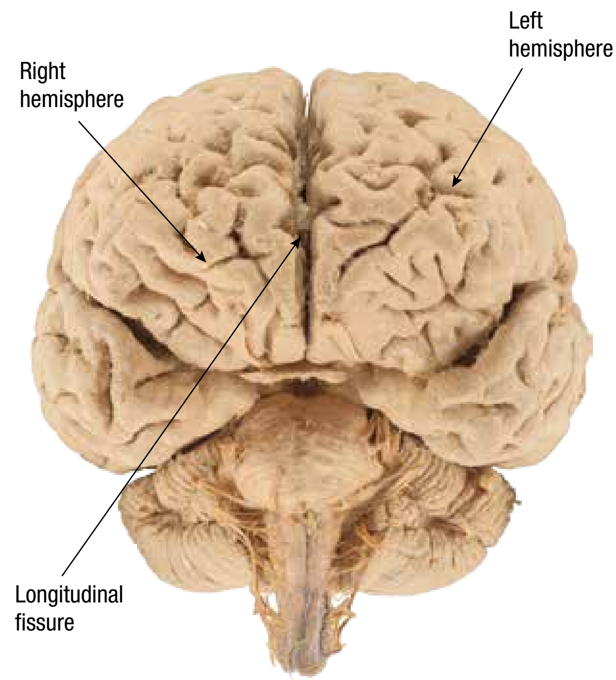
Figure 3.44 The thalamus: almost all sensory and motor information going to and from the cerebral cortex is processed through the thalamus. This diagram shows some of the neural pathways from different regions of the thalamus to specific areas of the cerebral cortex.

Cerebrum

The cerebrum is located above and in front of the cerebellum and occupies most of the forebrain. The **cerebrum** consists of an outer surface called the cerebral cortex and masses of neural tissue where neurons form connections with each other and receive and process incoming and outgoing information. The cerebrum and its outer cortex are primarily responsible for almost everything we consciously think, feel and do.

The cerebrum (including the cortex) is divided into two cerebral hemispheres. There is one on the left and one on the right of a deep groove that runs from the front to the back (called the *longitudinal fissure*). Both hemispheres remain connected, mainly by the corpus callosum which enables information exchange and coordinated functioning of the brain. Each hemisphere can be further subdivided into four areas called *lobes*; these are indicated by different colours in Figure 3.44 and discussed in the next section.

(a) Cerebrum



(b) Right hemisphere of the cerebrum

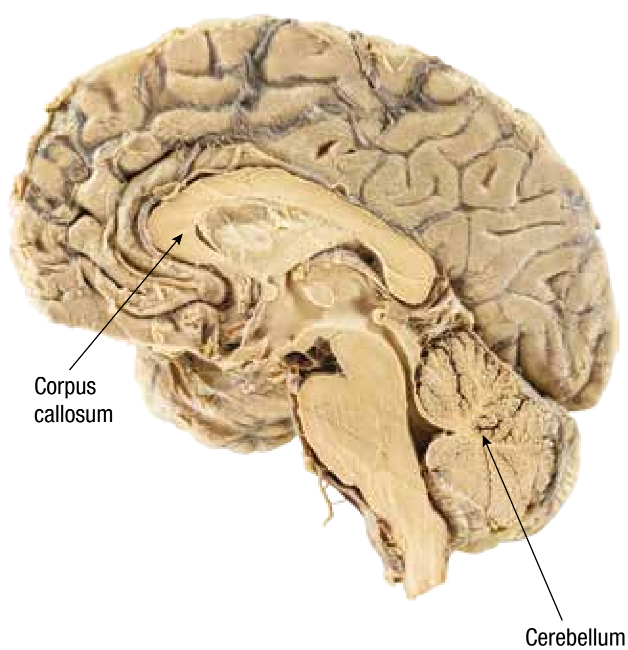


Figure 3.45 (a) The nearly symmetrical hemispheres of the left and right hemispheres of the cerebrum shown front on. (b) A side view of the cerebrum's right hemisphere revealing the corpus callosum and cerebellum.

LEARNING ACTIVITY 3.11

Summarising brain structures and functions

1. Complete the table below and show the location of each area and structure on the photograph of the brain in question 2.

Area	Structure	Main functions
Hindbrain	cerebellum medulla pons	
Midbrain	reticular formation	
Forebrain	hypothalamus thalamus cerebrum	

2. Label the brain.

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- Word copy of table
- Word copy of brain diagram

LEARNING ACTIVITY 3.12

Analysis of research on the thalamus

One study providing evidence for the role of the thalamus in filtering and directing attention to sensory input was conducted by American psychologist David LaBerge and psychiatrist Monte Buchsbaum (1990).

In one condition, participants had to attend to the presence or absence of a single letter. In a second condition, participants had to 'look out' for the same letter embedded among other letters. The second task required more 'attention' than the first because there was now a requirement to filter or sift through the assortment of letters to find the target letter.

A PET scanner was used to observe areas of the brain's activity as participants completed the tasks. Analysis of the scans showed that the second condition brought about greater PET activation of a specific area of the thalamus than the first condition, even when stimulus complexity was accounted for.

1. Identify the operationalised independent and dependent variables.
2. If a repeated measures experimental design was used:
   (a) what potential extraneous or confounding variable would need to be controlled?
   (b) how would this best be achieved?
3. What do the results suggest about the role of the thalamus?
4. What is a potential limitation of the research?

LEARNING ACTIVITY 3.13

Review questions

1. 'The cerebellum is most active when you perform a sequence of movements where the next movement cannot be predicted in advance.' Give an example of when this may occur.
2. Which structure is a continuation of the spinal cord?
3. How many of each of the following structures are there in the brain?
   (a) cerebellum
   (b) reticular formation
   (c) thalamus
   (d) hypothalamus
4. American movies often depict drunk drivers being asked by a police officer to walk a straight line as a simple and quick measure of a potential drink-driving offence. The drunken driver is shown unable to consistently remain on the line or walk precisely, smoothly and steadily. Considering the driver's impairment, which brain structure is likely to be most affected by the alcohol?

5. (a) Doctors have determined that a patient's hindbrain has been injured as the result of an accident. What changes could be expected in the patient's thoughts, feelings and/or behaviour if the injury occurred specifically to the:
   (i) medulla
   (ii) pons?
   (b) Which neuroimaging technique would provide the clearest 'scan' of damage?
   (c) If the patient demonstrated obvious and lasting changes in personality, what other brain area or structure should be investigated?
6. How does the hypothalamus primarily regulate behaviour and the internal bodily state?
7. (a) Why is the thalamus described as a 'relay station'?
   (b) What other brain structure consistently relays information?
8. In terms of structure and function, how does the cerebrum in humans differ from that of other animals?

ROLES OF THE CEREBRAL CORTEX

This outer layer of the brain is easily recognised by most people although many are unaware of its actual size. The cerebral cortex appears wrinkled like a walnut because it is crumpled up to fit into the limited amount of space available in the skull. It is only a few millimetres thick and if it were flattened out, this sheet of tissue would cover about four pages of a textbook. Only one-third of it is visible when looking from outside the brain. The rest of it is hidden within the many wrinkles and folds.

Figure 3.46 A close-up of a human brain's cerebral cortex. The protective membranes (meninges) have been peeled back to reveal the detail of the bumps and grooves.

The **cerebral cortex** is the outer surface of the cerebrum and involved with complex, 'higher order' mental abilities such as perception, learning, memory, language, thinking and problem-solving. It also processes incoming sensory information and is involved with the planning and control of voluntary bodily movements. It will be active whenever you read, speak, experience an emotion, estimate time, recall an answer to a test question, plan what you will do over the weekend, appreciate a new song, come up with a creative idea, catch a tennis ball, walk up stairs or go for a jog.

Some areas of the cerebral cortex are dedicated to specific functions. For example, the primary visual cortex is almost entirely involved in receiving and processing information from the eyes. Most areas, however, do not have such specific localised functions. Instead, they perform multiple functions to enable us to think, feel and behave as we do.

Generally, the areas of the cerebral cortex and their main functions can be organised into three broad categories: *sensory areas* which receive and process sensory information, *motor areas* which initiate voluntary movements, and **association areas** which surround sensory and motor areas and deal with more complex functions that require integration of inputs of information from different areas, such as when learning strategies for a new game app, problem solving, using language, designing a new Ferrari, planning a party, language and regulation of emotions.

Cerebral hemispheres

The **cerebral hemispheres** are two almost-symmetrical brain areas running from the front to the back of the brain. They are connected by the corpus callosum and are referred to respectively as the left hemisphere and the right hemisphere.

The left and right hemispheres not only appear to be alike in overall size, shape and structure, but they also have many of the same functions. The specific area of the hemisphere responsible for each of these functions is located in approximately the same place in each hemisphere. For example, each hemisphere has motor and sensory areas that perform the same motor and sensory functions, each for a different side of the body (i.e. contralateral function). The left hemisphere receives sensory information from the *right* side of the body and controls movements on the *right* side. The right hemisphere receives sensory information from the *left* side of the body and controls movements on the *left* side.

In addition to the hemispheres having common functions, each hemisphere also has specialised functions. For example, human language is primarily a function of the left hemisphere, and the right hemisphere is primarily involved in many functions that do not depend on language, such as spatial and visual thinking and recognition of faces and tunes.

Figure 3.47 When viewed from directly above the top of the head, only the cerebral cortex covering the two cerebral hemispheres is visible. The hemispheres are alike in size, shape and structure.

Hemispheric specialisation

The idea that one hemisphere has specialised functions or exerts greater control over a particular function is called **hemispheric specialisation**. The terms *hemispheric dominance* and *hemispheric lateralisation* are also sometimes used. Although each hemisphere can specialise or exert greater control in various functions, both the left and right hemispheres are actually involved in nearly all functions, usually acting together in a coordinated and interactive way. Ordinarily, we do not use the left hemisphere of our brain any more than the right hemisphere, and vice versa.

The earliest evidence for hemispheric specialisation came from observations of people who had suffered a stroke or an injury affecting one hemisphere but not the other. It was observed that damage to the left hemisphere often resulted in difficulties with language-related activities such as understanding speech and talking fluently. Damage to the right hemisphere often resulted in difficulties with tasks that did not depend on language. These were mainly dependent on visual and spatial abilities, such as when using a map to navigate through an unfamiliar location.

Left hemisphere specialisations

The left hemisphere specialises in verbal and analytical functions.

Verbal functions involve the use or recognition of words such as in reading, writing, speaking and understanding speech, all of which are important in language.

Analytical functions essentially involve breaking a task down into its key parts and approaching it in a sequential step-by-step way. This is required, for example, when you use logical reasoning to interpret and apply a formula to solve a mathematics problem, critically evaluate an experimental design in psychology, or prepare a meal at dinner time.

Analytical functions are also involved when you develop an argument for a debate, plan how to save up enough money to buy a car or find enough time to complete all the homework for six different subjects.

Right hemisphere specialisations

The right hemisphere specialises in *non-verbal functions* that do not depend on language skills. Its non-verbal functions include:

- spatial and visual thinking, such as completing a jigsaw puzzle, reading a map or visualising the location of objects or places
- recognising faces, patterns and tunes
- appreciating music and artworks (but not necessarily producing them)
- creative thinking
- daydreaming.

The right hemisphere is also more involved in recognising emotions from facial cues ('signals'), such as a raised eyebrow or trembling lips, and in non-verbal emotional expression.

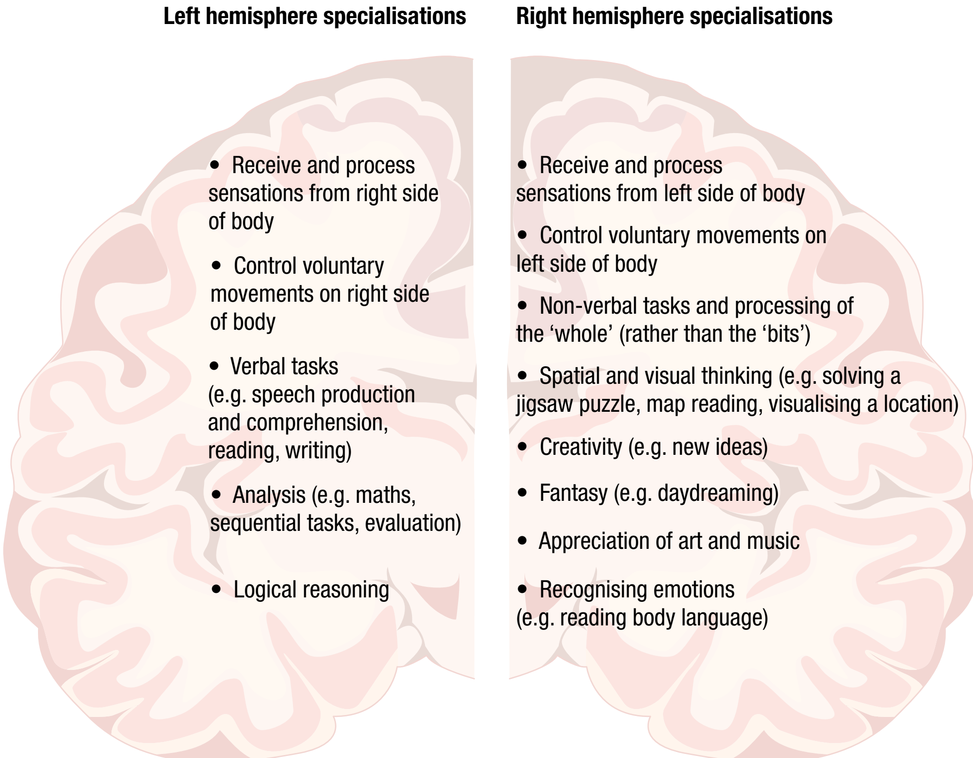

Figure 3.48 Specialised functions of the cerebral hemispheres

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Weblinks
- Left-brain/right-brain test
- Left or right brain test

eGuide*plus*

Practical activity — eye gaze as an indicator of hemispheric specialisation

LEARNING ACTIVITY 3.14

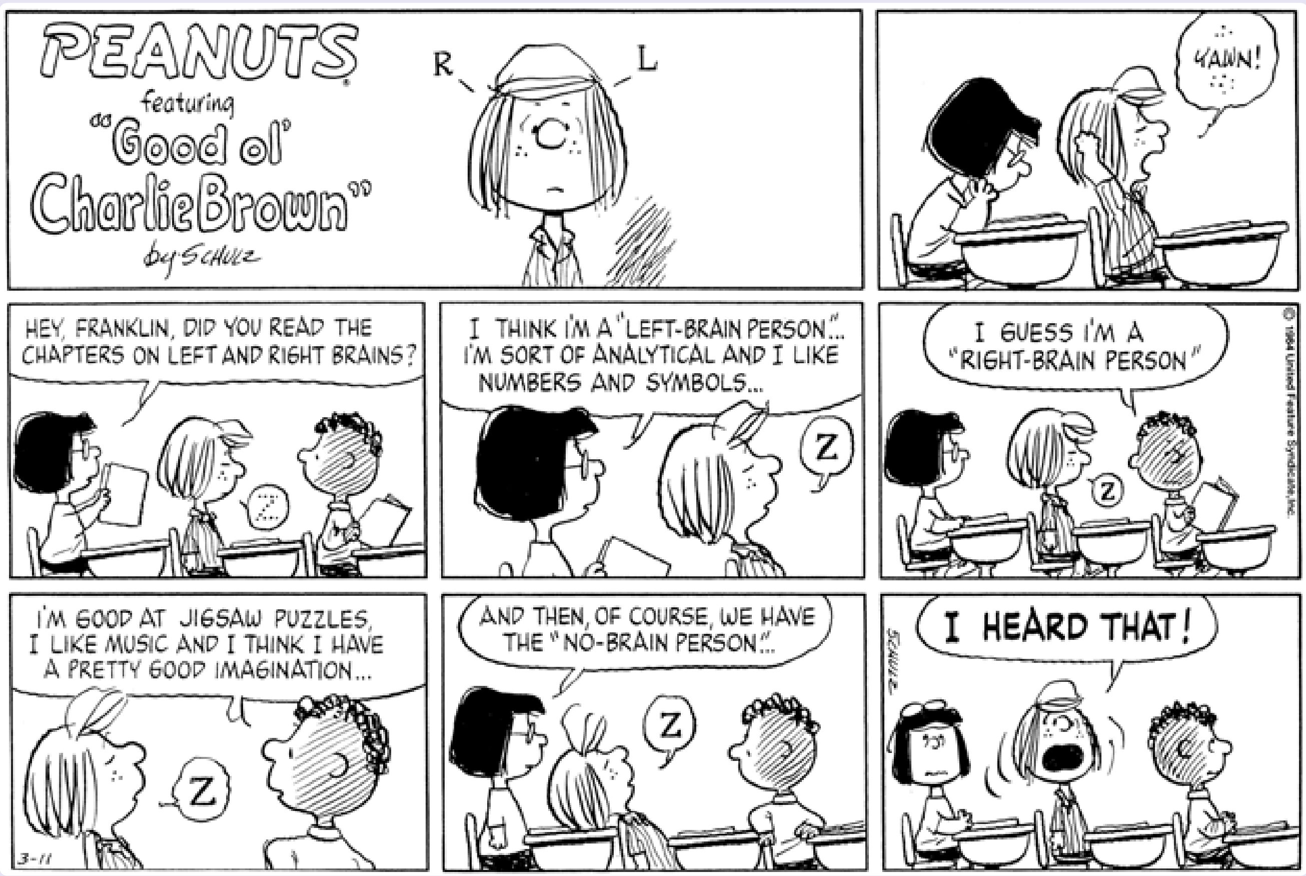
Review questions

1. Construct a definition of the cerebral cortex that refers to its locations and functions.
2. List three key functions that the cerebral hemispheres have in common.
3. Explain the meaning of the term hemispheric specialisation.
4. Identify the hemisphere that specialises in each of the following functions. Insert L or R in the spaces provided.
   (a) ___ appreciating the beauty of a forest
   (b) ___ judging whether a car will fit into a parking space
   (c) ___ kicking a football with the left foot
   (d) ___ listening to someone speak
   (e) ___ applying logic in an argument
   (f) ___ working out if you have enough money for a holiday
   (g) ___ daydreaming about being rich and famous
   (h) ___ finding your way around a maze
   (i) ___ speaking on the telephone
   (j) ___ playing golf on a video game
   (k) ___ playing Scrabble® on an iPad
   (l) ___ playing Angry Birds™ on a smart phone
   (m) ___ working out the meaning of a grin on someone's face
   (n) ___ arranging a bouquet of flowers
   (o) ___ giving someone the correct change for their purchases
   (p) ___ recognising classmates from an old class photo
   (q) ___ working out when you have to get up in the morning to get to school on time
   (r) ___ raising your right hand to answer a question in class.
5. A friend tells you about an internet test that determines 'hemispheric dominance' of the test-taker. The test seems very formal and involves a mixture of verbal and non-verbal tasks. Your friend did the test and one of the results indicated that they have no musical ability because of their dominant left hemisphere.
   What two key arguments could be used to dispute this result?
6. Frogs, turtles and fish have no cerebral cortex at all. Small mammals such as mice and rats have a tiny cortex; dogs and cats have relatively small cortices. But primates such as chimpanzees and humans have a much greater proportion of cortical area.
   What do these observations suggest about the relationship between cortical size and mental abilities associated with behaviour people in our society tend to regard as intelligent?

LEARNING ACTIVITY 3.15

Media analysis/response

1. How accurately does the cartoon represent left and right hemisphere specialisation? Explain with reference to examples in the cartoon.
2. To what extent is the description of any individual as either a 'left-brain' or 'right-brain' person accurate? Explain with reference to the real meaning of hemispheric specialisation or dominance.
3. Locate an online left-brain/right-brain 'test yourself' site on the internet (or access a test by using a weblink in your eBook). Complete the test and comment on:
   (a) the validity and reliability of the test
   (b) whether this type of test assists understanding of hemispheric specialisation or contributes to misconceptions about hemispheric specialisation.



Cortical lobes of the cerebral cortex

Cortical lobes are areas of the cerebral cortex associated with different functions. Each cerebral hemisphere has four lobes — the frontal lobe, parietal lobe, occipital lobe and temporal lobe. Each lobe has areas involved with sensory or motor functions, as well as association areas.

Frontal lobe

The **frontal lobe** is the largest of the four lobes and is located in the upper forward half of each cerebral hemisphere. At the front, just behind the forehead, is an association area called prefrontal cortex, which occupies more than one-quarter of the entire cerebral cortex. It has numerous connections linking it to other brain areas, including other lobes and areas deep in the folds of the cerebral cortex such as gustatory cortex for taste perception (which also stretches into a part of the adjacent parietal lobe). Interconnections through neural pathways allow the cortex to receive and combine information from throughout much of the brain to perform many functions, particularly the more complex ones.

The *prefrontal cortex* is involved with sophisticated mental abilities such as reasoning, planning, problem solving, decision making and symbolic thinking (such as when using words as to represent language or numbers, letters and other 'symbols' to represent maths or music). It is also involved with attention (picking out relevant information through the senses), regulation of emotions and expression of emotional reactions, self-awareness and aspects of personality such as initiating appropriate and inhibiting inappropriate behaviour. Some psychologists refer to this part of the frontal lobe as having an 'executive' role in all our thinking, feeling and behaving. This is because it coordinates many of the functions of the other lobes and determines our responses.

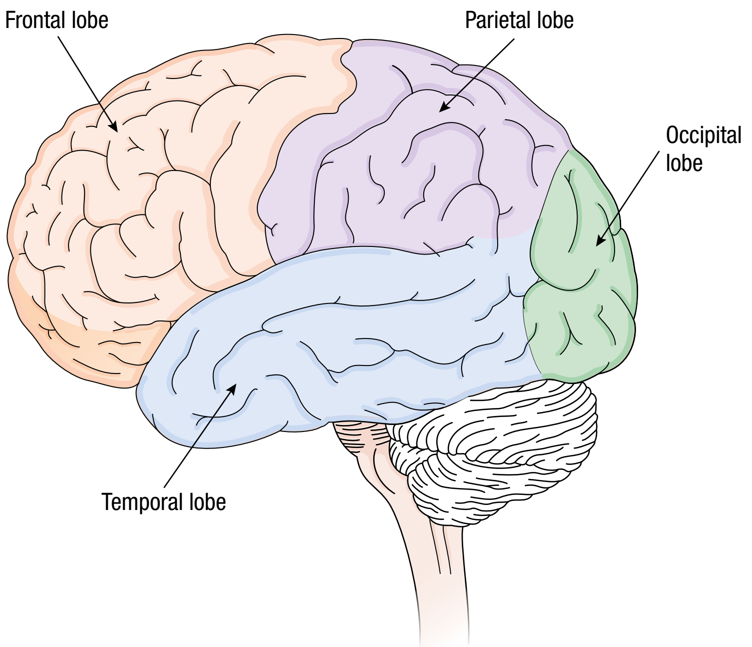


Figure 3.49 The lobes of each cerebral hemisphere

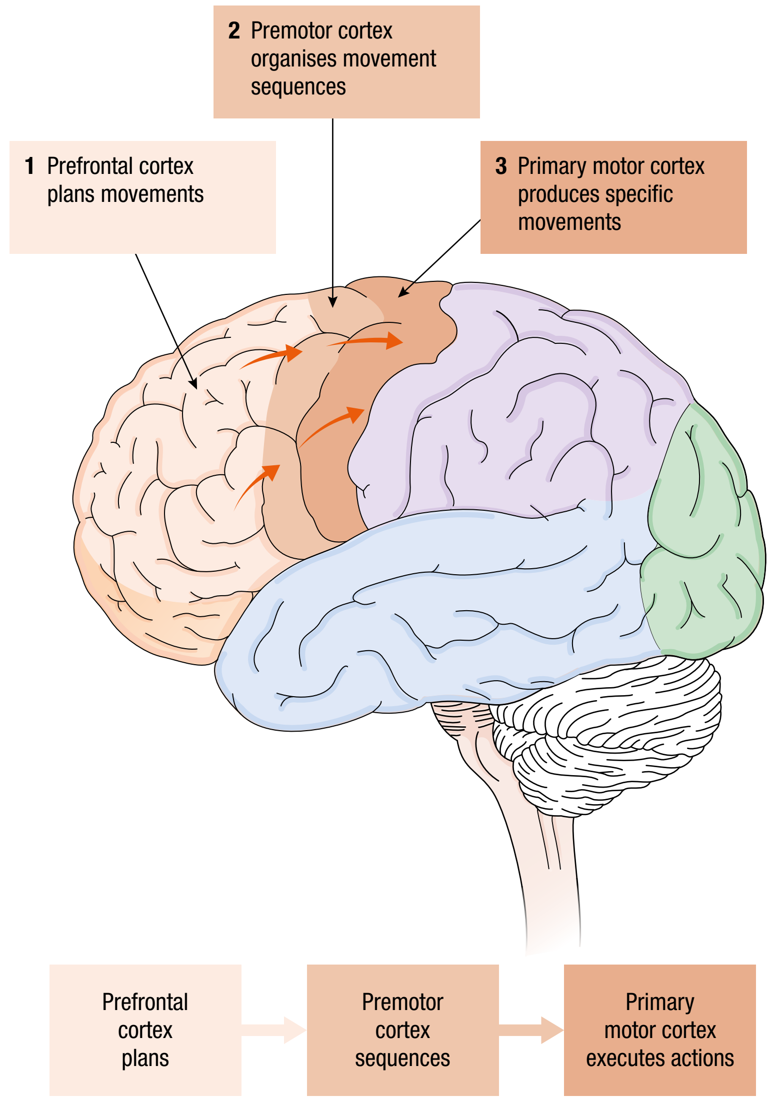


Figure 3.50 Initiating and executing voluntary motor activity within the frontal lobe

As shown in Figure 3.50, the frontal lobe is also responsible for planning and initiating voluntary bodily movements. Generally, the prefrontal cortex plans the required motor sequence then sends the instructions to an area called the premotor cortex towards the back of the frontal lobe. The *premotor cortex* prepares the appropriate movement sequence and sends the information to the adjacent primary motor cortex.

The primary motor cortex is a strip of neural tissue located at the rear of each frontal lobe and running roughly across the top of your head. The **primary motor cortex** initiates and controls voluntary movements through its control of skeletal muscles. When you want to text a friend, the primary motor cortex activates and guides your fingers to press the desired sequence of numbers.

The primary motor cortex in the *left* frontal lobe controls voluntary movements on the *right* side of the body. Likewise, the primary motor cortex in the *right* frontal lobe controls voluntary movements on the *left* side of the body.

As shown in Figure 3.51 on the following page, a different area along the primary motor cortex is involved with the movement of each specific body part. For example, a specific area of the cortex in the left frontal lobe controls movement of the thumb on the right hand. Similarly, a specific area of the cortex in the right frontal lobe controls movement of the left leg, and so on.

The amount of cortex devoted to a particular body part corresponds to the complexity, or 'fineness', of its movements. Parts that we are able to move with the greatest precision (such as the fingers and tongue) take up more cortical space than parts over which we have less control (such as the shoulder and thigh).

A specific area of cortex located next to the primary motor cortex in the frontal lobe of the left hemisphere coordinates movements of the muscles required for speech and supplies this information to the appropriate motor cortex areas. This is called Broca's area.

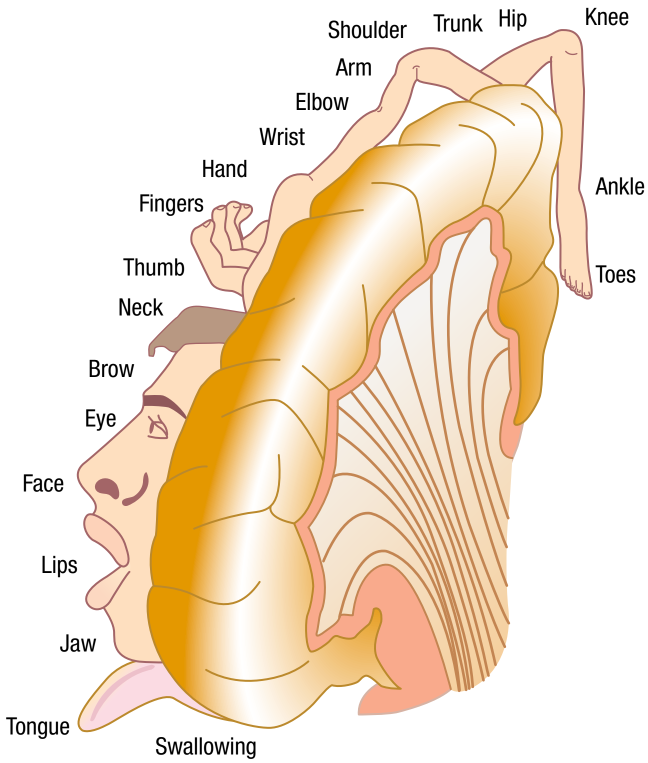


Figure 3.51 This diagram shows the organisation of the primary motor cortex. More of the cortex is devoted to body parts involved in finely tuned movement than to other parts. In addition, the lowermost parts of the body are located on the uppermost areas of the cortex and vice versa.

Broca's area has a crucial role in the production of articulate speech; that is, speech that is clear and fluent. If you were to read this section of text aloud, Broca's area would coordinate messages to your lips, jaws, tongue and vocal cords to enable you to produce ('say') the words clearly and fluently (see Figure 3.52).

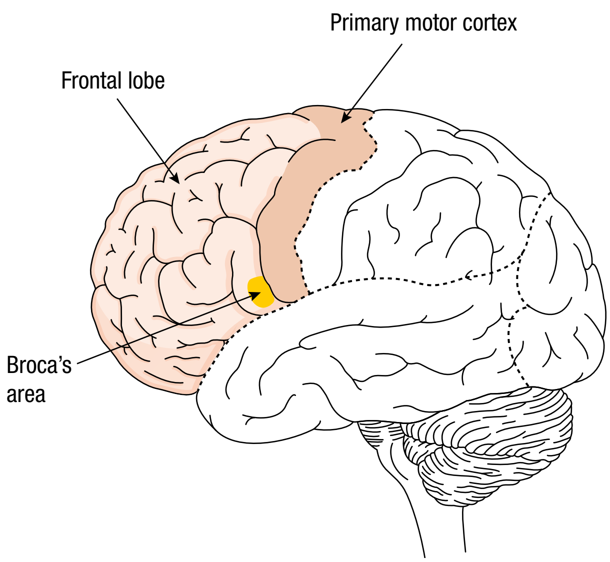


Figure 3.52 Broca's area

As with voluntary movements, speech production involves several different brain areas. Broca's area is linked to and interacts with other areas of the cerebral cortex that are involved with language. For example, specific areas provide information about the meaning of words and the structure of sentences, as well as the specific parts of speech such as adjectives, prepositions and conjunctions.

LEARNING ACTIVITY 3.16

Mapping the primary motor cortex

Copy the primary motor cortex in Figure 3.51 using transparent paper into your workbook. Use the reverse side of the traced copy to create the right primary motor cortex.

Use arrows to identify the specific area(s) of the left and right cortices that would initiate each of the following voluntary movements:

- bending your right arm
- wriggling the toes on your left foot
- opening your mouth for the dentist
- sucking on your thumb
- winking with your right eye
- clenching your left fist
- kissing
- crossing your legs
- bending your right knee to walk up a step
- talking.

LEARNING ACTIVITY 3.17

Applying your knowledge of the primary motor cortex

Suppose you mapped the primary motor cortex of an orangutan. What would you expect to find with regard to the distribution of body parts in this cortical area? Explain your answer with reference to the proportion of the primary motor cortex likely to be occupied by four different body parts, including the arms and legs.

Parietal lobe

The parietal lobe is located behind the frontal lobe and occupies the upper back half of the brain, but not the rearmost area (see Figure 3.53).

The **parietal lobe** receives and processes bodily, or 'somatosensory', information. This sensory information includes touch and temperature (from the skin) and information about muscle movement and the body's position (from muscles, tendons and joints).

Located at the front of each parietal lobe, near the primary motor cortex, is a strip of cortex called the primary somatosensory cortex.

The **primary somatosensory cortex** receives and processes sensory information from the skin and body parts such as arms, hands, legs, feet, lip, tongue and so on.

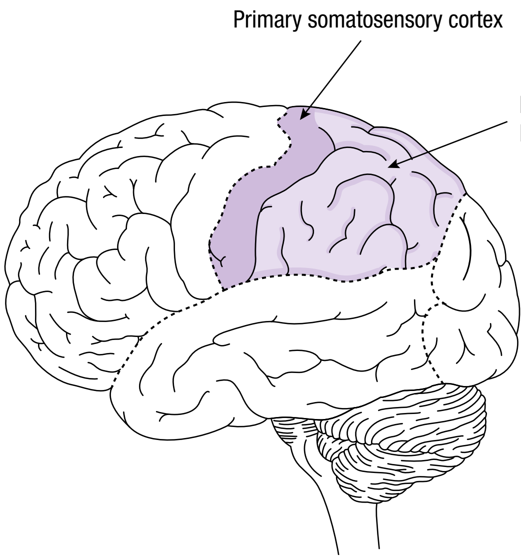


Figure 3.53 The parietal lobe and primary somatosensory cortex

Like the primary motor cortex, the primary somatosensory cortex in the *left* parietal lobe receives and processes sensory information from the *right* side of the body. Likewise, the primary somatosensory cortex in the *right* parietal lobe receives and processes sensory information from the *left* side of the body.

As shown in Figure 3.54, different areas of this cortex are involved with sensations of touch received from specific body parts. The amount of cortex devoted to a particular body part corresponds to the sensitivity and amount of use of the body part. For example, your lips, fingers and tongue, which are very sensitive to touch and frequently used in everyday behaviour, have more cortical space than parts that are less sensitive and used less frequently, such as the back of your legs and your hips.

The misshapen appearance of the person called a *homunculus* shown in Figure 3.55 represents the disproportionate areas of primary somatosensory cortex devoted to different parts of the body.

The parietal lobe also has association areas that are involved in functions such as attention, spatial reasoning and judging the position of our body in space. In addition, a section of cortex deep within this lobe is interconnected with the frontal lobe and is involved in taste perception.

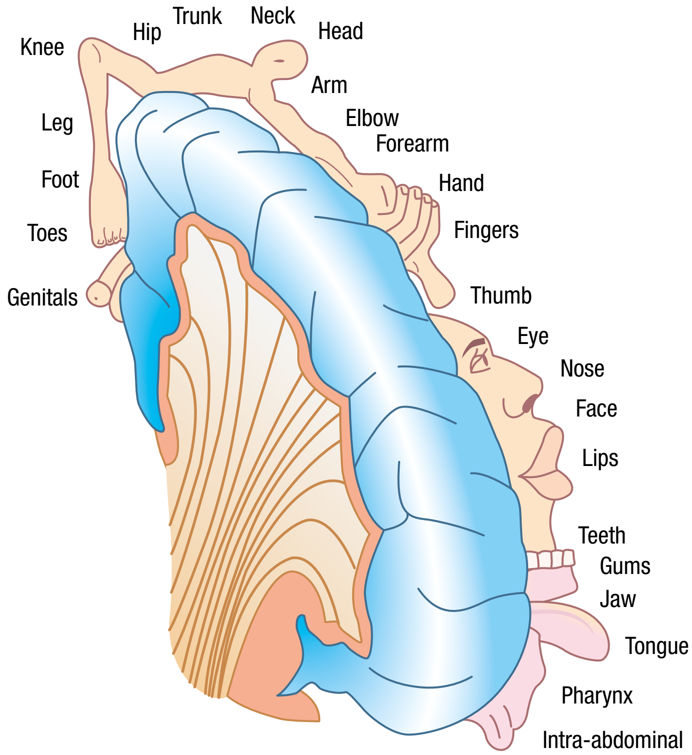


Figure 3.54 This diagram shows the organisation of the primary somatosensory cortex. More cortical area is devoted to the more sensitive body parts than to other parts. In addition, the lowermost parts of the body are located on the uppermost areas of the cortex, and vice versa.

Figure 3.55 This misshapen person (called a *homunculus*) represents the body parts in terms of the relative size of the area each body part occupies along the primary somatosensory cortex.

LEARNING ACTIVITY 3.18

Sensitivity of the primary motor somatosensory cortices

The following two activities provide quick ways of helping you understand the sensitivity of your primary motor cortex and your primary somatosensory cortex.

1. *Primary motor cortex*. Try wiggling each of your fingers one at a time. Now try wiggling each of your toes.
   Note how in Figure 3.51 (see page 167) the area of your primary motor cortex is much larger for your fingers than for your toes, which relates to the greater sensitivity and more precise control in your fingers.
2. *Primary somatosensory cortex*. Ask a friend to close their eyes. Using a random number of fingers (one to four), press down on the skin of your friend's back for one or two seconds and ask your friend to report how many fingers you are using. Now repeat the same procedure on the palm or back of your friend's hand.
   Your friend should be much better at guessing the number of fingers used when you're pressing their hand than when you're pressing their back. As in Figure 3.54 (see page 168), the area of the primary somatosensory cortex is much larger for the hands than for the back, which is reflected in more sensitivity and greater accuracy of detection for finger pressure on the hand.

Source: Adapted from Huffman, K. (2004). *Psychology in action* (7th ed.). New York: John Wiley & Sons.

Occipital lobe

The occipital lobe is located at the rearmost area of each cerebral hemisphere, at the back of your head (see Figure 3.56). The **occipital lobe** is almost exclusively devoted to the sense of vision. Damage to the occipital lobe can produce serious visual impairments, even if the eyes and their neural connections to the brain are normal. Although the occipital lobe is primarily involved in vision, areas in the other lobes also have important visual functions.

The occipital lobe is divided into many different visual areas. The largest by far is the primary visual cortex. The **primary visual cortex** is located at the back of each occipital lobe and this is the major destination of visual information from the two eyes. The information comes to the primary visual cortex from visual sensory receptors located on the retina at the back of each eye.

Each hemisphere receives and processes half of the visual information. The left half of *each* eye (which receives visual sensory information from the right half of the visual field) sends information only to the visual cortex in the left occipital lobe. The right half of each eye (which receives visual sensory information from the left half of the visual field) sends information only to the visual cortex in the right occipital lobe.

Neurons in the primary visual cortex and surrounding 'secondary' visual areas are specialised to respond to different features of visual information arriving there; for example, such features as orientation ('direction') of a line, and edges, shape ('forms'), motion and colour. Some neurons respond to specific features (e.g. shape or colour), while other neurons respond to two or more features (e.g. shape and colour) (Gazzaniga & Heatherton, 2006).

Association areas in the occipital lobes also have important roles in vision. These interact with the primary visual cortex in each occipital lobe to select, organise and integrate visual information. They also interact with association areas in the frontal, parietal and temporal lobes to integrate visual information with other information such as memory, language and sounds.

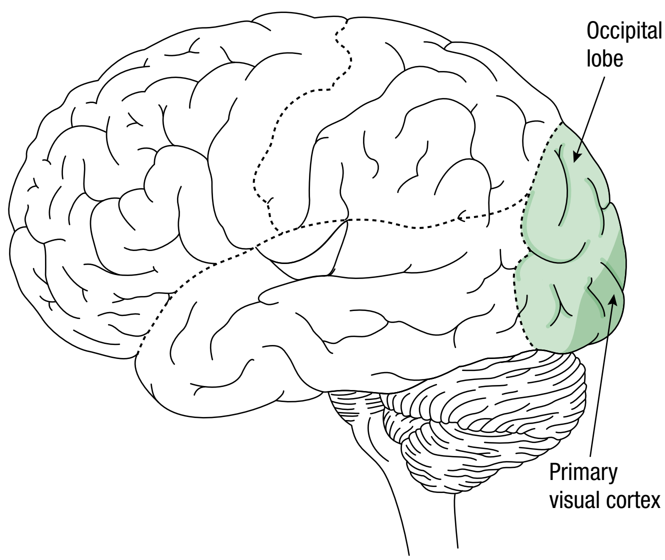


Figure 3.56 Occipital lobe showing the primary visual cortex

Temporal lobe

The temporal lobe is located in the lower, central area of the brain, above and around the top of each ear. The **temporal lobe** is involved with auditory perception and also plays an important role in memory, aspects of visual perception such as our ability to identify objects and recognise faces, and our emotional responses to sensory information and memories.

The **primary auditory cortex** in each temporal lobe receives and processes sounds from both ears so that we can perceive and identify different types of sounds.

Different areas of this cortex are specialised to register and respond to different features of sound. For example, if you were listening to classical music, the deep, low pitched sound of a bassoon will be registered in a different place on the auditory cortex than where the high-pitched sound of a tin flute will be registered.

A specific area of cortex in the temporal lobe of the left hemisphere, located next to the primary auditory cortex and connected to Broca's area by a bundle of nerves, is called Wernicke's area.

Like Broca's area, **Wernicke's area** is also involved in speech production but also has a crucial role in the comprehension of speech; more specifically, in interpreting the sounds of human speech. When you hear a word, the primary auditory cortex of the left temporal lobe processes the auditory sensation, but you cannot understand the word until the information has been processed by Wernicke's area.

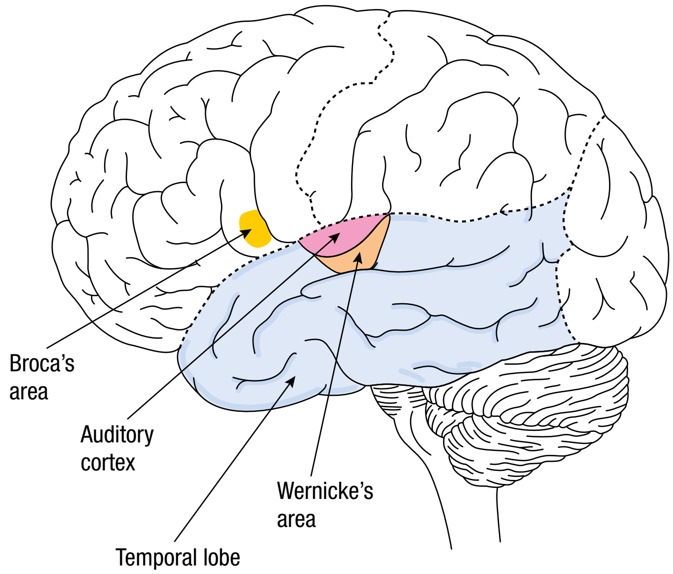


Figure 3.57 Temporal lobe, showing the location of some key structures

BOX 3.5 The brain and language

Human language is a complex mental ability that involves intricate coordination of many brain areas. An example of the complexity of language is that impairments in language often result from injury to several different cortical areas. Depending on where the injury occurs, a person may be able to speak fluently but be unable to read, or may be able to comprehend what they read but be unable to speak. Others can write but not read, read but not write, read numbers but not letters, or sing but not speak.

We tend to think of speaking and reading, or writing and reading, or singing and speaking, simply as variations of the same general ability, but studies of patients with certain brain injuries suggest otherwise.

For example, in 1861, Paul Broca found that damage to a specific area in the left frontal lobe caused one of his patients severe problems in being able to clearly pronounce words, although they were quite capable of singing and understanding speech and writing. The area, shown in Figure 3.52 on page 167, is named after Broca, however, *Broca's area* is just one of the brain areas involved in language. Even in reading this text aloud, other areas of the cerebral cortex are involved. For example, years after Broca's discovery, it was found that the *angular gyrus*, located towards the bottom of the left parietal lobe, is needed to receive visual information from the visual cortex and recode it into an auditory form from which *Wernicke's area* (in the left temporal lobe) derives its meaning.

As shown in Figure 3.58 opposite, a number of different areas of the cerebral cortex are activated when language is spoken, seen or heard.

Different areas of the cerebral cortex are even activated when we use specific forms of grammar or concepts. For example, in 1985, two adult females who had experienced strokes both suffered damage to language-related parts of association cortex in the left hemisphere. Neither had difficulty with nouns but both had difficulty with verbs. Their respective problems, however, were opposite. One could speak verbs but had difficulty writing them, whereas the other could write verbs but could not say them. Interestingly, the female who could speak verbs was able to say 'I watch TV' (where 'watch' is used as a verb) but was unable to say 'My watch is slow' (where 'watch' is a noun). Yet another person, an adult male with damage to a different language-related brain area, lost the ability to say a particular group of nouns, specifically, the names of any fruit. He could say any noun from abattoir to zoo, but when it came to the name of a fruit he was 'lost' for words (Hart, Berndt & Caramazza, 1985).

Prominent American neurologist Norman Geschwind (1972) combined many findings from research and linked the roles of different brain structures in explaining how we use language.

According to Geschwind, when you read aloud, the words first register in the visual cortex. These are then relayed to the angular gyrus, which then transforms the words into an auditory code. This code is received and understood in the neighbouring Wernicke's area and sent to Broca's area. Broca's area directs the action of the motor cortex to create the pronounced word. This pathway from written to spoken word is shown in Figure 3.59 opposite.

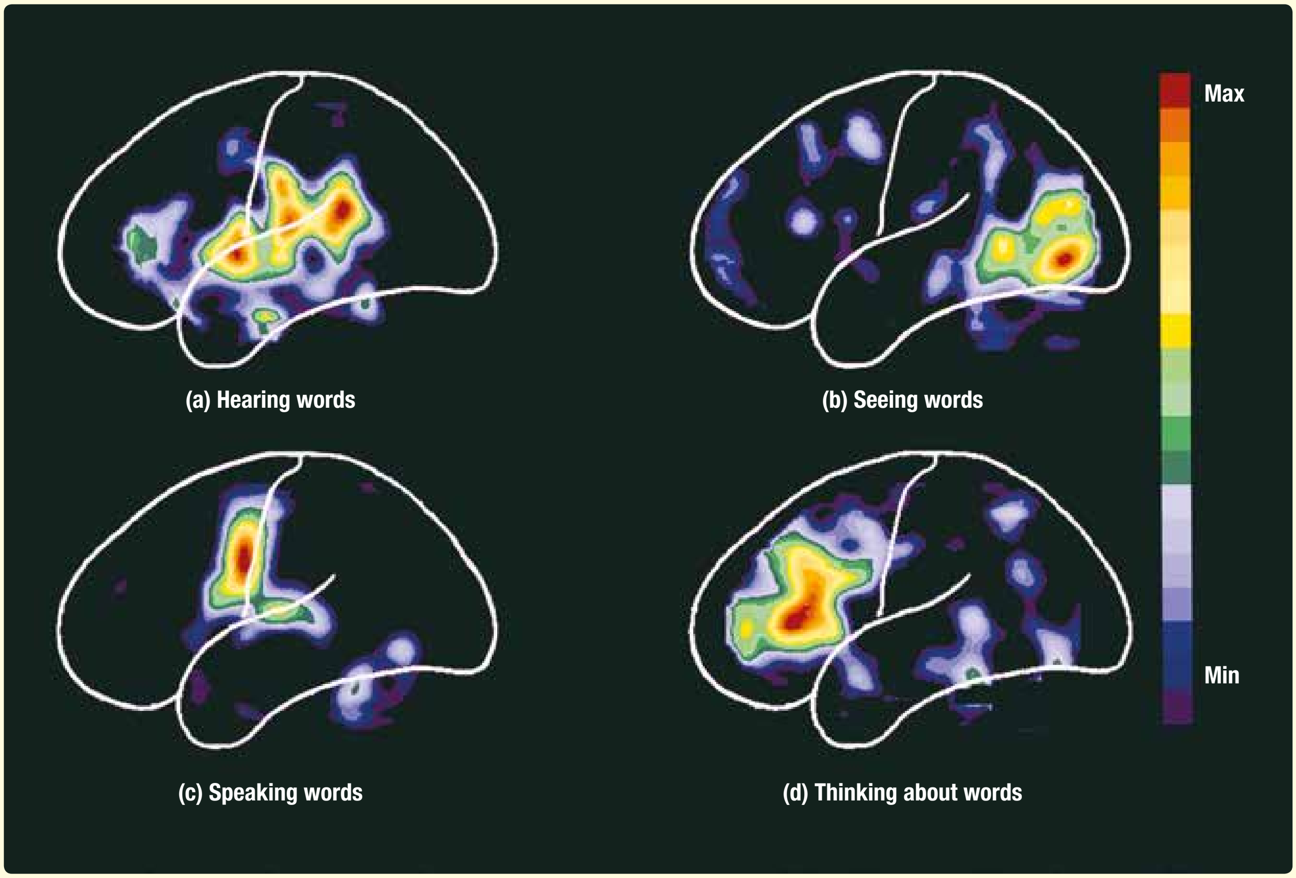


Figure 3.58 These PET scans of left-facing individuals show levels of increased activity in specific brain areas: (a) when hearing words (auditory cortex and Wernicke's area); (b) when seeing words (visual cortex and angular gyrus); (c) when repeating words (Broca's area and the motor cortex); and (d) when generating verbs, a more complex language task, activating the most amount of brain. The colours violet, blue, green, yellow and red, in that order, represent increasing amounts of activity.

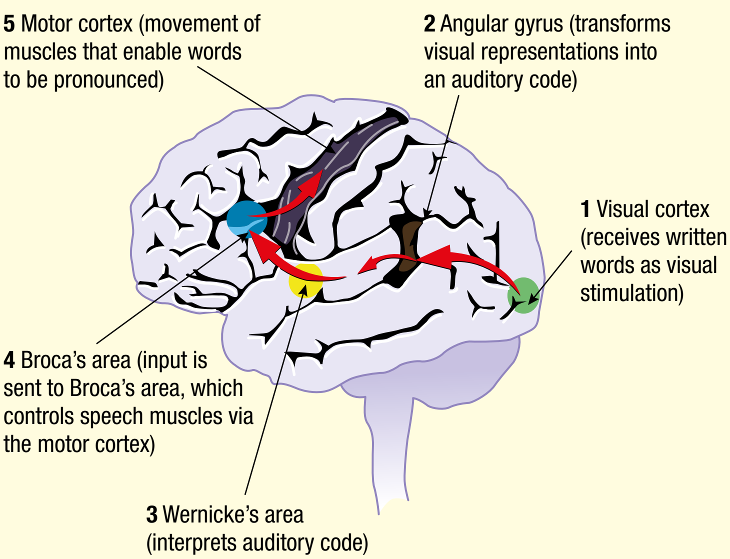


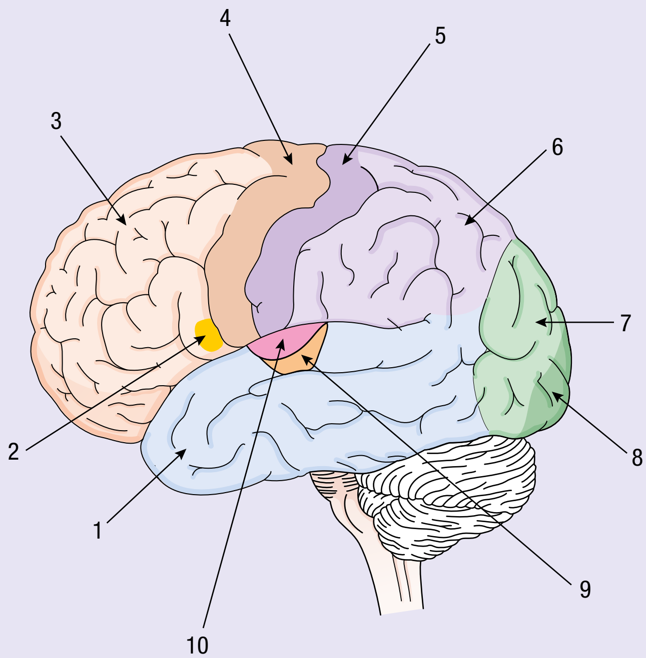
Figure 3.59 Five steps appear to be involved in reading aloud.

More recent research has found that the right hemisphere also has a role in language. For example, some people with extensive damage to the left hemisphere are capable of swearing and using other emotionally charged words, or singing and producing well-learnt phrases. In some cases, these individuals can sing sentences they are unable to say, thereby making use of the right hemisphere's musical function. In relation to comprehension, some frequently used concrete words, such as *car, television* and *food*, are understood by the right hemisphere, even if the patient is unaware that they have been shown the word. The right hemisphere also appears to have the ability to comprehend the overall context or theme present in a sentence (Andrewes, 2001).

LEARNING ACTIVITY 3.19

Summarising brain areas and structures

1. Name the brain areas and structures shown in the following diagram.



1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

2. Complete the following table or summarise the relevant information using a copy of the diagram of the brain in question 1 and additional labels where required.

Lobe	Key structures or areas	Main functions
Frontal	primary motor cortex prefrontal cortex Broca's area	
Parietal	primary somatosensory cortex association areas	
Occipital	primary visual cortex	
Temporal	primary auditory cortex Wernicke's area	

3. Most mental processes and behaviours do not exclusively involve any one of the lobes. Demonstrate interaction between the lobes by using arrows on a diagram of the brain to link the lobes in two different functions.

4. Following a head injury sustained in a car accident, Sofia is unable to feel any sensation of touch or temperature in an area on the left side of her face between her cheeks and her lower jaw. Fortunately, Sofia did not injure her spine.
(a) Which brain area is likely to be affected?
(b) Explain your answer to part (a).
(c) In which lobe is this area located?

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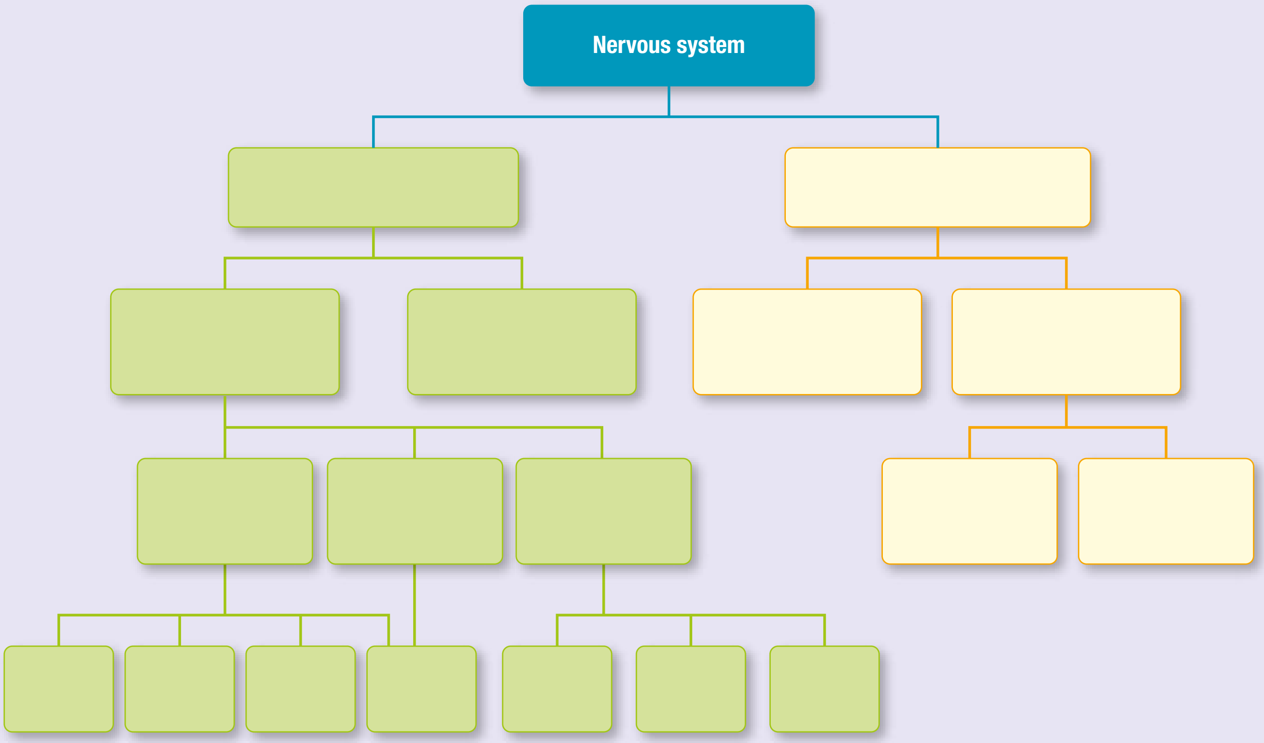
- Word copy of brain diagram
- Word copy of table

LEARNING ACTIVITY 3.20

Review: Organisation of the nervous system

Complete the following figure to show the organisation and location of the following divisions and features of the nervous system.

medulla	hindbrain	brain	reticular formation	midbrain	cerebrum and cerebral cortex
sympathetic nervous system		pons	somatic nervous system		forebrain
parasympathetic nervous system			hypothalamus		peripheral nervous system
central nervous system		thalamus	spinal cord	autonomic nervous system	cerebellum



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Weblinks

- TED talk on myths about psychology 14 m 55 s
- Practical activity — an alternative way of localising and summarising brain areas
- Learning activity on ethics in brain research

LEARNING ACTIVITY 3.21

Reflection

Some people think that we use only 10% of our brains and that we can harness the rest to boost our mental abiltities. Based on your study of the brain, comment on the accuracy of this statement and explain your view.

or

Comment on whether electronic technology enabling artificial intelligence can (or will eventually) have the capability of the human brain.

CHAPTER SUMMARY

- ROLE OF THE BRAIN IN MENTAL PROCESSES AND BEHAVIOUR
  - Complexity of the brain
  - Approaches over time to understanding the role of the brain
    - Brain versus heart debate
    - Mind–body problem
    - Phrenology
  - First brain experiments
    - Brain ablation experiments
      - Flourens pioneers experimental ablation
      - Lashley's search for the location of learning and memory
    - Electrical stimulation of the brain
      - Fritsch and Hitzig discover the motor cortex
      - Penfield maps the cerebral cortex
      - Sperry's split-brain experiments
    - Neuroimaging techniques
      - Structural neuroimaging
        - CT
        - MRI
      - Functional neuroimaging
        - PET
        - fMRI
  - Nervous system: structure and function
    - Central nervous system
      - Brain
      - Spinal cord
    - Peripheral nervous system
      - Somatic nervous system
      - Autonomic nervous system
        - Sympathetic
        - Parasympathetic
  - Role of the neuron
    - Structure of a neuron
      - Dendrites
      - Soma
      - Axon
      - Myelin
      - Axon terminals
    - Types of neurons
      - Sensory neurons
      - Motor neurons
      - Interneurons
  - Glial cells
    - Astrocytes
    - Microglia
    - Oligodendroglia
    - Schwann cells
  - Structure and function of brain areas
    - Hindbrain
      - Cerebellum
      - Medulla
      - Pons
    - Midbrain
      - Reticular formation
    - Forebrain
      - Hypothalamus
      - Thalamus
      - Cerebrum
  - Roles of the cerebral cortex
    - Cerebral hemispheres
    - Hemispheric specialisation
      - Left hemisphere specialisations
      - Right hemisphere specialisations
    - Cortical lobes of the cerebral cortex
      - Frontal lobe
      - Parietal lobe
      - Occipital lobe
      - Temporal lobe

KEY TERMS

ablation p. 132
association area p. 163
astrocyte p. 154
autonomic nervous system p. 149
axon p. 151
axon terminal p. 152
brain p. 146
brain hypothesis p. 125
brain stem p. 132
brain versus heart debate p. 125
Broca's area p. 167
central nervous system p. 146
cerebellum p. 156
cerebral cortex p. 162
cerebral hemisphere p. 163
cerebrum p. 160
computerised tomography (CT) p. 138
contralateral p. 133
corpus callosum p. 136
cortical lobe p. 165
dendrite p. 151
electrical stimulation of the brain (ESB) p. 133
faculties p. 130
forebrain p. 158
frontal lobe p. 165
functional magnetic resonance imaging (fMRI) p. 141
glial cell p. 154
heart hypothesis p. 125
hemispheric specialisation p. 163
hindbrain p. 156
hypothalamus p. 159
interneuron p. 153
localisation p. 131
magnetic resonance imaging (MRI) p. 139
medulla p. 157
microglia p. 154
midbrain p. 157
mind–body problem p. 126
mind–brain problem p. 127
motor neuron p. 153
myelin p. 151
neuroimaging p. 138
neuron p. 150
occipital lobe p. 169
oligodendroglia p. 154
parasympathetic nervous system p. 150
parietal lobe p. 168
peripheral nervous system p. 148
phrenology p. 130
pons p. 157
positron emission tomography (PET) p. 140
prefrontal cortex p. 165
primary auditory cortex p. 170
primary motor cortex p. 166
primary somatosensory cortex p. 168
primary visual cortex p. 169
reticular formation p. 157
Schwann cells p. 154
sensory neuron p. 152
soma p. 151
somatic nervous system p. 148
spinal cord p. 147
split-brain experiment p. 137
split-brain surgery p. 136
sympathetic nervous system p. 149
temporal lobe p. 169
thalamus p. 159
Wernicke's area p. 170

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 178–83. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about the role of the brain	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Complexity of the brain			
Approaches over time to understanding the role of the brain			
• Brain versus heart debate			
• Mind–body problem			
• Phrenology			
First brain experiments			
• Brain ablation experiments			
– Pierre Flourens pioneers experimental ablation			
– Karl Lashley's search for the location of learning and memory			
• Electrical stimulation of the brain			
– Gustav Fritsch and Eduard Hitzig discover the motor cortex			
– Wilder Penfield maps the cerebral cortex			
– Split-brain experiments			
• Neuroimaging techniques			
– Structural neuroimaging			
– Functional neuroimaging			
Nervous system: structure and function			
• Organisation of the nervous system			
– Central nervous system			
– Peripheral nervous system			
◦ Somatic nervous system			
◦ Autonomic nervous system			
- Sympathetic nervous system			
- Parasympathetic nervous system			

Key knowledge I need to know about the role of the brain	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Role of the neuron			
• Structure of a neuron			
– Dendrites			
– Soma			
– Axon			
– Myelin			
– Axon terminals			
• Types of neurons			
– Sensory neurons			
– Motor neurons			
– Interneurons			
• Glial cells			
– Astrocytes			
– Microglia			
– Oligodendroglia			
– Schwann cells			
Structure and function of brain areas			
• Hindbrain			
– Cerebellum			
– Medulla			
– Pons			
• Midbrain			
– Reticular formation			
• Forebrain			
– Hypothalamus			
– Thalamus			
– Cerebrum			
Roles of the cerebral cortex			
• Cerebral hemispheres			
• Hemispheric specialisation			
– Left hemisphere specialisations			
– Right hemisphere specialisations			
• Cortical lobes of the cerebral cortex			
– Frontal lobe			
– Parietal lobe			
– Occipital lobe			
– Temporal lobe			

CHAPTER 3 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question

Question 1

The outer layer of neural tissue covering the human brain is called the

A. corpus callosum.
B. cerebral cortex.
C. meninges.
D. association cortex.

Question 2

The relationship between the central nervous system and the peripheral nervous system is best described as

A. non-interactive.
B. autonomous.
C. interdependent.
D. outlying.

Question 3

A major function of the spinal cord is to

A. protect the vertebrae.
B. initiate voluntary muscle movements.
C. enable sensory neurons to connect directly with motor neurons.
D. connect the brain and peripheral nervous system.

Question 4

Experimental research using ablation involves _____ the brain to observe behavioural effects.

A. damaging
B. stimulating
C. inhibiting
D. stimulating and/or inhibiting

Question 5

The split-brain experiments on hemispheric specialisation were conducted by

A. Flourens.
B. Penfield.
C. Sperry.
D. Galen.

Question 6

The brain structure that is most prominently involved in regulation of eating, drinking and body temperature is the

A. cerebellum.
B. reticular formation.
C. thalamus.
D. hypothalamus.

Question 7

The brain structure that coordinates bodily movements to ensure precise and smooth execution is the

A. cerebellum.
B. cerebrum.
C. medulla.
D. hypothalamus.

Question 8

The brain area primarily involved in regulating bodily activities that are vital for survival is the

A. cerebral cortex.
B. hindbrain.
C. forebrain.
D. midbrain.

Question 9

Which of the following statements about hemispheric function is correct?

A. The left and right hemispheres control voluntary movements on both sides of the body and receive sensory information from both sides of the body.
B. The left and right hemispheres exchange and process sensory information before deciding which side of the body requires control of voluntary movements.
C. The right hemisphere controls voluntary movements on the right side of the body and receives sensory information from the right side of the body.
D. The left hemisphere controls voluntary movements on the right side of the body and receives sensory information from the right side of the body.

Question 10

A major function of the somatic nervous system is to

A. transmit information from sensory receptor sites to the CNS.
B. carry neural messages to the CNS and internal organs and glands.
C. maintain the body's internal states.
D. interpret information provided by sensory systems of the body.

Question 11

The division of the nervous system that is primarily self-regulating is called the _____ nervous system.

A. central
B. somatic
C. autonomic
D. peripheral

Question 12

Something gives you a sudden and unexpected fright. Which division of the nervous system will be activated when this happens?

A. sympathetic
B. parasympathetic
C. somatic
D. central

Question 13

Which structure screens then redirects incoming sensory information to the relevant cortical area?

A. thalamus
B. hypothalamus
C. medulla
D. cerebrum

Question 14

The brain vs heart debate

A. has its origins with the development of neuroimaging techniques in the 1970s.
B. is about the source of human mental processes and behaviour.
C. was first proposed by the philosopher Descartes.
D. proposes that both the heart and brain contribute to human mental processes and behaviour.

Question 15

An advantage of a PET scan when compared with a CAT scan is that

A. a PET scan provides information about brain movement, whereas a CAT scan provides only structural information.
B. a PET scan provides information about brain activity, whereas a CAT scan provides only structural information.
C. a PET scan provides magnetic brain images whereas a CAT scan provides computerised cross-sectional brain images.
D. a PET scan is non-invasive, whereas a CAT scan is invasive because radiation is used.

Question 16

Which of the following neuroimaging techniques would provide the most precise information on brain function?

A. fMRI
B. PET
C. MRI
D. CT

Question 17

Three prominent hindbrain structures are the

A. cerebellum, reticular formation and hypothalamus.
B. thalamus, cerebrum and hypothalamus.
C. thalamus, reticular formation and pons.
D. cerebellum, medulla and pons.

Question 18

The largest part of the forebrain is the

A. reticular formation.
B. cerebellum.
C. cerebrum.
D. medulla.

Question 19

You will be able to move the muscles in your hand and fingers to answer this question through the specific action of your

A. sensory neurons.
B. motor neurons.
C. autonomic nervous system.
D. spinal cord.

Question 20

Which of the four lobes is primarily involved in vision?

A. occipital
B. frontal
C. parietal
D. temporal

Question 21

A neurosurgeon electrically stimulated parts of a patient's primary somatosensory cortex. If the patient was conscious during the procedure, which of the following was probably experienced?

A. 'hearing' faint sounds
B. 'seeing' random visual patterns
C. a sense of having the skin touched
D. movement of one or more of the larger body parts

Question 22

The amount of primary motor cortex devoted to a specific body part reflects the

A. degree of stimulation required to activate the part.
B. degree of precise control required by the part.
C. sensitivity of the sensory receptors controlling the body part.
D. sensitivity of the body part to stimulation.

Question 23

Which of the following tasks is a specialised function of the right cerebral hemisphere?

A. reading a novel
B. logical reasoning
C. following the directions in a recipe
D. finding one's way around a maze

Question 24

The area of the brain that, if injured, is more likely to adversely affect mental abilities such as symbolic thinking, planning and decision making, is the

A. forebrain.
B. midbrain.
C. hindbrain.
D. cerebellum.

Question 25

You have an itchy leg, so you scratch it. The sensation of the itch is processed by the _____, whereas the scratching movements are controlled by the _____.

A. frontal lobe; parietal lobe
B. parietal lobe; frontal lobe
C. primary somatosensory cortex; primary motor cortex
D. primary motor cortex; primary somatosensory cortex

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (2 marks)

Broca's area is located in the ______________________________ lobe; whereas, Wernicke's area is located in the ______________________________ lobe.

Question 2 (1 mark)

Which division of the nervous system automatically restores bodily systems to their normal level of functioning after heightened activity has been suddenly initiated?

____

Question 3 (1 mark)

Which cortical lobe directly receives then processes auditory information?

____

Question 4 (1 mark)

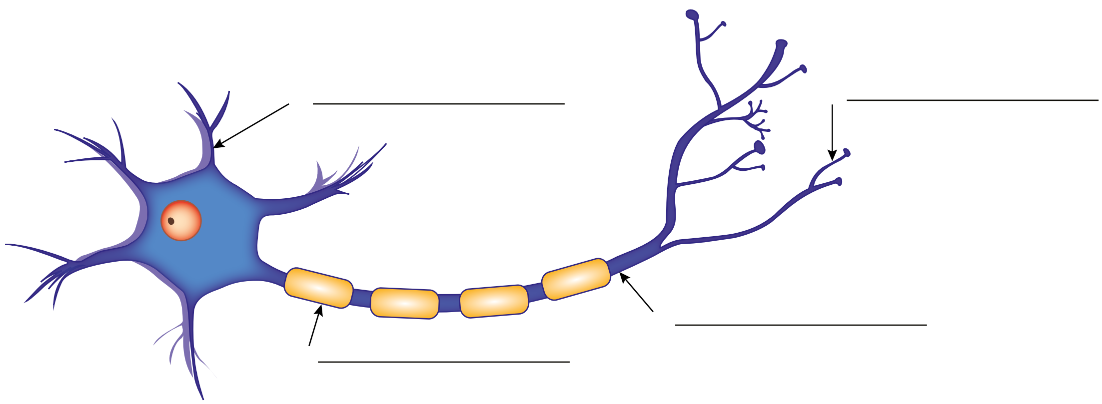
Explain the meaning of 'localisation' in relation to brain function.

____

____

Question 5 (4 marks)

Name the four parts of the neuron in the following diagram.



Question 6 (4 marks)

Use the following brain image to indicate the approximate location of each of the following. Ensure you clearly mark and label each area or structure.

(a) medulla
(b) occipital lobe
(c) thalamus
(d) forebrain

Question 7 (2 marks)

Use an example to describe the interactive nature of a motor neuron, sensory neuron and interneuron.

Question 8 (3 marks)

(a) Name one type of glial cell and describe its role. 2 marks

(b) What is a vital role of neurons that glial cells cannot perform? 1 mark

Question 9 (2 marks)

Describe the mind–body problem.

Question 10 (3 marks)

(a) Define phrenology. 1 mark

(b) Why is phrenology best regarded as pseudoscience? 2 marks

Question 11 (2 marks)

During a car accident, Stephen suffered a brain injury. Fortunately, he did not injure his spine. Afterwards, he found that he could not detect any sensations (such as touch, hot or cold changes) on both sides of his face between his cheekbones and lower jaw.

Which of Stephen's cortical areas is likely to have been affected by the brain injury, and in which lobe is this cortical area located?

Question 12 (3 marks)

Explain the relationship between the brain and conscious experience of the world with reference to the thalamus and reticular formation.

Question 13 (3 marks)

Briefly describe three key functions each of the cerebral hemispheres have in common.

Question 14 (2 marks)

Some psychologists refer to 'the brain and *its* nervous system' when discussing the brain.

Briefly discuss the accuracy of this expression, with reference to an example of a relevant mental process or behaviour.

Question 15 (2 marks)

Popular magazines sometimes describe people as 'left-brained' or 'right-brained', suggesting that one hemisphere is entirely dominant over the other in certain activities or that we may be able to make one hemisphere more dominant and therefore improve or even excel in some abilities.

Write a counterargument to this view ensuring you refer to hemispheric function and a relevant example.

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.
The answers to the Section B questions are in eBookPLUS.

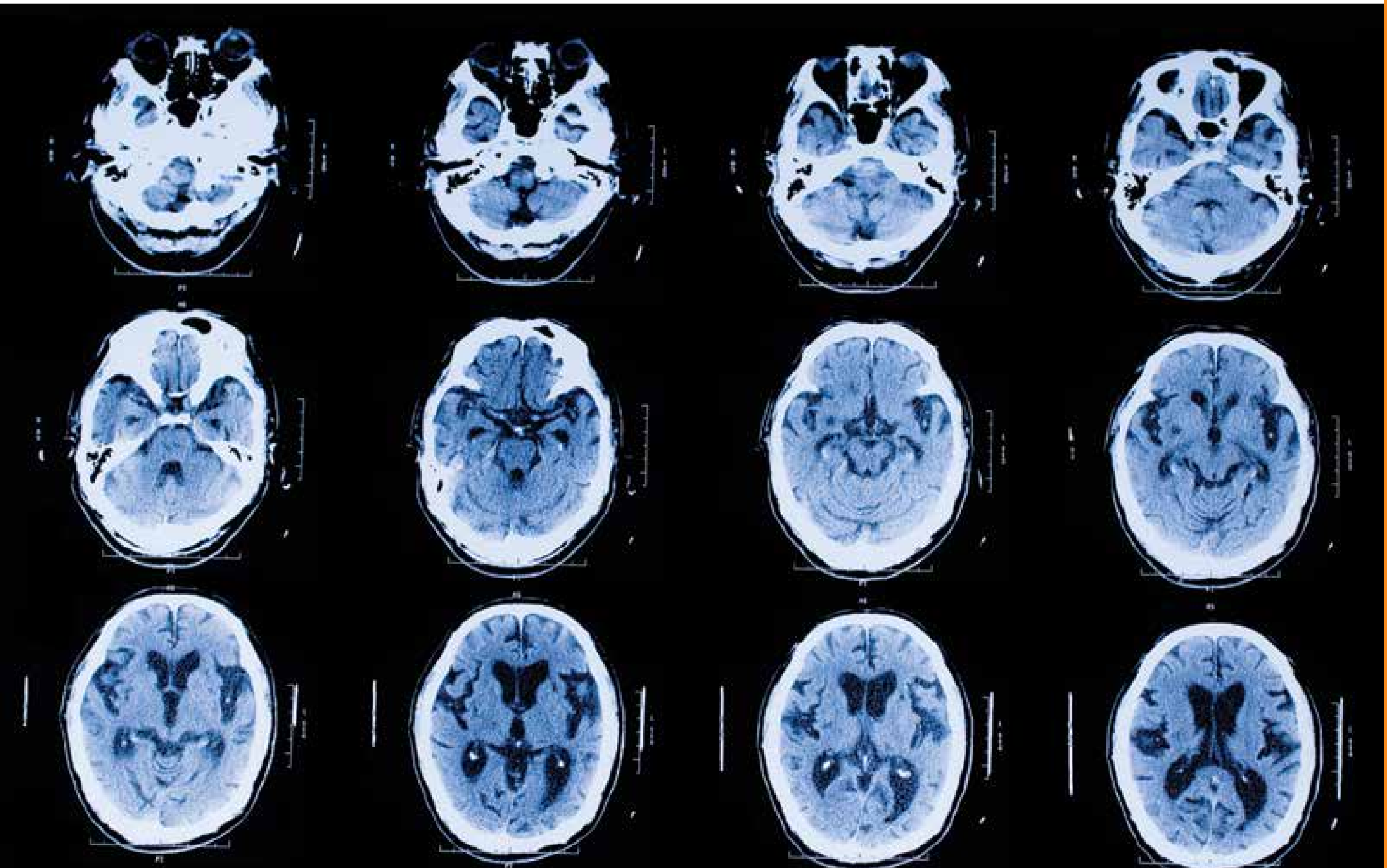
4 BRAIN PLASTICITY AND BRAIN DAMAGE

KEY KNOWLEDGE

- infancy and adolescence as periods of rapid development and changes in brain structure and function, including development of myelin, synaptic pruning and frontal lobe development
- the impact of injury to the cerebral cortex on a person's biological, psychological and social functioning and the ability of the brain to undergo adaptive plasticity, illustrated by rehabilitation of people with brain injuries
- the use of animal studies and neuroimaging techniques to develop understanding of human neurological disorders including Parkinson's disease

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), p. 15.

CHAPTER CONTENT



Before neuroimaging techniques became available, it was widely believed that the brain stopped developing at around the age of 12. One reason for this belief is that the brain's overall structure is almost complete at birth and it grows very little in size during childhood.

Although the sizes and shapes of our brains look very alike, no two human brains are actually identical. Genetic information directs the course of our brain's development and the experiences we have throughout life actively shape its structure. In this sense, our brain never reaches a point where we can describe it as 'fully developed'.

From birth through to the end of life, neurons and the connections between them change in response to our experiences. They change to represent and store this information so that we can learn and remember. Sometimes neurons die and connections are eliminated, especially if not needed or used. But the more we repeat a thought, feeling or action, the more connections that are dedicated to it and the stronger those connections become. In some cases, the brain can repair itself and a healthy part can take over the function of a damaged area. However, despite its remarkable adaptability and capacity for change, the brain cannot be transplanted or replaced.

In this chapter we examine the onset and process of brain development in infancy through to late adolescence, by which time most areas have reached maturity. We then examine the adaptability of the brain in response to experience. In particular, we consider how experience can change the brain's structure, especially when damage through injury interferes with its normal functioning.

BRAIN DEVELOPMENT IN INFANCY AND ADOLESCENCE

Infancy and adolescence are periods of rapid development and change in brain structure and function. These occur in a genetically programmed, orderly way. At birth, the infant's brain has just about all the neurons it will ever have despite being only about one quarter the size of an adult's brain. By six months of age the brain will reach about half its adult size, almost three-quarters the size by two years of age and about 90–95% of its adult size by the age of 6. By the mid-20s or so the brain will have reached adult size by most estimates, but some parts are still maturing, particularly cortical areas.

Brain growth and development are orderly processes, but this does not mean that they occur at the one pace within each individual. There are bursts and spurts, most notably in early childhood and adolescence.

Areas deep within the brain that are responsible for vital survival functions develop first. It is essential that breathing, heartbeat, circulation, sleeping, sucking and swallowing are possible when the infant leaves the uterus (Epstein, 1986; Kolb & Wishaw, 2014).

Although the brain quadruples in size from birth to adulthood, it is not due to an increase in the number of neurons. A substantial amount of its growth is due to two processes — the development of myelin and the growth of new neural connections through synaptogenesis and the branching of dendrites.

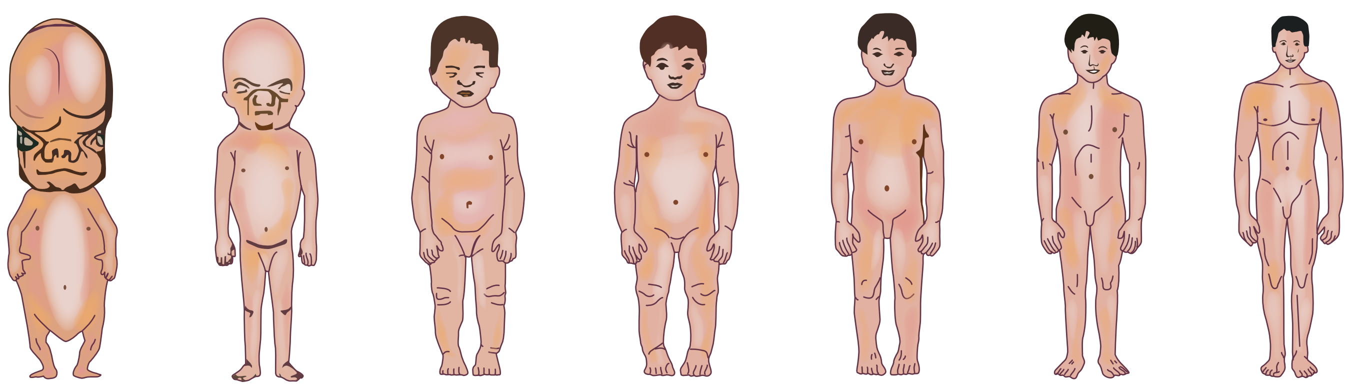


Figure 4.1 Changes in brain and body proportions as we grow older. The brain reaches full adult size by the mid-20s but some areas are still developing.

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Weblink
Video on brain development 8 m 7 s

Development of myelin

The growth and development of white, fatty myelin around many axons through **myelination** contributes to the increase in brain size. This important process allows neurons to be more efficient in sending messages to other neurons (although not all axons are ever myelinated).

Myelination starts before birth during fetal development and continues through childhood, adolescence and into adulthood. The most intense period of myelination occurs shortly after birth. By this stage, axons have also grown in size. They are longer, with denser branching at their ends because there are more axon terminals. There is also a burst of myelination in adolescence.

Myelination typically emerges in the hindbrain then spreads over time into the midbrain and forebrain. Within the cerebral cortex, sensory areas are myelinated before motor areas. This progression of myelination through the brain is consistent with the overall course of brain growth and development.

Myelination does not occur in a uniform way across the cortex. Sensory and motor areas are myelinated by age 3 or 4, whereas association areas in the frontal and temporal lobes responsible for more complex functions are myelinated last.

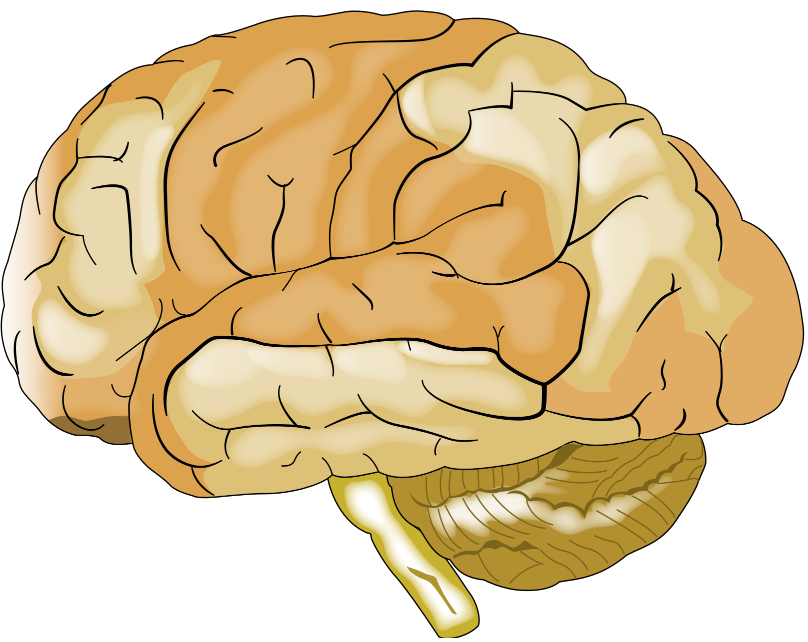

Figure 4.2 Progress of myelination in the cerebral cortex. Light shaded areas myelinate last.

Synaptogenesis and synaptic pruning

Synaptogenesis accounts for most of the brain's growth in size. **Synaptogenesis** involves the formation of new synapses between the brain's neurons. A *synapse* is the place where neighbouring neurons connect and communicate — where messages are passed from axon terminals to dendrites. After birth, the neurons continue to develop new dendrites, the dendrites can grow more branches and each branch can grow spines, making the dendrites extremely 'bushy' in appearance (see Figure 4.3). As described in chapter 3, each of these dendritic spines provides a site where a neuron can connect with an adjacent neuron and collect information.

Generally, synaptogenesis occurs more quickly in sensory (and motor) areas of the cortex than in association areas. It is believed that this allows the brain to have the capability to respond to the constant stream of new environmental input; for example, to deal with touch sensations and all the new sights, sounds, smells and so on that bombard the sense organs.

Synapses in the brain begin to form long before birth. After birth, synaptogenesis occurs so rapidly within the first 15 months that the total number of synapses increases tenfold. The infant brain forms far more neural connections through synaptogenesis than it will ever use. So, weak or unused connections are 'pruned'. This process of eliminating synaptic connections is called **synaptic pruning**. Synaptic pruning is considered to be the means by which the brain 'fine tunes' its neural connections. It is a long-term process, continuing for many years, but in different areas of the brain at different times.

Synaptic pruning also tends to occur first in sensory areas and last in association areas. It is complete in the visual cortex by about age ten, but the elimination of dendrites can continue in association areas of the frontal lobe until well beyond age 20, eventually stabilising in adulthood around age 30. There is a burst of synaptic pruning during early adolescence, with almost half the synaptic connections eliminated at this time (Kolb & Wishaw, 2014; Spear, 2010).

What is constant across different areas of the brain, however, is that the number of synapses in an adult is about 40% less than the number in a three-year-old. Which connections will be kept and which will be pruned is based on experience. The connections that have proven to be valuable and have strengthened through repeated use are retained. Those that have become weak or obsolete decay and disappear. The entire process occurs as if the rule 'use it or lose it' is being followed. It is also a process that closely ties experience to brain development (Gazzaniga, Ivry & Mungun, 2014; Kolb & Wishaw, 2014; Spear, 2010).

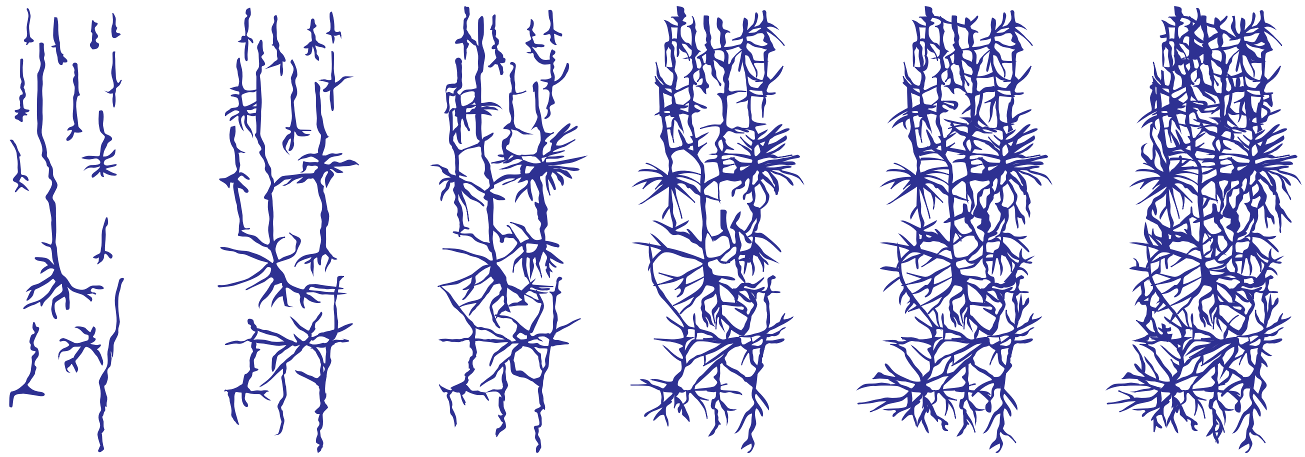

Figure 4.3 The infant brain forms far more neural connections than it will ever use. The brain then 'prunes' any synaptic connections that are not used in a process based on a 'use it or lose it' rule.

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Weblink
Explanation of myelination and synaptic pruning in adolescence
3 m 37 s

Frontal lobe development

Brain development continues into adulthood until about the mid-twenties or so, with the frontal lobes last to fully mature. The **prefrontal cortex** — the association area just behind the forehead — is the very last part of the brain to mature. This is consistent with the general, overall pattern of brain growth and development. Areas at the bottom grow and develop before those at the top, and areas at the back before those at the front.

The progression of myelination, synaptogenesis and synaptic pruning through the frontal lobe (and other lobes) follows this overall pattern. Within the frontal lobe, synaptogenesis occurs more quickly in the motor cortex and other areas towards the back of the lobe than it does in the prefrontal cortex at the front. Synaptic pruning and myelination also occur last in the prefrontal cortex.

During the early childhood years, between the ages of 3–6 years, there is a significant increase in the number of neural connections established in the frontal lobes through synaptogenesis. As this occurs, children become increasingly sophisticated in cognitive abilities, especially when compared to capabilities at birth.

During the ages of about 7 to 15 years, the rapid synaptic growth shifts to the temporal and parietal lobes. This is believed to be associated with significant increases in language development.

During the 'teenage' years of around ages 16 to 20, there is a heightened level of synaptic pruning in the frontal lobes whereby unneeded connections are actively eliminated. This pruning assists more efficient functioning of neuronal activity, which is why it is believed to occur at this time (Huffman, 2012).

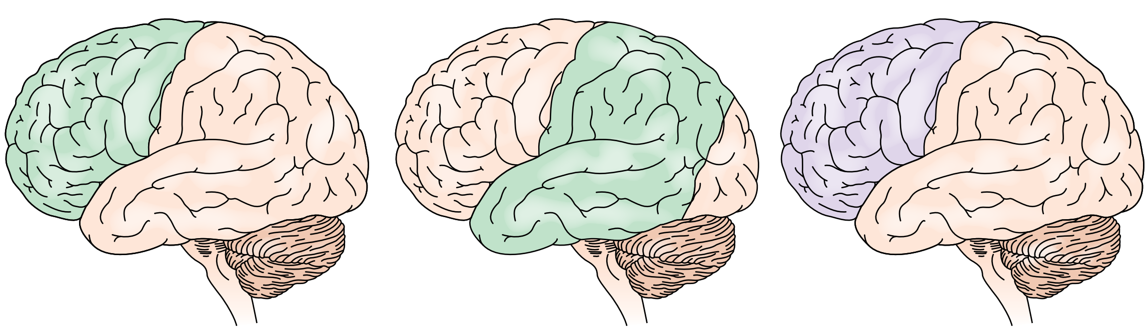

Figure 4.4 Periods of more rapid synaptogenesis and synaptic pruning occur during brain development from early childhood to later adolescence. The prefrontal cortex is the last brain area to mature and the heightened level of synaptic pruning between 16–20 years assists more efficient functioning of neuronal activity.

Source: Adapted from Huffman, K. (2012). *Psychology in action* (10th ed.). Hoboken, New Jersey: John Wiley & Sons, p. 334.

Some psychologists regard it as significant that the prefrontal cortex is the last brain area to reach maturity. It is considered significant because of the role of the prefrontal cortex in the more advanced, 'higher level' mental functions, such as our ability to reason, plan ahead, organise, solve problems, make decisions and so on. It has been suggested that the occasional impulsive, unpredictable, unstable or immature behaviour displayed by many adolescents is at least partly a reflection of their brain still being a 'work in progress' because it still has yet to reach full adult maturity.

The underdeveloped prefrontal cortex has been proposed as one explanation for the immaturity of decision making and higher incidence of 'unstable' behaviour among many adolescents. During adolescence, emotions and impulses can be intense and compelling, especially as the adolescent's limbic system — the motivational and emotional centre of the brain — tends to be quite well-developed and mature. But the part of the brain that is responsible for reasoning, decision making, exercising judgment and emotional regulation is still maturing. As a result, although adolescents are able to think critically, they may sometimes have difficulty doing so. They are also more likely to act irrationally than during periods of later brain development. The adolescent also engages in risky behaviours more than adults. Some of the most life-threatening risky behaviour is especially common during the 'teenage years' (Bove et al., 2016; Grison, Heatherton & Gazzaniga, 2015; Horstman, 2012; Spear, 2010).

Figure 4.5 Risky behaviour during adolescence may be partly explained by an immature prefrontal cortex in the frontal lobe.

eGuide*plus*

Weblink

TED talk: Neuroscientist on 'The mysterious workings of the adolescent brain' 14 m 26 s

LEARNING ACTIVITY 4.1

Review questions

1. Construct a timeline or flow chart to outline growth in brain size from birth to adulthood.
2. Explain why the human brain never reaches a point where it is 'fully developed'.
3. (a) What is myelination?
   (b) When does it start and end?
4. (a) What is synaptogenesis?
   (b) When does it start and end?
5. (a) What is synaptic pruning?
   (b) Why is it believed to occur?
6. Explain the meaning of 'use it or lose it' in relation to brain development.
7. Explain how myelination and synaptogenesis collectively account for a substantial increase in brain size after birth.
8. Draw a picture of a brain and use numbers and/or arrows that become narrower to indicate the overall pattern of brain growth and development.
9. Give an example of a risky, life-threatening behaviour commonly associated with adolescence. What is a possible explanation in terms of lobe development?

LEARNING ACTIVITY 4.2

Reflection

An underdeveloped prefrontal cortex in early adolescence may be one reason why some teenagers have difficulties with self-control, and lack efficient and adult decision-making abilities.

Comment on whether this reason justifies inappropriate behaviour by teenagers and explain your view.

IMPACT OF INJURY TO THE CEREBRAL CORTEX AND ADAPTIVE PLASTICITY

At most times, our brain serves us well. When intact and undamaged, it usually enables us to successfully adapt to our environment and meet the demands of everyday life. When the cerebral cortex or any other part of the brain is injured, people can experience one or more impairments that may affect them physically and/or how they think, feel and behave. Many people with cortical damage can function quite effectively in everyday life, but the impact will depend largely on the individual involved and the nature and severity of the injury itself. Appropriate treatment also plays a vital role in the level of recovery.

Brain injury refers to any brain damage that impairs, or interferes with, the normal functioning of the brain, either temporarily or permanently. Most cases of brain damage occur after birth and in such instances are referred to as *acquired brain injury*. That type of damage can be caused by an accident, an intentional blow, violent shaking of the head, stroke, alcohol and other drugs, brain surgery, infection (such as meningitis), brain inflammation (such as encephalitis) or a brain disease (such as Parkinson's disease) (Brain Injury Australia, 2017a).

Brain injury can have *sudden onset* when it occurs abruptly, often at a single point in time; for example, when caused by a blow to the head, infection, stroke or drug overdose. Alternatively, brain injury can have *insidious onset*, when it gradually develops over a period of time in an imperceptible way, showing few signs and symptoms; for example, due to prolonged use of alcohol or another substance, a tumour or a neurodegenerative disease.

A *neurodegenerative disease* is characterised by the progressive decline in the structure, activity and function of brain tissue. Parkinson's disease and Alzheimer's disease are both neurodegenerative diseases. Essentially, neurons within the brain ('neuro') gradually become damaged or deteriorate ('degenerate') and lose their function, hence the term 'neurodegenerative'.

Brain injury is common. It is estimated that about 1 in 45 Australians have a brain injury that impairs everyday life in some way. Three out every four of them are aged under 65. As many as two out of every three of these people acquired their brain injury before they turned 25. And three out of every four people with acquired brain injury are male (Australian Institute of Health and Welfare [AIHW], 2017; Brain Injury Australia, 2017a; Synapse, 2016).

The most common cause of acquired brain injury is stroke. A *stroke* occurs when a blood vessel bringing oxygen and nutrients to the brain bursts or is clogged by a blood clot. As a result, brain tissue is deprived of blood, causing the brain cells to die within minutes. This affects any mental process or behaviour controlled by those brain cells, such as thinking, speech and movement. The next largest cause of acquired brain injury is an accident or trauma, known as traumatic brain injury.

Figure 4.6 A stroke is the leading cause of acquired brain injury in Australia. The white area towards the centre of this CT scan shows brain damage caused by an aneurysm which is a common cause of stroke. It occurs when the wall of an artery swells to the point where it appears like a balloon. As an aneurysm grows, it becomes thinner and weaker and often will leak or burst, which releases blood into the brain.

Traumatic brain injury

Traumatic brain injury is a type of acquired brain injury caused by a blow to the head or by the head being forced to move rapidly forward or backward, usually with some loss of consciousness. There may be a momentary loss of consciousness (which, for example, can happen from a punch to the face) through to a long-term bout of unconsciousness or coma. Sometimes a traumatic brain injury results in very serious and often life-threatening problems.

Traumatic brain injury may be the result of a motor vehicle accident, fall, assault, sporting accident, gunshot wound or violent shaking. Traumatic brain injury is not the same as head injury, since a person can sustain damage to the face, scalp and skull without necessarily injuring their brain. When the head is struck hard, the brain slams against the inside of the skull. As a result of this blow or rapid movement, brain tissue may bleed, bruise, tear, twist or become swollen.

Some traumatic brain injuries are classified as mild, like *concussion*, which is most commonly acquired when playing contact sports such as AFL football and rugby. Problems in most cases tend to be short-lived and people return to normal functioning fairly quickly.

In some cases, however, people continue to experience problems that can last for weeks, months or even years. This is known as *post-concussion syndrome* and persistent symptoms often include headaches, dizziness, balance problems, fatigue, anxiety, depression, insomnia, light and sound sensitivity, and problems with attention, concentration and memory.

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Weblink
Mind Matters: A documentary on brain injury 55 m 19 s

Severity of brain injury

Mild
e.g. good recovery, limited concentration, able to return to work.

Moderate
e.g. improvement over time, difficulties with coordinating movements, inability to organise, may require different line of work.

Severe
e.g. decreased movement control, decreased ability to communicate, requires support with daily living, unable to return to work.

Very severe
e.g. unable to control movement, unable to communicate, requires 24-hour support, unable to return to work.

Figure 4.7 A brain injury can range from mild to very severe.

Source: Brain Injury Australia (2017). *Brain injury: What is brain injury?* Retrieved from http://www.braininjuryaustralia.org.au/brain-injury-2/

BOX 4.1 The Glasgow Coma Scale

A range of clinical tests can be performed to assess the severity of a traumatic brain injury. One test involves measuring the degree of decrease in observable responsiveness to external stimuli. The Glasgow Coma Scale is commonly used for this purpose. The test is simple and considered a reliable and objective way of recording the initial and subsequent level of consciousness in a person after a brain injury. It may be used by trained staff at the site of an injury like a car crash or sports ground, for example, and in a hospital's emergency department or intensive care unit (Institute of Neurological Sciences, 2017).

The *Glasgow Coma Scale* assesses three aspects of a brain injured person's responsiveness — eye opening, verbal responses and motor responses. The assessment criteria are shown in the chart opposite. In each category, the top item is the 'normal response' and no response (None) is the 'lowest response'.

For example, for eye opening, if the person's eyes open spontaneously in the presence of the assessor, then a score of 4 is assigned. If spontaneous eye opening is not demonstrated, a verbal stimulus is used. The assessor introduces themself with speech and requests eye opening. If the person opens their eyes, then a score of 3 is assigned. The assessor then determines verbal and motor responses. The scores for each category are then added, yielding a total score between 3 (a person showing no response) and 15 (a person who is alert and well-oriented). A total score of 8 or less is classified as 'severe severity'. A person given this score may be in a coma.

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Conducting a Glasgow Coma Scale assessment

Glasgow Coma Scale

CRITERIA	POINTS	
EYE OPENING	Spontaneously	4
	To sound	3
	To pressure	2
	None	1
VERBAL RESPONSE	Oriented	5
	Confused	4
	Words	3
	Sounds	2
	None	1
MOTOR RESPONSE	Obeys commands	6
	Localising	5
	Normal flexion	4
	Abnormal flexion	3
	Extension	2
	None	1

A total score of **13 to 15** is classed as mild severity.
A total score of **9 to 12** is classed as moderate severity.
A total score of **3 to 8** is classed as severe severity.

Impact of injury to the cerebral cortex

Brain injury to the cerebral cortex has different effects on different people, both in the short term and long term. When the cerebral cortex is damaged, some other part of ourselves will also be affected. Even a mild injury can result in a serious disability that will interfere with a person's daily functioning and personal activities, often for the rest of their life. The extent of some of these changes may only become apparent as time progresses (Brain Injury Australia, 2015).

In this section, we examine research findings on individuals with an injury to particular areas of their cerebral cortex, how this affects their everyday experience and what their injury has revealed about cerebral cortex functions. We start with one of the earliest and best-known cases of an injury to the cerebral cortex in the frontal lobes. Then we consider a spatial disorder associated with damage to a specific area of cortex in the temporal lobe.

Biological, psychological and social changes due to frontal lobe injury

Phineas Gage, a construction foreman working on a new railway line in the US state of Vermont, was only 25 years old when he suffered a massive head injury that seriously injured his frontal lobes. Gage was supervising a crew of workmen in September 1848. To remove a large rock in the way of the track, Gage poured gunpowder into a deep, narrow hole drilled into the rock. The gunpowder was packed in tightly with an iron rod before a fuse was lit to ignite it. The rod was more than a metre long, 3.5 centimetres in diameter and weighed 6 kilograms.

As Gage was packing down the gunpowder, a spark from the rod ignited the gunpowder and blew the rod into his cheek and out through the top of his skull. After going through his skull, the rod is said to have landed somewhere between 20 and 50 metres away, depending on which report is read. Gage was pushed backwards and fell to the ground. His body began to shake uncontrollably, but he was still alive. Within minutes of the accident he is reported as sitting up and talking to people near him (Blakemore, 1977). The doctor attending him was able to stop the bleeding, and cleaned out loose bits of brain tissue and bone before dressing the wound.

There was no immediate indication that Gage's mental or physical abilities had been affected by the accident, despite injury to both his frontal lobes, including the prefrontal cortex. However, the once friendly, considerate and quietly spoken Phineas Gage is reported to have become impatient, crudely spoken, aggressive, irresponsible and hard to get along with. His friends and acquaintances said that he had changed so much he was no longer the person they

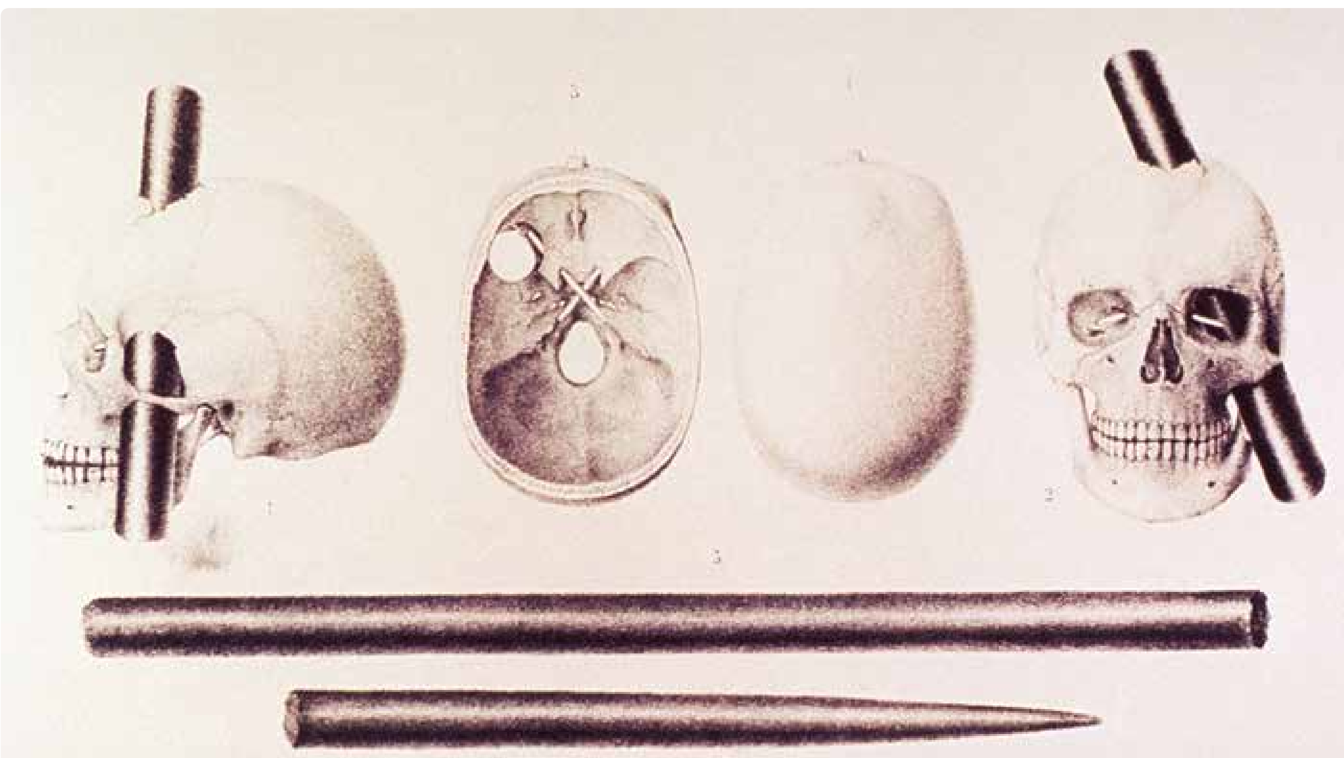

Figure 4.8 Phineas Gage's skull and the iron rod that penetrated his frontal lobes, especially the prefrontal cortex

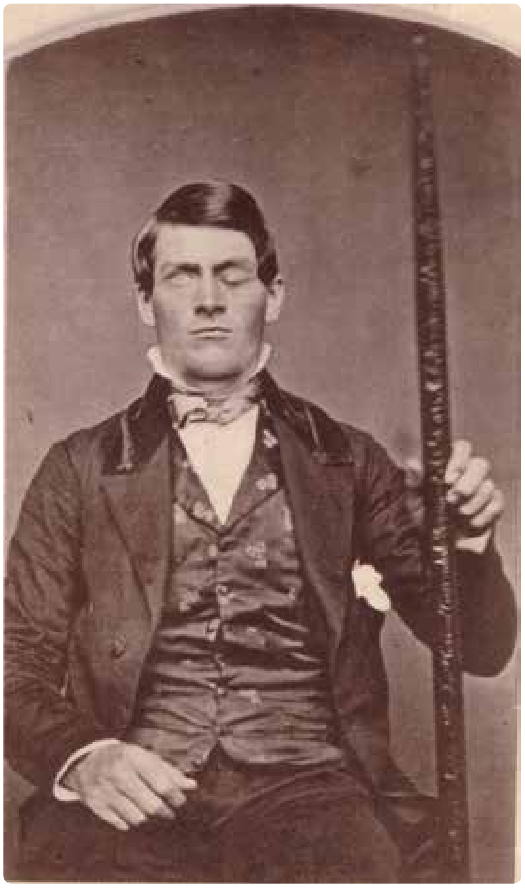

Figure 4.9 Phineas Gage (1823–1860) holding the iron rod that injured his frontal lobes

had known. Twelve years later, at the age of 36 or 37, Phineas Gage died (Macmillan, 2017).

Gage's doctor, John Harlow (1848), wrote a detailed account of the accident as well as of Gage's condition and symptoms. Years later, when he learned of Gage's death, he petitioned Gage's family to exhume the body and allow him to keep Gage's skull and the rod as a 'medical record'. These are on display in a museum at Harvard University in America.

Nearly 150 years later, American psychologist Hanna Damasio and her colleagues (1994) examined the metal rod and damage to Gage's skull. Using skull measurements and computer imaging techniques, they reconstructed the pathway of the rod to more accurately pinpoint the brain injury (see Figure 4.10 on the next page). Then, they searched for case studies of patients with a known injury in the same area of cortex as Gage's injury. They examined these isolated case study reports and found that Gage's symptoms were consistent with those reported by other patients.

Common among patients with an injury to the forward part of the frontal lobes (in the prefrontal cortex) is an unusual collection of biological, psychological and social changes.

Biological changes

Biological changes are primarily physical in nature. Patients with a severe injury to the prefrontal cortex often have a range of problems with motor activities. In particular, their overall level of motor activity and ordinary voluntary, spontaneous movements are markedly reduced. For example, facial expressions tend to become blank and head and eye movements are minimal. Some reflexes that are evident only during early infancy, such as the grasping reflex of the hand, may also reappear.

Psychological changes

Psychological changes primarily involve emotion, personality and cognition, which in turn impact on behaviour.

Emotional changes often include a persistent apathy (lack of concern about anything) and lack of emotional responsiveness, including lack of concern for the past or present. However, the patients experience episodes in which this apathy is dramatically broken by bouts of euphoria (extreme excitement), impulsive behaviour, disregard for social conventions, verbal and physical aggressiveness, boastfulness, silliness and, sometimes, unrestrained sexual activity. Collectively, these types of changes are often perceived by others as changes in the individual's personality. A reduced responsiveness to pain is also commonly reported.

In relation to cognitive abilities, general intelligence — as measured by IQ scores — shows only slight changes. However, creative thinking and problem solving tend to be affected, and forgetfulness is shown in many tasks requiring continual attention. Some researchers believe that the apparently insignificant effect of frontal lobe damage on measured intelligence may be explained by limitations of traditional intelligence tests; for example, they tend to measure 'convergent thinking' rather than 'divergent thinking'. Convergent thinking is used when looking for a single correct answer and, unlike divergent thinking, does not require a significant amount of creativity (Centre for Neuro Skills, 2017).

Many case study reports of patients with a severe frontal lobe injury involving the prefrontal cortex have also emphasised problems with goal-directed behaviour, especially an inability to plan activities and use foresight. Daily activities of these patients seem disorganised and without a clear direction of where these activities are leading or why they are being undertaken. For example, a patient given a simple set of errands may be unable to complete them (if able to do any at all) without numerous false starts, backtracking and confusion (Breedlove, Watson & Rosenzweig, 2010).

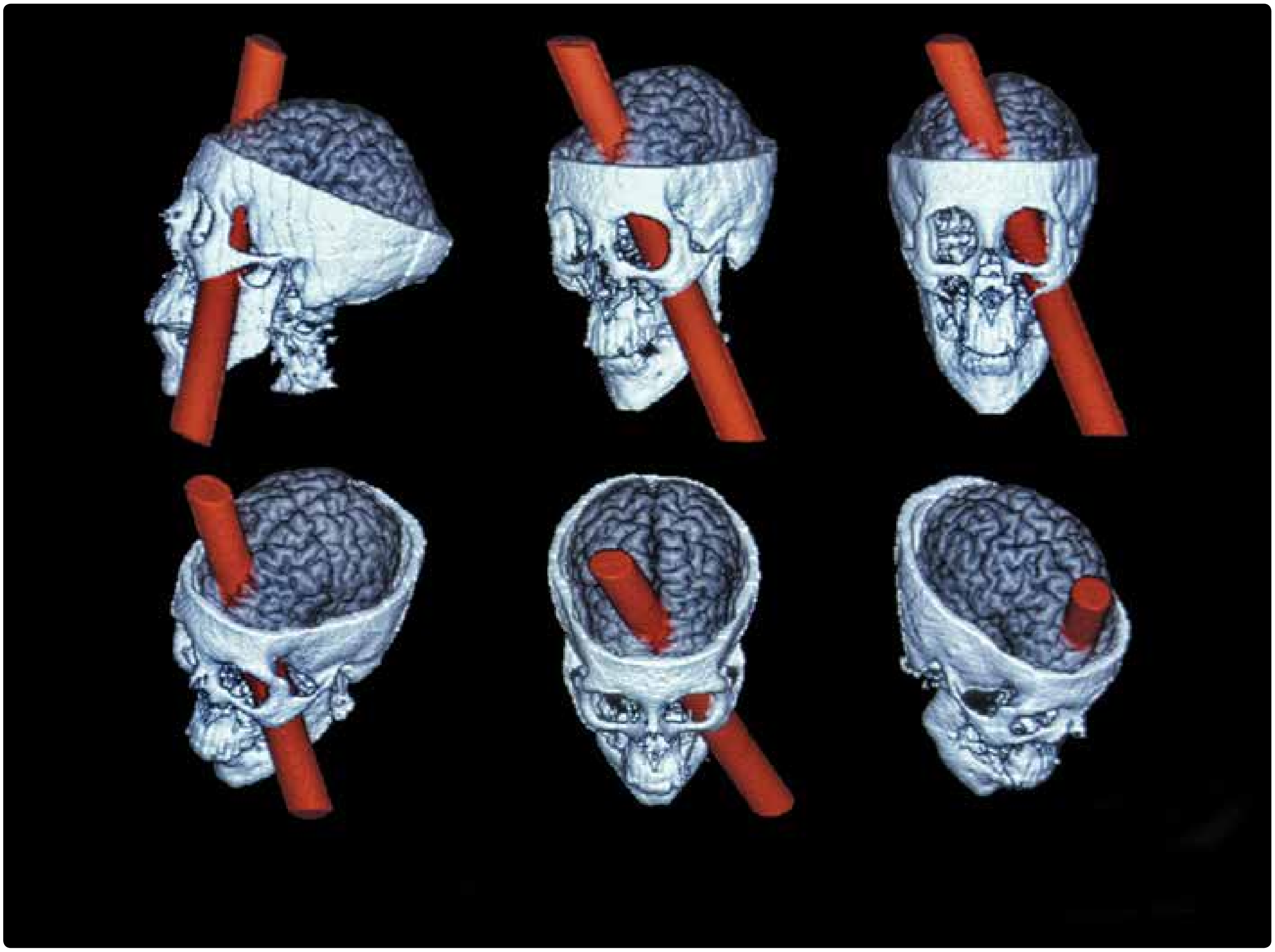

Figure 4.10 This computer reconstruction, based on measurements of Phineas Gage's skull, shows from several different perspectives the brain areas that are most likely to have been injured in his accident. The red cylinder shows the path of the iron rod, which entered the skull below the left eye and exited through the top of the head, severely injuring both frontal lobes, especially prefrontal cortex areas.

Social changes

Biological and psychological changes associated with frontal lobe injury, particularly personality changes and onset of socially inappropriate behaviour, can be difficult for partners, family members, friends, work colleagues and others in the individual's social network. This can lead to a breakdown in personal relationships and loss of social support. In addition, the individual may experience difficulty establishing new social relationships.

According to Brain Injury Australia (2017b), injury to the cerebral cortex puts the individual at an increased risk for unemployment, lack of affordable housing, homelessness and social isolation.

In addition, individuals with this type of brain damage are significantly overrepresented in the criminal justice system. One Australian study has found that over 40% of prisoners have an acquired brain injury. In addition, compared to the general population, people with a brain injury have higher rates of contact with police, more court appearances and more convictions, longer periods of detention or imprisonment, and are more likely to be victims of crime. However, their offences tend to be relatively minor (e.g. 40% of offences involve theft or road traffic infringements) and are committed under the influence of alcohol (Brown & Kelly, 2012; Centre for Neuro Skills, 2017).

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Weblinks

- Mini documentary on Gage and frontal lobe damage 5 m 41 s
- Authoritative site on Gage
- ABC *Catalyst* case study of a patient with frontal lobe injury 9 m 2 s

BOX 4.2 Lobotomy: injuring the frontal lobe to treat mental disorders

In the late 1930s Portuguese neurologist Egaz Moniz devised the *lobotomy*, a surgical procedure that severed nerve fibres to cut off the foremost portion of the frontal lobes from the rest of the brain. The operation was initially used to treat people diagnosed with a mental disorder, especially patients who could not control their emotions. Moniz received the Nobel Prize in Physiology or Medicine in 1949 for his advancement of the lobotomy.

In America, many doctors embraced the lobotomy and performed it on tens of thousands of men and women with mental disorders such as schizophrenia, major depression and obsessive–compulsive disorder.

Often called a prefrontal or transorbital lobotomy, it was a crude but simple operation, sometimes performed in a doctor's office using a local anaesthetic, with an ice pick inserted into the brain via an area under the patient's upper eyelid. The ice pick was then moved around until the connecting neural tissue was severed, in part or whole, depending on the diagnosis of the patient's disorder. The entire procedure took 3–4 minutes.

The operation generally had the effect of decreasing the patients' emotional responsiveness. Many became emotionally docile, remaining extremely and consistently calm even when in frustrating circumstances. As a result, the patients were much easier to manage in psychiatric hospitals. But it also left them disconnected from their social surroundings and had adverse effects on cognitive functions.

The prefrontal cortex is not only involved in regulating emotional responses, but also in the execution of many higher order mental abilities. Consequently, the lobotomy left most patients unable to plan and organise their lives effectively as well as other problems associated with thinking. This eventually raised concerns about the lobotomy, although it continued to be practised until the mid 1950s, when new medications were developed to treat mental disorders.

Figure 4.11 American neurosurgeon Walter Freeman demonstrates how to perform a lobotomy to mental health professionals in 1949. Freeman is shown hammering an ice pick under the patient's upper eyelid and into their frontal lobe.

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Weblinks

- Transorbital Lobotomy by Walter Freeman (graphic) 10 m 58 s
- A brief history of the practice of lobotomy regarding Dr. Walter Freeman 5 m 10 s

Spatial neglect due to parietal lobe injury

A patient in a rehabilitation facility wakes in the morning and proceeds to shave his face. When he puts the shaver down to go to breakfast, it is apparent that he shaved only the right side of his face. While eating breakfast, the patient starts to look for his coffee cup until someone points out that it is just slightly to the left of his dish. At lunch or dinner, he may leave the food on the left half of his plate untouched while asking for more, only to be reminded that there is still food on the plate. If asked to read compound words such as *football* or *birthday*, he will read *ball* and *day*, overlooking the first half of the word. If questioned, he states that he read the words correctly. If asked to draw a clock, he will draw a circle correctly but then crowd all the numbers into the right half. If asked to draw a person, he will draw only the right side of the body, leaving out the left arm and leg. If questioned, he states that the drawings look alright to him (Springer & Deutsch, 1998).

This unusual behaviour is associated with brain injury resulting in a disorder called spatial neglect which causes problems with attention. Generally, **spatial neglect**, also called *hemispatial neglect* and *visual neglect*, is a neurological disorder whereby individuals are unable to notice anything either on their left or right side even though there may be no sensory loss. They tend to behave as if that one side of their world does not exist.

Pen-and-paper tasks are commonly used as part of the behavioural assessment of spatial neglect. These may include drawing objects and cancellation tasks (as shown in Figure 4.12) and copying drawings (as shown in Figure 4.13). Cancellation tasks tend to be the most sensitive of the behavioural tests. These require patients to find targets (sometimes embedded amongst distractors) on a centrally placed sheet of paper.

Spatial neglect is most commonly observed in stroke or accident victims who have fairly extensive injury to the cerebral cortex in the rear area of the parietal lobe of the right hemisphere. Consequently, these patients mostly neglect the left side of their world. Spatial neglect of the right side sometimes occurs after similar damage to the left hemisphere (or in subcortical areas), but much less frequently and in a milder form. In either case, the side of the world opposite to the damaged hemisphere tends to be neglected, rather than the same side (Kolb & Whishaw, 2014; Li & Malhotra, 2015; Parton, Malhotra & Husain, 2004).

Spatial neglect is a complex disorder with many different types and subtypes. Although neglect is mostly experienced with the visual sense, it may occur for other senses, such as hearing or touch, or with movement. Furthermore, it may be isolated to one or a combination of these senses. When tested, some patients acknowledge the presence of something on the neglected side and mistakenly report its presence as if it appeared on the non-neglected side.

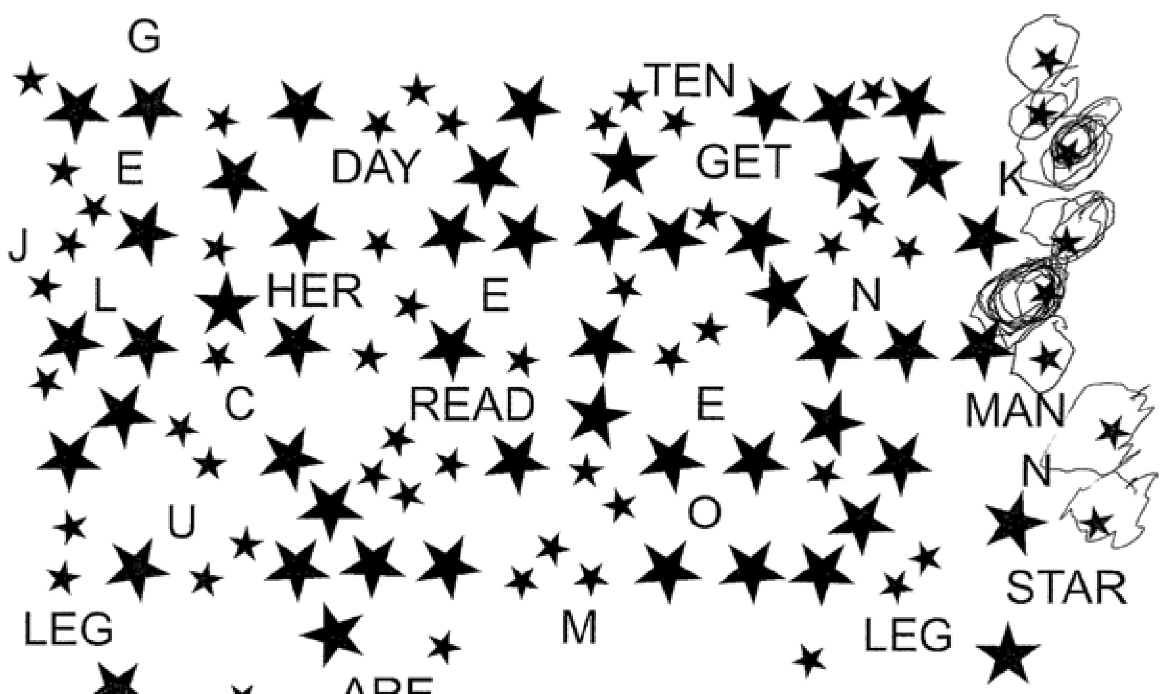

Figure 4.12 A star cancellation task from a behavioural test for spatial neglect. The stimulus is positioned centrally and the patient is asked to find and mark all the small stars without marking the large stars or letters. This patient was only able to locate the small stars at the far right of the stimulus despite having unlimited time to complete the task.

Source: Li, K., & Malhotra, P.A. (2015). Spatial neglect. *Practical Neurology, 15*, 333–339.

Thus, for example, a patient may be given an auditory stimulation on their left neglected side and claim that the sound came from the right. Or, in the case of neglect involving movement, the patient may be asked to raise their left hand and, if they respond at all, they may raise their right hand.

The extent of neglect among different individuals varies and depends on the severity and specific location of their brain injury. It may range from indifference towards objects on one side to denial of the very existence of that side of the body. For example, one patient called a nurse in the middle of the night to ask her to help him throw his own left leg out of bed, thinking that 'the alien leg' had been put there as a cruel joke by other patients. Less severely affected individuals may simply ignore things in their left or right visual field and not necessarily all parts of their body on that side (Li & Malhotra, 2015; Parton, Malhotra & Husain, 2004; Stirling, 2002).

The higher incidence of spatial neglect when there is injury to the right rather than left parietal lobe demonstrates the importance of the cerebral cortex in the right parietal lobe in attention and in conscious awareness of objects and the self. Like many other mental processes, however, other brain areas are also involved in attention and consciousness. Interestingly, many individuals with spatial neglect insist that there is nothing wrong with how they perceive and act in the world.

Some people with spatial neglect make a gradual recovery from the disorder. Most make some degree of spontaneous recovery but tend to have significant cognitive impairments, particularly relating to attention, treatments tend to be unlikely to be successful unless they are tailored to the underlying cognitive impairments in individual patients (Li & Malhotra, 2015).

Psychologists are unclear about why it occurs following damage to the parietal lobe. Nor is there any widely accepted explanation of the disorder.

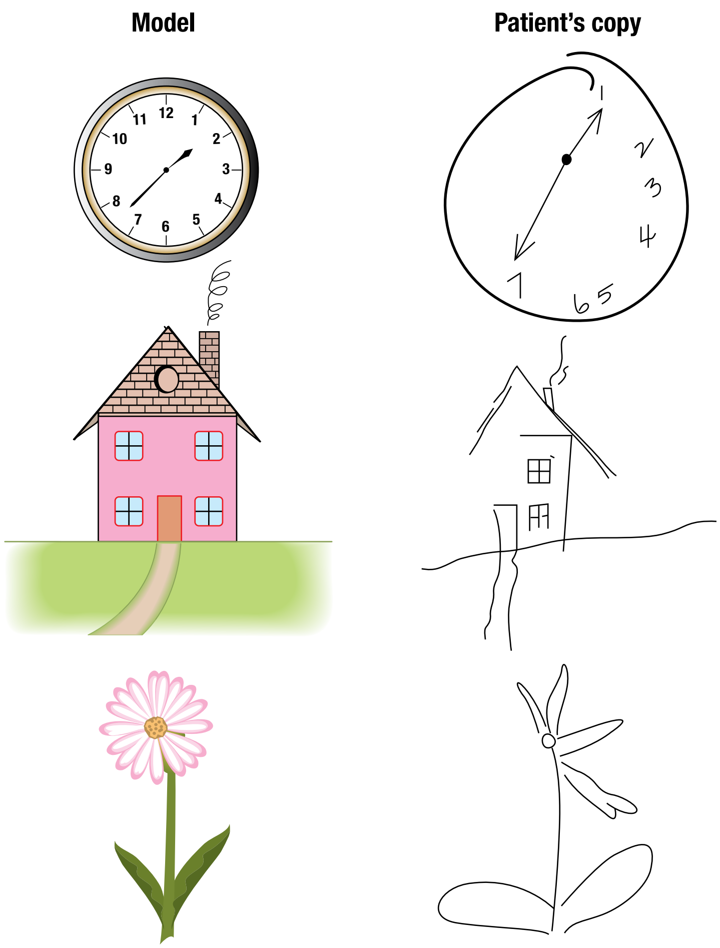

Figure 4.13 Drawings of common symmetrical objects by an individual with spatial neglect. Note that the left side of each object has been ignored.

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Weblinks

- Video on spatial neglect featuring a neurologist and two patients 5 m 48 s
- Video on a therapy session for spatial neglect 4 m 31 s

BOX 4.3 Oliver Sacks' case studies of patients with cerebral cortex injuries

British neurologist Oliver Sacks (1933–2015) reported many case studies that describe the effects of injury to the cerebral cortex in his books that included *The Man Who Mistook His Wife for a Hat* (1985) and *Seeing Voices* (1990). There have also been movies based on some of his books.

In one case study, Sacks (1990) described the experiences of a patient whose brain injury involved an association area in the occipital lobe. The man could still see the basic features of objects, such as colour, edges and movement. He was also able to recognise basic geometric shapes.

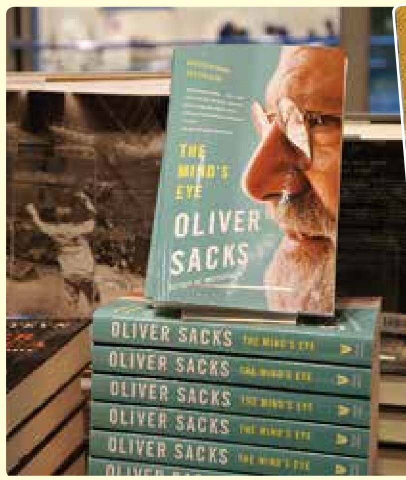
When Sacks showed the man a rose and asked him to identify it, the man responded: 'About six inches in length. A convoluted red form with a linear green attachment. It lacks the simple symmetry of the Platonic solids, although it may have a higher symmetry of its own . . . ' After some time spent continuing to reason about its parts, the man finally guessed that it might be some sort of flower.

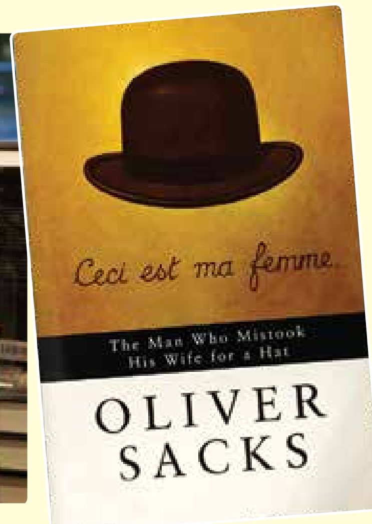
Sacks then held the rose under the patient's nose and asked him to smell it. 'Beautiful!' the man exclaimed. 'An early rose. What a heavenly smell!' The man could easily identify the rose by smell but not by sight, even though he could see every feature and describe most of them in considerable detail.

According to Sacks, the man was unable to integrate the information because of damage to an association area that would have helped him make the connection between the visual and olfactory (smell) parts of the relevant information stored in his memory.

In another case study, Sacks (1985) described the case of 'Christina' who had lost the ability to feel the position of her own body. She reported feeling disembodied, like a ghost. For example, on one occasion when she was a patient in a hospital, she became annoyed at a visitor whom she thought was tapping her fingers on a tabletop. But it was actually Christina, not the visitor who was doing it. It was as if her hands were acting on their own and her body was doing things of which she was unaware.

Sacks diagnosed Christina as having lost all her sensory feedback about joints, muscles and positions of her limbs. For unknown reasons, the sensory neurons that would normally carry this information to the primary somatosensory cortex in the parietal lobe were malfunctioning. This case study provided important insights into *kinesthesia*, the sense of knowing where our body parts are in space.





LEARNING ACTIVITY 4.3

Review questions

1. (a) Explain the meaning of acquired brain injury with reference to an example.
   (b) Distinguish between brain injuries with sudden or insidious onset with reference to two examples of each type.
   (c) Explain why boxing is a dangerous sport, especially professional boxing for which protective headwear is not required during bouts.
   (d) Distinguish between meningitis and encephalitis.
2. (a) Explain whether Phineas Gage experienced a traumatic brain injury.
   (b) Which area of Gage's brain was injured?
   (c) What did his injury indicate about the role of this brain area in mental processes and behaviour?
   (d) How accurately and completely do Gage's symptoms represent symptoms of most people who damage the same brain area?
3. (a) Injury to which area of the cerebral cortex is most commonly associated with spatial neglect?
   (b) Explain what spatial neglect is with reference to examples of mental processes and behaviour associated with the disorder.
   (c) Give an example of a visual scene that may be reported by an individual with spatial neglect while watching a sports event. Your example should identify the location of the brain injury, the event and the position from where the scene is viewed.
   (d) Suggest an example of a biological, a psychological and a social change that could occur together with spatial neglect. Explain your choice of examples.

LEARNING ACTIVITY 4.4

Data analysis on recovery from spatial neglect

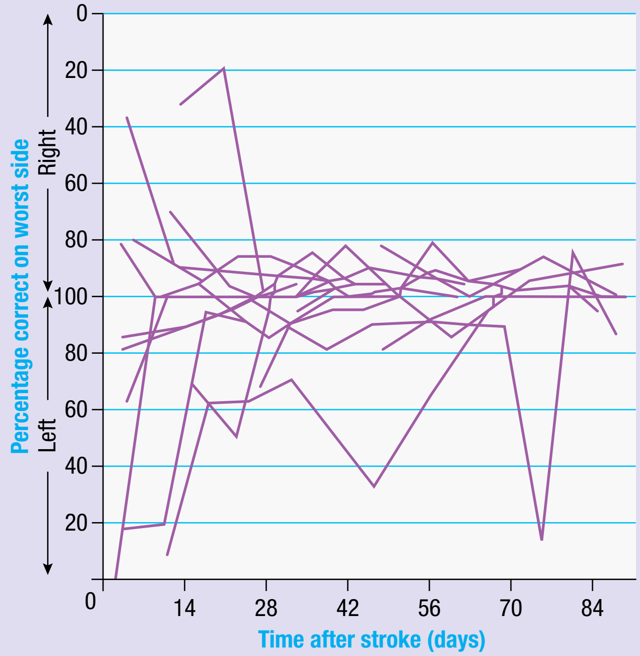
Spatial neglect is quite common among patients with brain damage caused by a stroke. One of the earliest studies on recovery from right or left neglect induced by a stroke was conducted by British neurologist Derick Wade and his colleagues (1988). Patients admitted to hospital and surviving for 6 months were regularly tested on three cognitive tasks to measure their recovery.

One of the tasks required each patient to cross out all '1's and '4's presented in different strings of numbers (i.e. a cancellation task). Examples of strings of numbers used in the study are:

$983_{4}7_{1}0356350_{41}$	$758_{4}390238756_{41}$
$3829_{1}7_{4}65960758$	$537260_{1}987_{4}8285$
${}_{4}7382059385837_{1}$	$38_{4}958_{1}9_{4}62_{1}578$

The results for 15 patients are plotted in the graph on the right. Of the 15 patients, nine had left visual neglect and six had right neglect.

1. What do the X and Y axes of the graph describe?
2. How many patients showed recovery from spatial neglect?
3. Explain, with reference to the data, whether there was a difference in rate of recovery by each patient.
4. (a) After how many days did one of the patients experience a sudden and dramatic relapse from recovery?
   (b) Suggest a possible reason for the relapse.
5. Write an overall conclusion about recovery from spatial neglect based on the data.



Source: Wade, D.T., Wood, V.A., & Hewer, R.L. (1988). Recovery of cognitive function soon after stroke: a study of visual neglect, attention span and verbal recall. *Journal of Neurology, Neurosurgery, and Psychiatry*, *51*(1), 10–13.

LEARNING ACTIVITY 4.5

Analysis of research on brain function

A psychologist wanted to test research findings that specific areas of the primary motor cortex in the left and right frontal lobes are involved in specific voluntary motor movements on opposite sides of the body.

She tested her hypothesis through an experiment conducted as part of a case study involving one male research participant. The participant was suffering from severe, unpredictable epileptic seizures and had been referred to the psychologist by the participant's doctor, as the psychologist had expertise in diagnosing the source of epileptic seizures.

Taking advantage of the opportunity to test her hypothesis, the psychologist obtained permission from the participant to study voluntary motor movements during brain scanning that had been organised to locate the source of the epileptic seizures. Approval for the experiment was also obtained from an ethics committee.

Working as a member of a team that included a qualified radiologist and neurosurgeon, she asked the participant to raise his right foot when a yellow light was flashed in the scanning chamber and to raise his left foot when a blue light was flashed. There were five trials involving each foot, but the different coloured lights were flashed randomly.

She found that a specific area of primary motor cortex in the left frontal lobe was active whenever a voluntary movement of the right foot was made and a corresponding area of cortex in the right frontal lobe was active whenever a voluntary movement of the left foot was made. These results supported the hypothesis and were consistent with those of similar studies previously conducted by other researchers.

1. Formulate a research hypothesis for this experiment.
2. What is the operationalised independent variable?
3. What is the operationalised dependent variable?
4. Explain why the psychologist flashed the lights randomly.
5. Suggest a limitation of this study.
6. Has the psychologist breached any ethical standards? Explain your answer.
7. Explain the meaning of participant confidentiality, voluntary participation and informed consent in relation to this experiment.

LEARNING ACTIVITY 4.6

Reflection

Brain injury often affects a person's behaviour and the thinking that underlies their actions. Sometimes they do things they may not otherwise do.

Comment on whether someone who has a brain injury should be held responsible for their actions.

Brain plasticity

Throughout our lives our brains constantly change. This reflects the brain's plasticity. **Plasticity** (also called *neural plasticity* and *neuroplasticity*) is the ability of the brain to change in response to experience.

Change occurs primarily at the synapse and therefore at the microscopic level. Individual neurons and their connections can be modified for different reasons — during its development when we are young, during learning throughout our entire lives and sometimes in response to brain injury.

The brain as a whole does not change its shape. New neural pathways can form and link up with existing pathways and existing pathways may interconnect with other pathways. These types of changes involve neurons as well as glial cells. Their activities result in changes to the brain's physical structure and function. For example, the brain can reorganise and reassign its neural connections and pathways based on which parts of it are overused, underused or injured. Its structure is constantly remodelled by everyday life experience and environmental demands as it adapts to meet our needs.

Lifelong plasticity accounts for many of the learning experiences we have throughout life, such as learning our native ('first') language as a child, learning to play a musical instrument as an adolescent, learning to text message as an adult, learning to use a computer in old age, and so on. Our genes govern the overall architecture of our brain, but experience guides, sustains and maintains the details.

Plasticity is a characteristic of probably all animal brains but the larger brains of mammals have more capacity for change. For example, if a monkey is trained to push a lever with a finger several thousand times a day, the brain tissue that controls the finger changes to reflect the experience. More motor cortex neurons are active in the same area than were active before the training (Breedlove, Watson & Rosenzweig 2010).

Human brains function in a similar way. Whether learning to use a keyboard or a skateboard, we perform with increasing skill as our brain incorporates the learning within its structure. The neural activity underlying this process occurs in a systematic way and not haphazardly.

Although some areas of the brain such as the sensory and motor cortices have a higher level of plasticity than others, it is unclear as to whether all brain areas have plasticity. However, the brain of a developing individual is even more plastic than that of an adult, particularly at specific times in development when it seems that the brain is more responsive to certain types of experiences. This is one reason why infants tend to learn a new language more quickly than do adults. Similarly, infants recover more quickly from brain injury than do adults due to the greater plasticity of their brain (Breedlove, Watson & Rosenzweig, 2010; Myers, 2007; Sweatt, 2016).

Figure 4.14 The brain of a developing individual tends to have greater plasticity than that of an adult.

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Weblink
Video outlining brain plasticity 4 m 8 s

eGuide*plus*

Weblink
TED talk on brain plasticity by an eminent neuroscientist 23 m 3 s

Adaptive plasticity

The term adaptive plasticity is commonly used in relation to brain injury. **Adaptive plasticity** refers to the ability of the brain to compensate for lost function and/or to maximise remaining functions in the event of brain injury. For example, in the months following a brain injury, an individual may show very noticeable improvements that occur naturally with little or no intervention. These are associated with what is believed to be a period of physiological stabilisation of the injured area. Language recovery by adults after a stroke can be relatively extensive, but the full extent of the recovery may not be evident for 1 or 2 years. Recovery from traumatic brain injury by children in particular can be remarkable. However, there are also cases among children and adults where any measurable recovery does not occur.

How the brain changes in response to injury, and the effectiveness of its response, depends on the location, degree and extent of the damage, and the age at which the injury is sustained. For example, a brain injury may be due to a neurodegenerative disorder or involve a malignant, rapidly spreading tumour that is unstoppable, let alone recoverable. Similarly, some parts of the brain are unable to recover from injury, especially hindbrain or brain stem structures. And some injuries to these areas are so severe that the patient may remain on life support in a coma indefinitely.

Adaptive plasticity is typically quicker and more substantial in the earlier years, particularly in infancy and early childhood. As we grow older the brain gradually loses the ability to compensate for damage, but not necessarily altogether.

Generally, adaptive plasticity enables the brain to compensate by reorganising its structure — its neural connections. Reorganisation can occur immediately or continue for years and may involve a number of different processes.

Mechanisms underlying recovery

At the neuronal level, two important processes for recovery are rerouting and sprouting. In **rerouting**, an undamaged neuron that has lost a connection with an active neuron may seek a new active neuron and connect with it instead. **Sprouting** is the growth of additional branches on axons or dendrites to enable new connections. When sprouting occurs from a damaged neuron, the new growth projects to an area that has been 'deactivated' by damage to other neurons. Thus, sprouting involves rerouting as well.

(a) (b) (c)

Figure 4.15 Figure (a) shows a damaged neuron before sprouting. Progressive sprouting is shown in (b) and (c).

Sprouting and rerouting enable the formation of entirely new neural connections to compensate for loss of function due to brain injury. This essentially means that the brain's adaptive plasticity enables it to take over or shift functions from damaged to undamaged areas. Such plasticity can occur at all levels of the central nervous system, from the cerebral cortex down to the spinal cord.

In order for neurons to reconnect or form new connections, they need to be stimulated through activity. Relevant types of experience during recovery from brain injury are therefore important influences on the speed of recovery. For example, depending on the location and degree of brain damage, stroke or accident victims often need to 'relearn' tasks they previously performed routinely such as reaching, walking, speaking or reading. The younger the individual, the greater the likelihood of successful 'relearning' and subsequent new learning.

Recovered functions

Through adaptive plasticity, functions that were assigned to certain areas of the brain can sometimes be reassigned to other undamaged areas of the brain to compensate for changing input from the environment. For example, an extraordinary amount of stimulation of one finger can result in that finger 'taking over' a part of the somatosensory cortex that usually represents other adjacent fingers. If you lost your middle finger in an accident, the area of the somatosensory cortex that represents that finger will initially be unresponsive because there is no longer any sensory input received from the location of the missing finger. You might expect the 'left middle finger neurons' of the somatosensory cortex to degenerate and eventually disappear. Instead, over time, that area of the somatosensory cortex will begin to receive input from the adjacent fingers and become responsive to stimulation of these fingers.

This has been demonstrated experimentally in studies in which researchers have surgically destroyed areas of the somatosensory cortex of monkeys. The results of such studies typically show that the somatosensory cortical 'map' representing the destroyed areas gradually shifts to undamaged adjacent areas of the parietal lobes, restoring the ability to experience bodily sensations (Thompson, 2000).

A dramatic example of the brain's reassignment of functions to other areas is evident when a function is taken over by the opposite cerebral hemisphere if injury destroys the part of the hemisphere where the function is primarily located. Recovery from other types of extensive brain injury by adults through adaptive plasticity can also be quite dramatic. Some patients with a paralysed hand or arm, for example, can recover its use within a few months.

The case of a 25-year-old female who was an accomplished pianist highlights this fact. She had a stroke that damaged left hemisphere areas of her brain and was unable to speak and lost complete use of her right hand. It was a devastating loss at a young age, and her inability to play the piano only added to her distress. The woman was placed in a rehabilitation program that involved repeated attempts to engage the right side of her body, including speech therapy and piano playing. After several months of rehabilitation, she regained nearly full use of her right hand, and she was again able to speak. She also demonstrated exceptionally rapid finger movements in both hands, displaying speed and coordination beyond those of the average (non-stroke-affected) person. Today she has resumed her piano playing and has fully recovered her abilities to the virtuoso levels attained before the stroke (Azari & Seitz, 2009).

Figure 4.16 Neuroplasticity enabled a stroke patient to fully recover her exceptional motor skills used as a concert pianist. Rehabilitation was an important part of her recovery.

An even more dramatic example of the brain's plasticity involves recovery of language following loss of a hemisphere. A 5-year-old boy had almost all the cerebral cortex of the left hemisphere surgically removed to treat his uncontrollable and life-threatening epileptic seizures. The boy had been experiencing as many as 10 to 12 seizures a day since he was 3. The results of various tests conducted before the radical surgery led to a psychological diagnosis that 'following onset and continuation of seizures, speech and learning steadily regressed and the patient was classified as retarded'. At first, the boy's language abilities worsened, but then improved rapidly.

Long-term follow-up tests over the next 21 years revealed above average language abilities and intelligence. It appeared that loss of most of the left hemisphere during early childhood had not impaired language development. The patient had gone on to complete a university degree and was assessed as also having an excellent memory and highly developed motor and spatial skills.

Whereas surgical removal of the left hemisphere of an adult's brain usually results in severe impairment of language, affecting both speech and writing, surgical removal of the left hemisphere during early childhood does not necessarily have permanent consequences for cognitive and behavioural functions (Breedlove, Watson & Rosenzweig, 2010; Devlin et al., 2003; Smith, Walker & Myers, 1988).

Figure 4.17 Young children with a surgically removed left hemisphere have been observed to gradually recover lost language abilities through neuroplasticity.

eBook*plus*

Weblink
Video on plasticity following childhood hemispherectomy 5 m 54 s

Adaptive plasticity does not only occur to compensate for damage. It can also occur as a consequence of everyday experience. For example, neuroimaging studies using PET and MRI show that in musicians who play string instruments, the area of the somatosensory cortex that represents the fingers of the left hand (the hand requiring greater motor learning for fine finger control) is larger than the area that represents the right hand (which is used to manipulate the bow), and larger than the left hand area in nonmusicians. Similarly, concert pianists have larger than usual cortical areas for finger control and professional quilters have highly developed areas for the thumb and forefinger, which are critical to their craft (Nelson, 1999).

There is also evidence that other brain areas can increase in size through extensive use. For example, to become a taxi driver in London, individuals have to go through a comprehensive training course (averaging about 34 months) and then pass a strict test of their ability to find the shortest route between any two locations. As a result of this type of training and assessment, London taxi drivers have become renowned for their ability to efficiently navigate their way throughout one of the most complex and largest metropolitan areas in the world without using a street directory (or GPS).

When MRI scans of London taxi drivers (who find new routes daily) are compared with London bus drivers (who follow a limited number of set routes daily), they show that the rear part of the hippocampus of taxi drivers, which is involved in spatial navigation (and memory formation), is significantly larger. And, the more years an individual has driven a taxi, the larger the hippocampal area, and vice versa (Maguire et al., 2000; Maguire et al., 2003).

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Weblink
How the brain can change — Norman Doidge and Australian researchers 44 m 49 s

BOX 4.4 Rehabilitation with constraint-induced movement therapy

Although there is often some spontaneous recovery from an acquired brain injury when the injury 'settles' with the passing of time, participation in a rehabilitation program is an important part of the recovery process, especially in moderate and severe cases.

One treatment that has been found to help stroke patients regain considerable use of a limb forces them to constantly use the limb. *Constraint-induced movement therapy* requires patients to use, for example, an affected arm, by immobilising the good arm for up to 90% of the time they are awake. In addition, the patient is required to practise moving the affected limb repeatedly for up to six hours a day.

In one study, 13 patients aged between 33 to 73 years regained as much as 75% of normal use of the paralysed arm within 12 days. There was also evidence of 'rewiring' (remapping) of the motor cortex. The researchers called this 'treatment-induced plastic changes in the human brain'. In follow-up examinations up to 6 months after treatment, arm movement remained at a high level, and the size of the relevant motor cortex areas in the two hemispheres had become almost identical, 'representing a return toward a normal condition' (Liepert et al., 2000).

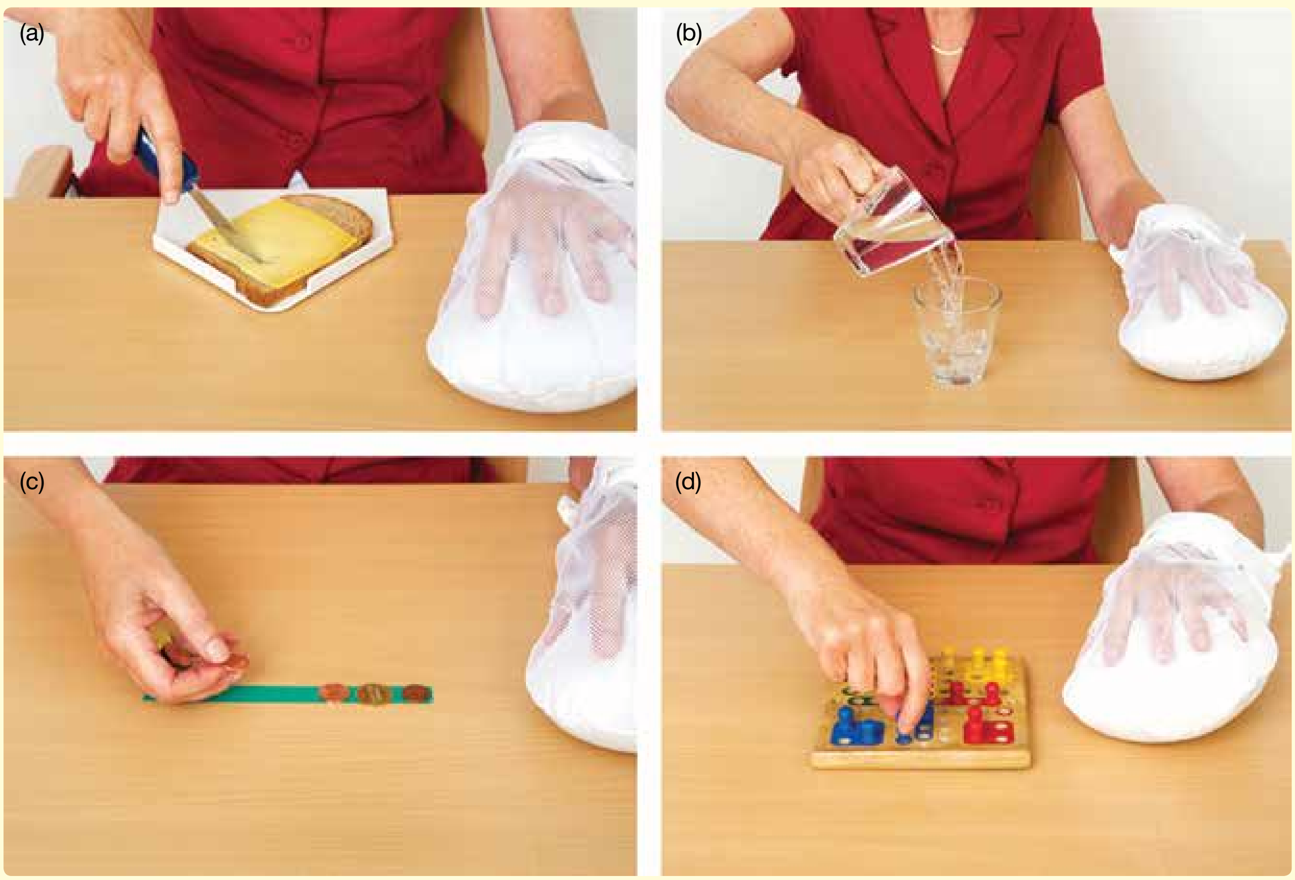

Figure 4.18 Constraint-induced movement therapy involves immobilising a non-affected limb to force usage of the affected limb.

BOX 4.5 Phantom limb syndrome

Most people who have had a limb amputated continue to experience sensations from where their missing limb was originally located. This is called *phantom limb syndrome*. The missing limb feels as if it still exists and some even report feeling a persistent itch, extreme discomfort or chronic pain where it was located. Phantom limbs may also be experienced as moving normally, or missing arms may 'gesture' during conversations as if they really existed.

Such experiences have long intrigued psychologists and a number of explanations have been proposed to explain them. Indian-born psychologist Vilayanur Ramachandran, a leading researcher on phantom limb syndrome, has proposed that it can be attributed to the brain's plasticity.

Ramachandran stimulated the skin surface in various points on the face, arms and upper body while using functional neuroimaging to monitor brain activity in volunteer participants with an amputated limb. The same was done with a control group of participants who did not have an amputated body part. The scans showed areas of somatosensory cortex that were activated when different parts of the body were stimulated by touch.

In one experiment, Ramachandran and his colleagues (1992) found that participants with an amputated hand reported that stimulation of their cheek through touch (with a cotton swab) was perceived as if the stimulation was on their now-missing hand. In some cases, this sensation was quite precise. When specific areas of the face were stimulated, participants reported sensations in a particular area, such as just one finger, of the phantom hand.

The scans also revealed that stimulating the cheek activated an area in the somatosensory cortex that previously would have been activated by their hand. Both the cheek and hand are represented next to each other in the somatosensory cortex.

Following loss of the hand, the adjacent cortical area had both taken over the unused cortex previously representing the hand and also assumed its function. The new face and arm representations were now connected with each other, filling in the space occupied by the hand representation. Through its plasticity, the brain had reorganised itself to compensate for the loss of sensation from the missing hand.

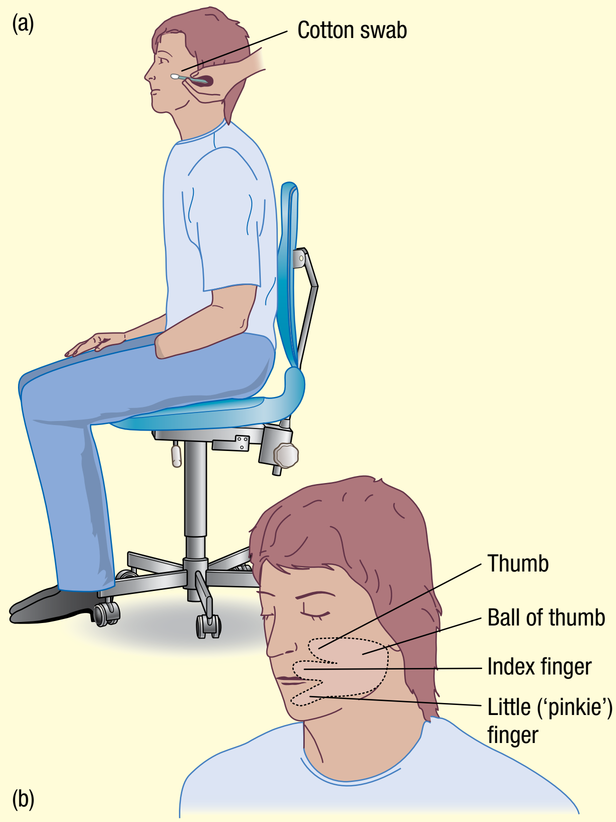

Figure 4.19 Mapping sensations in phantom limbs: (a) the researcher lightly touches the cheek of a participant's face with a cotton swab, thereby triggering sensations in their now-missing hand; (b) stimulating specific parts of the face can result in sensations in a particular area of the missing hand.

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Weblink
Ramachandran discusses phantom limb syndrome and its explanation in terms of plasticity 10 m 15 s

LEARNING ACTIVITY 4.7

Review questions

1. Explain the meaning of plasticity in relation to the brain.
2. Explain why the brain is considered to have plasticity with reference to two key points.
3. In what way does plasticity account for the fact that no two human brains are identical?
4. (a) Explain the meaning of adaptive plasticity with reference to brain injury.
   (b) Describe two neural mechanisms or processes that indicate and enable adaptive plasticity.
5. Give an example of research findings that support the occurrence of adaptive plasticity in response to:
   (a) everyday experience
   (b) recovery from brain injury.
6. Explain how adaptive plasticity enables compensation for lost brain function and/or maximises remaining functions in the event of brain injury.
7. Will the brain recover to some degree from all types of injuries? Explain your answer.
8. What role does rehabilitation play in plasticity and recovery from brain injury?

LEARNING ACTIVITY 4.8

Reflection

Does brain plasticity mean that 'brain training' programs and exercises may be effective? Does it depend on the type of program and how it is used? Discuss with reference to an example.

You may wish to consider information and examples in the Healthy Brain Program at the Brain Foundation website www.brainfoundation.org.au

PARKINSON'S DISEASE

Parkinson's disease is a progressive neurological disorder which is characterised by both motor and non-motor symptoms (Parkinson's Australia, 2017a). Motor symptoms such as tremors, muscle rigidity, slow movements and unstable posture, primarily result from the progressive degeneration of neurons in the substantia nigra, which is located in the basal ganglia in the midbrain (see Figure 4.20).

Neurons in the substantia nigra produce the neurotransmitter called dopamine so when the substantia nigra is diseased or damaged, the amount of dopamine available is markedly reduced. Dopamine carries messages between neurons to help ensure effective planning, initiation and maintenance of movements, both at rest and during periods of activity. If there are fewer neurons in the substantia nigra, less dopamine will be produced. This means that the motor cortex higher up in the brain receives fewer or irregular messages on how to control movements. Movement commends are disrupted because essential information about how and when to move has gaps or has not been received. This is what primarily contributes to the motor symptoms that are characteristic of Parkinson's disease and often lead many people to define it as a 'movement disorder'. However, Parkinson's disease does not only affect movement, nor does a decrease in dopamine necessarily account for all symptoms experienced with the disorder (Brain Foundation, 2017; Parkinson's Australia, 2017a).

Although Parkinson's disease is linked to the degeneration of dopamine-producing neurons, it is not known what actually causes this specific type of neurological disorder. Therefore, it is described as *idiopathic*, which means 'having no known cause'.

Parkinson's disease is not considered to be genetic though there is a family history of the disorder in a small percentage of cases. Neurotransmitters other than dopamine have also been suggested as contributory factors in the disease. For example, dopamine-producing neurons in the midbrain also release the neurotransmitter called GABA (gamma amino butyric). This is the main inhibitory neurotransmitter in the central nervous system (but also found in the peripheral nervous system). Generally, GABA dampens ('lowers') the activity of other neurotransmitters to help stabalise neuronal activity and maintain balanced overall functioning of the nervous system. Without GABA, neurons fire too often and too easily.

Since people with Parkinson's disease also have a reduced level of GABA, this can make it difficult to isolate the effects of dopamine and GABA deficiencies.

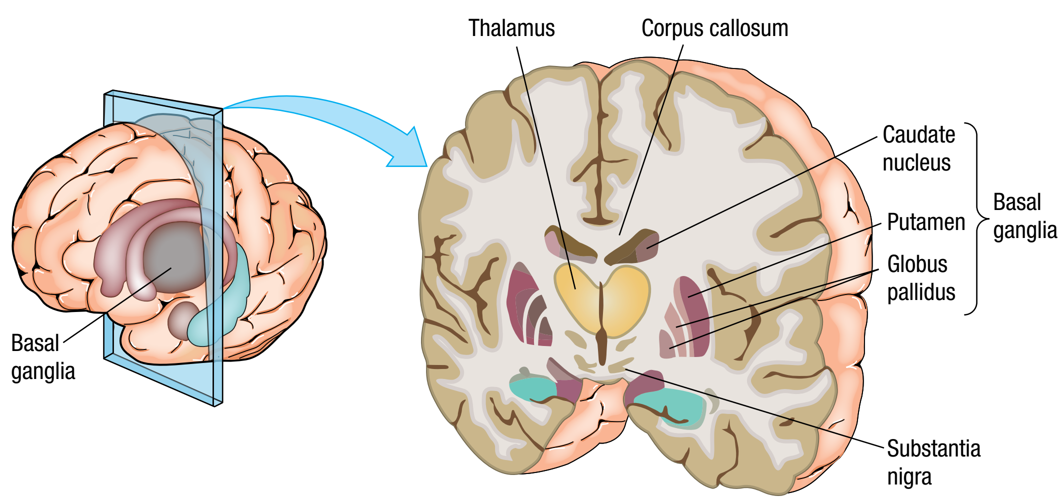

Figure 4.20 Parkinson's disease is a disorder of the central nervous system, involving primarily a degeneration of neurons deep within the brain in an area called the basal ganglia, and in particular a loss of dopamine-producing neurons in the substantia nigra. This cross-section shows the basal ganglia and substantia nigra, which interact with other structures in controlling and coordinating movement. The basal ganglia comprises three smaller structures ('nuclei') made up by clusters of neurons. The neurotransmitter GABA is also released by the dopamine-producing neurons which has led researchers to investigate the role of GABA in Parkinson's disease.

However, some researchers have proposed a range of possible effects of GABA or GABA depletion; for example, that GABA blocks the effect of dopamine and thereby worsens symptoms; that it contributes to the death of dopamine-producing neurons; that it makes the nervous system vulnerable to disturbed neuronal activity, and that it contributes to the degeneration of the nervous system (Blaszczyk, 2016; Di Michele et al., 2013; Tritsch, Ding & Sabatini, 2012).

Environmental factors such as head injury and exposure to pesticides and other chemical toxins have also been suggested as contributory factors or possible causes. The most significant risk factor seems to be age. Generally, however, the disease is currently thought to be the result of a complex interaction between genetic and environmental factors (Parkinson's Australia, 2017a).

Symptoms

The symptoms of Parkinson's disease develop slowly and gradually progress over years. They tend to vary greatly between individuals diagnosed with the disorder and no two people will experience the condition the same way. According to Parkinson's Australia (2017a), there are four key symptoms used for diagnostic purposes. All of these are motor symptoms.

Motor symptoms

1. *Tremor* involving continuous, involuntary shaking (trembling) of the body is the best-known symptom (but not present in all cases of Parkinson's disease).

   Most often, tremors are 'resting tremors' and occur when the limb is not in use. Sometimes 'action tremors' are experienced. These occur when commencing some form of motor activity; for example, when the person walks, their hands may begin to shake. Usually, tremor is worst at rest, improves during voluntary movement and disappears during sleep.

   'Restless legs' is also common. This is when the person's legs appear to move or feel as if they are moving constantly, especially at night.
2. *Muscle rigidity*, or 'stiff muscles', whereby the muscles seem unable to relax and are tight, even at rest, is another key symptom.

   Individuals report feeling that their muscles will not do what they want them to do. They may have difficulty performing automatic movements, such as swinging their arms when walking or rolling over in bed. They may feel their muscles are so tight that they have frozen and won't actually move.

   Rigidity can also lead to lack of facial expression through loss of facial muscle tone. This sometimes gives the face a mask-like appearance.
3. *Slowness of movement* (called *bradykinesia*), particularly when initiating and executing movement and in performing repetitive movements, presents in a variety of ways, including difficulty starting new movements or stopping an ongoing movement.

   There is a decrease in fine motor coordination required for 'delicate' work with the hands such as when doing up buttons, putting on make-up, shaving or slicing vegetables. Difficulty with turning over in bed is common, as are problems with handwriting becoming slow and small.

   Because of its impact on everyday activities, bradykinesia can be one of the most disabling symptoms.
4. *Postural instability*, balance problems and gait (walking) disturbances occur later in the course of the disease. Inability to maintain a steady, upright posture or to take a corrective action to prevent a fall often results in just that — falling. Individuals tend to go backwards as well, and a light shove may cause them to continue taking many steps backwards or to fall.

   Gait disturbance is apparent in the short, shuffling steps taken by individuals and reduced arm swing.

Figure 4.21 The use of a balance aid often becomes necessary late in the course of Parkinson's disease to assist with mobility and help prevent falls.

Non-motor symptoms

Lack of dopamine is believed to also contribute to many of the symptoms classified as non-motor.

Speech problems, especially change in verbal fluency, are a common non-motor symptom. The muscles involved in speech may be affected which can reduce the volume, clarity and speed of speech. For example, speech can become rapid, with the words crowded together, similar to the short, shuffling, 'propelling' steps when walking. The muscles involved in swallowing can also be affected, making it difficult to chew or swallow.

Other symptoms may include a decrease or loss of sense of smell, pain and discomfort in an arm or leg, tiredness and disturbed sleep, constipation, problems urinating, and mental health problems such as confusion, panic attacks, anxiety disorder and depression.

Problems with cognitive function such as slowness of thinking, impaired planning and decision making and memory loss may occur in up to 40–50% of people with Parkinson's disease, especially late in the disease and in older people. However, cognitive impairments are also associated with other age-related disorders (such as dementia) so it can be difficult to isolate the actual cause (Golbe, Mark & Sage, 2014; Parkinson's Australia, 2017a).

Due to the very slow onset of Parkinson's disease, it can take a while for people to notice then realise their reduced ability to control movement and other motor or non-motor symptoms. For some, a slight tremor of the hand when it is relaxed and not in use will be the first sign that something is wrong. For others, deterioration in the sense of smell, difficulty with walking, or falling due to disturbed balance control, may be the first sign of the disease. The symptoms of Parkinson's disease also tend to vary in severity from day to day and at different times throughout the day.

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Weblink
Interview with Michael J. Fox on his experience of PD 7 m 26 s

Diagnosis and treatment

The average age of diagnosis of Parkinson's disease is between 55 and 65 years, though it can affect anyone at any time, including much younger people. It is estimated that about 1 in 350 people in Australia have the condition, with the incidence increasing to about 1 in 100 people over the age of 60. It is slightly more common in men than in women (Brain Foundation, 2017; Parkinson's Australia, 2017a).

Diagnosis is based on the individual's presenting symptoms, a neurological examination, a review of their past medical history and their response to Parkinson's medications if the disease is suspected. However, there are no really adequate or specific biological or neuroimaging tests available for a diagnosis that would confirm the presence of the disorder.

At present, there is no known cure for Parkinson's disease. It is not contagious, lifespan is not necessarily shortened and medications can help treat symptoms and improve quality of life for a very long time. Because of the complex nature of Parkinson's disease, for each individual its management requires a holistic, biopsychosocial approach which takes account of all aspects of the affected person's life, not just their motor problems. Given that no two people are affected in the same way, management will vary (Brain Foundation, 2017).

Motor symptoms such as tremor, muscle rigidity and slowness of movement may be relieved by medications that restore the deficiency of dopamine. Two types of dopamine-influencing medications can be used — those that can be converted into dopamine by the brain and those that are able to effectively stimulate reception of dopamine by the neurons. Other medications that influence the activity of other neurotransmitters that can directly or indirectly affect motor symptoms may also be used.

In some cases, deep brain stimulation of the substantia nigra within the basal ganglia may be a treatment option, depending on the symptoms. As a result, the individual may be able to treat the amount of medication previously required. However, not all Parkinson's symptoms will necessarily respond to the stimulation.

Figure 4.22 According to Parkinson's Australia (2017b), exercise has been proven to be essential in maintaining mobility and quality of life.

Other 'neurosurgical' options involve cutting ('lesioning') specific parts of the brain to alleviate targetted motor symptoms. However, none of the drugs or other interventions can prevent the progression of the disease (Parkinson's Australia 2017a).

One of the most commonly used and effective medications is L-dopa, made from levodopa, a chemical that is converted to dopamine by neurons and thereby replaces dopamine lost in Parkinson's disease.

It is relatively common for people to require high doses of medication and therefore experience side effects as the disease progresses and natural dopamine production is reduced. In many cases, medication has a maximum benefit for a period of 5–10 years. Many patients report that some of the side effects are as disabling as the disease itself (Parkinson's Victoria, 2015).

Use of animal studies and neuroimaging techniques to develop understanding of Parkinson's disease

Researchers often use animal studies and neuroimaging techniques to understand human neurological disorders such as Parkinson's disease. The main goals of this research are to understand the physiological changes associated with the disorder, to prevent the disease, to slow its progression after its onset and to develop treatments (e.g. treat the symptoms with as few side effects as possible). In this section we examine examples of research studies that have used animals and/or neuroimaging techniques.

Animal studies

There have been numerous animal studies conducted throughout the past four decades to investigate various aspects of Parkinson's disease. Most have used mice, rats, rabbits and monkeys. These mammals are substitutes for people because of obvious ethical constraints for research with humans.

The use of animals allows researchers to investigate Parkinson's disease in ways which would not be possible with humans. This includes performing procedures on animals to induce Parkinson's symptoms, such as damaging the relevant dopamine-producing brain area or dopamine pathways to the motor cortex. Alternatively, animals may be injected with substances for use in drugs being developed to prevent or treat symptoms. For example, researchers can administer chemical agents that target neurons in the substantia nigra and induce their degeneration so that dopamine production is restricted. They can then use a drug under development to test whether it can counter the effects of their experimental manipulation (Blandini & Armentero, 2012).

It is assumed that causes and treatments of Parkinson's disease will be similar in both the animal species selected for study and in humans because of similarities in brain structures and functions. This is important so that the animal reacts to Parkinson's disease or its treatments like humans do. For example, small mammals have been used in studies on Parkinson's disease because they have dopamine in their brain and nervous system and it functions in much the same manner as it does in people. In particular, dopamine has been found to have a role in their control of voluntary movements.

So, researchers find it reasonable to claim that we can learn about Parkinson's disease (and other neurological disorders) in humans from the study of the brain and behaviour in animals. The expectation is that discoveries made in the animal studies will provide valuable insights into the disease in humans that may otherwise have not been possible. Of course, care is taken when drawing conclusions and making generalisations from one species to another.

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Video on marmosets and PD research 5 m 52 s

Discovery of levodopa

Some animal studies have been particularly valuable when considered in terms of their immediate or long-term outcomes. For example, Swedish doctor Arvid Carlsson was awarded the Nobel Prize in Physiology or Medicine in 2000 for his animal studies on Parkinson's disease. His experiments revealed that dopamine played a role in the control of voluntary movements, and was linked to Parkinson's disease. His experiments also led to the development of levodopa for treating the disorder.

Figure 4.23 Swedish doctor Arvid Carlsson used animal studies to develop levodopa, the most commonly used medication for treating symptoms of Parkinson's disease.

Carlsson (1957) studied rabbits to which he administered a drug (reserpine) to decrease the level of dopamine in their brain. He hypothesised that this would cause loss of movement control, which is what occurred in a very dramatic way. The rabbits became very lethargic and their movements were significantly impaired. The effects were very similar to the symptoms of Parkinson's disease. However, he also found that their movement could be restored by injecting them with levodopa, a chemical that is converted to dopamine by neurons.

When follow-up studies by Carlsson led him to conclude that a lack of dopamine caused Parkinson's disease, it became apparent that levodopa could be used as a drug to alleviate its symptoms. This led other doctors to try using levodopa on patients with Parkinson's disease, and found it alleviated some of the motor symptoms in the early stages of the disease. Levodopa, also called L-dopa, subsequently became the first treatment for Parkinson's disease.

More recently, researchers have used mouse models to help understand why the standard levodopa treatment for Parkinson's disease is often effective for only a limited period of time. They found that midbrain dopamine-producing neurons also released GABA, thereby raising questions about the role GABA has in Parkinson's disease, and which Parkinson disease effects are due to loss of GABA and which are due to loss of dopamine. This has led to further research to investigate more effective long-term management of symptoms (Tritsch, Ding & Sabatini, 2012).

Deep brain stimulation treatment

Studies with rats and monkeys led to the development of a surgical treatment for Parkinson's disease when levodopa and other drugs are not effective. The treatment is called *deep brain stimulation*, an invasive procedure whereby a surgeon implants electrodes (tiny wires) within the basal ganglia. The electrodes, which are connected to a pulse generator implanted under the skin of the chest, stimulate the target area with tiny amounts of electric current. The electrical activity blocks the faulty neuronal activity that causes tremor, rigidity, and other motor symptoms. The pulse generator is similar to a heart pacemaker and about the size of a stopwatch. Because the left hemisphere controls the right side of the brain and vice versa, deep brain stimulation is commonly performed on both sides of the brain.

Deep brain stimulation has been found to improve motor symptoms and reduce the need for levodopa in over 80 000 human patients throughout the world. However, as with any neurosurgery, there are risks

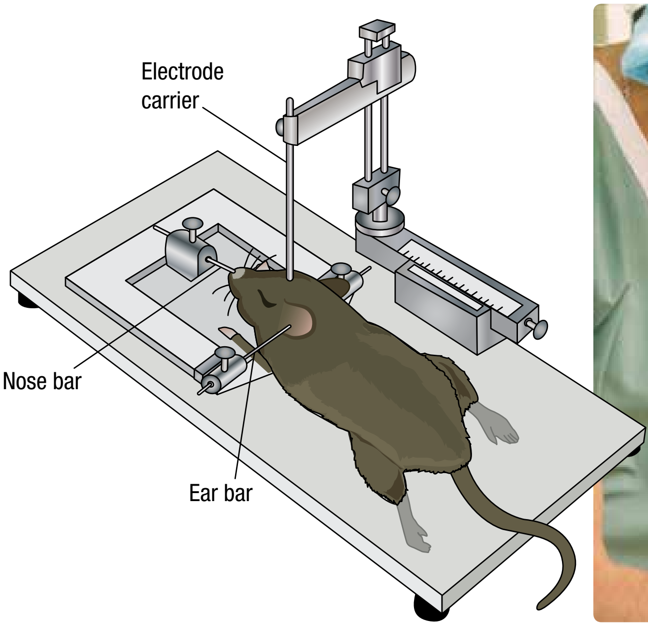

Figure 4.24 Animal studies led to the development of deep brain stimulation as a surgical treatment for some people with Parkinson's disease. The apparatus shown allows precise positioning of electrodes for stimulating the substantia nigra or any other targeted brain area. Neuroimaging is used to assist with mapping, measuring and monitoring of electrode insertion.

eBook*plus*

Weblink
Video on DBS for Parkinson's disease at the Monash Medical Centre 4 m 23 s

eGuide*plus*

Weblink
60 Minutes report on DBS for PD at the Alfred Hospital in Melbourne 5 m 40 s

involved. In the case of deep brain stimulation, these include death, stroke, speech changes, difficulties with decision making or infection. In addition, some people may experience increased depression or anxiety which may not be reversible (Frank, et al., 2007; Parkinson's Australia, 2017c).

Neuroimaging studies

Structural and functional neuroimaging techniques have long been used in the study of Parkinson's disease. These have enhanced understanding of brain areas and processes underlying the disease, enabled earlier and more precise diagnosis, and supported evaluation of existing and potential new treatments. Neuroimaging studies are not conducted with only human participants. Many animal studies have also been conducted, often with monkeys.

CT and MRI mainly provide detailed images of degeneration in brain areas and pathways. These are especially useful for diagnostic purposes to assess the nature and extent of damage and to monitor degeneration over time. Images can be taken at the neuronal level within dopamine-producing areas and neural pathways along which dopamine is used.

However, CT and MRI images are static (still). They provide useful clues about brain function on the basis of structural abnormalities but do not actually display its activity. When used for diagnostic purposes, the image can also help rule out other conditions which may resemble Parkinson's disease or structural abnormalities which may result in Parkinson's-like symptoms (Parkinson's Australia, 2017c).

Functional neuroimaging techniques such as PET and fMRI are preferred for research purposes as they provide detailed images of both brain structure and activity. Researchers can use these techniques in very precise ways; for example, to measure changes in the release of dopamine at synapses within the substantia nigra and observe the impact in dopamine pathways for movement. Importantly, it is possible to observe activity within various dopamine-producing and motor areas throughout the brain at the same time.

Functional neuroimaging techniques have also increased diagnostic accuracy and enabled earlier diagnosis through their very detailed images at the neuronal level. They allow more detailed monitoring of the rate of progression of the disease, as well as the impact of different treatments. In particular, functional techniques have been increasingly used to study symptoms other than the motor ones of tremor, muscle rigidity and bradykinesia. For example, researchers have used PET and fMRI to study changes in mental processes among people with the disorder, such as cognitive functioning and impairments in personality or social behaviour (Niethammer, Feigin & Eidelberg, 2012).

There has been a rich variety of neuroimaging studies on Parkinson's disease. Some of the more recent studies have investigated and enhanced understanding of:

- brain functionality and processes underlying different motor symptoms, e.g. areas of high and low activity when compared with non-Parkinson's patients
- consequences of reduced dopamine levels on non-motor mental processes and behaviour
- consequences of reduced levels of neurotransmitters on symptoms, neural activity or nervous system degeneration
- non-motor symptoms of the disease that may precede the motor symptoms and provide evidence of onset
- activity in specific areas of the motor cortex associated with different symptoms such as hand tremors and rigidity

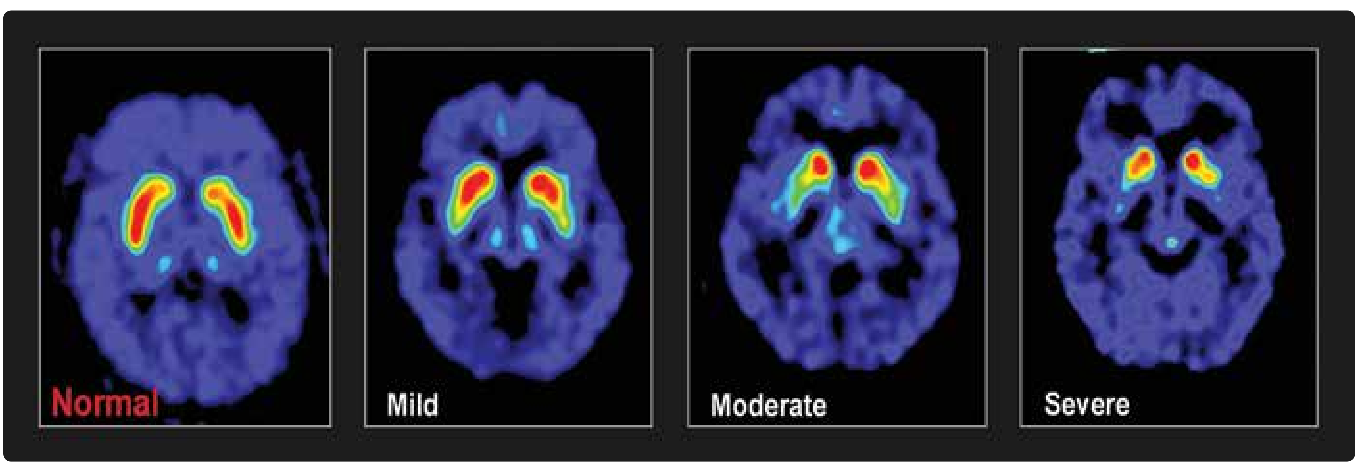

Figure 4.25 PET scans comparing dopamine activity in the substantia nigra of a healthy individual and a patient with Parkinson's disease. The radioactive tracer is seen as yellow, green and orange. Note the greater uptake of the tracer and activity in the scan from a healthy person.

- the impact of different treatments, particularly medications, e.g. effects of various dosages and frequency of use, how quickly levodopa impacts on dopamine levels and usage, responsiveness to the medication at the individual symptom level, age-related differences in responsiveness, differences in performance on motor tasks by patients taking and not taking levodopa, differences between patients who have levodopa wear off and those who don't
- the effects of gene therapies that may slow the disease's progression and avoid side effects of existing treatments, e.g. insert copies of a gene that may minimise dopamine depletion
- new ways of compensating for the loss of neurons, e.g. implant fetal stem cells in the brains of individuals with Parkinson's disease to establish new, healthy connections where dopamine may be released and thereby minimise the symptoms or their effects.

BOX 4.6 Motor neurone disease

Motor neurone disease is a general term used to describe a group of diseases in which motor neurons controlling the muscles degenerate and die. This gradually impairs the abilities to move around, speak, breathe and swallow. With no neurons to activate them, muscles gradually weaken and waste (mnd Australia [MNDA], 2017a).

Like Parkinson's disease, motor neurone disease is degenerative — the person's ability to voluntarily control their muscles gradually deteriorates after its onset. However, motor neurone disease is terminal, whereas Parkinson's is not.

Motor neurone disease may be diagnosed in anyone at any age but it tends to be most common among adults between the ages of 50 and 60. It is a much rarer disorder than Parkinson's disease. There are over 400 000 people worldwide with motor neurone disease, and about 2000 people in Australia. There are slightly more men than women. About 10% of people with motor neurone disease have a family history of the disorder.

Motor neurone disease can be difficult to diagnose because the initial symptoms can be similar to many other conditions. The early symptoms are mild, and may include feeling unbalanced and wobbly when standing or stumbling due to weakness of the leg muscles, difficulty holding objects or turning on a tap due to weakness of the hand muscles, slurring of speech, or swallowing difficulties due to weakness of the throat and tongue muscles.

About 50% of people with motor neurone disease may experience some change in cognitive abilities, language, behaviour and personality, but usually change is mild. These changes are due to impaired functioning of the frontal and temporal lobes and are associated with motor neurone disease. The functions of the bowel and bladder are usually not affected, nor the senses of sight, hearing, smell and touch.

Once the symptoms appear, average life expectancy is 2.5 years, although it can occasionally be longer than 6 years. The effects of motor neurone disease on each individual vary enormously in relation to the initial symptoms, rate and pattern of progression, and survival time after diagnosis.

There is currently no cure for motor neurone disease but some treatments can help people living with the disease to live better for longer. Only one medication is approved for treatment in Australia. This is called riluzole and is sold as Rilutek™ or APO-Riluzole. Riluzole prolongs survival by about two to three months. However, research indicates that people who start taking riluzole early in the onset of motor neurone disease are more likely to remain in the milder stages of the disease for longer than those not taking riluzole (MNDA, 2017b).

The famous physicist Stephen Hawking, who has helped to bring his ideas about black holes and quantum gravity to the general public, was first diagnosed with a form of motor neurone disease (called amyotrophic lateral sclerosis) when he was aged 21 and was not expected to live much longer. Now aged over 70, he spends most of his waking life in a wheelchair and speaks through a computer system which he operates with his cheek. However, he works as the director of research at the Centre for Theoretical Cosmology at Cambridge University in England and continues to generate new theories.

Figure 4.26 Stephen Hawking has lived with a form of motor neurone disease since he was aged 21, which is most unusual.

LEARNING ACTIVITY 4.9

Review questions

1. (a) Explain what Parkinson's disease (PD) is with reference to key motor and non-motor symptoms.
   (b) How may speech fluency be changed by motor impairment?
2. Give two examples of how PD may impact on psychological and social functioning.
3. Why can PD be described as (a) a neurological disorder, (b) a neurodegenerative disorder and (c) an idiopathic disorder?
4. Explain how a low level of dopamine is believed to impair motor activity.
5. Briefly describe two possible treatments for PD, outlining how they work and several potentially significant side effects of each treatment.
6. List three outcomes from animal and/or neuroimaging studies that have led to benefits for people with PD.

LEARNING ACTIVITY 4.10

Reflection

Consider some of the findings of animal studies on Parkinson's disease.
Comment on whether animal studies on the disorder are justifiable.

LEARNING ACTIVITY 4.11

Media analysis/response

Find a YouTube video describing a 'brain training' program.

1. Name and briefly outline the program, ensuring you refer to:
   - aspects of brain performance or functioning claimed to be improved
   - an example of a 'brain training' 'exercise', 'activity' or 'game' included in the program.
2. Include a URL link to your YouTube video.
3. What term(s) do psychologists tend to use instead of 'brain training'?
4. Comment on whether the 'brain training' program can actually produce its advertised benefits, ensuring you refer to the concept of neural plasticity.
5. Comment on whether 'brain training' is worthwhile.

CHAPTER SUMMARY

- **BRAIN PLASTICITY AND BRAIN DAMAGE**
  - **Brain development in infancy and adolescence**
    - Development of myelin
    - Synaptogenesis and synaptic pruning
    - Frontal lobe development
  - **Impact of injury to the cerebral cortex and adaptive plasticity**
    - Impact of injury to the cerebral cortex
      - Biological, psychological and social changes due to frontal lobe injury
      - Spatial neglect due to parietal lobe injury
    - Brain plasticity
      - Adaptive plasticity
        - Mechanisms underlying recovery
        - Recovered functions
  - **Parkinson's disease**
    - Symptoms
      - Motor symptoms
      - Non-motor symptoms
    - Diagnosis and treatment
    - Use of animal studies and neuroimaging techniques to develop understanding of Parkinson's disease
      - Nature of animal studies
      - Discovery of levodopa treatment
      - Deep brain stimulation treatment
      - Neuroimaging studies

KEY TERMS

acquired brain injury p. 190
adaptive plasticity p. 200
bradykinesia p. 206
brain injury p. 190
brain plasticity p. 200
deep brain stimulation p. 209
dopamine p. 205
idiopathic p. 205
insidious onset p. 190
levodopa p. 208
motor symptom p. 205
muscle rigidity p. 206
myelination p. 187
neurodegenerative p. 190
neuroimaging p. 208
non-motor symptom p. 205
Parkinson's disease p. 205
plasticity p. 200
postural instability p. 206
prefrontal cortex p. 188
rerouting p. 201
spatial neglect p. 196
sprouting p. 201
substantia nigra p. 205
sudden onset p. 190
synaptic pruning p. 187
synaptogenesis p. 187
traumatic brain injury p. 190
tremor p. 206

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 215–18. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about brain plasticity and brain damage	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Brain development in infancy and adolescence			
• Development of myelin			
• Synaptogenesis and synaptic pruning			
• Frontal lobe development			
Impact of injury to the cerebral cortex and adaptive plasticity			
• Traumatic brain injury			
– Impact of injury to the cerebral cortex			
– Biological, psychological and social changes due to frontal lobe injury			
– Spatial neglect due to parietal lobe injury			
• Brain plasticity			
– Adaptive plasticity			
Parkinson's disease			
• Motor symptoms			
• Non-motor symptoms			
• Diagnosis and treatment			
• Use of animal studies and neuroimaging techniques to develop understanding of Parkinson's disease			
– Nature of animal studies			
– Discovery of levodopa			
– Deep brain stimulation treatment			
– Neuroimaging studies			

CHAPTER 4 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

Which of the following statements about brain growth and development is correct?

A. All human brains are identical.
B. Experience cannot change the brain's neuronal organisation.
C. Infancy and adolescence are periods of rapid development and changes in brain structure and function.
D. Sensory and motor areas in the cerebral cortex develop and mature before hindbrain areas.

Question 2

Brain size is about 90–95% adult size by the age of about

A. 1 month.
B. 6 months.
C. 6 years.
D. 25 years.

Question 3

Synaptogenesis

A. is an acquired brain injury.
B. starts before birth.
C. starts after birth.
D. 'fine tunes' neural connections.

Question 4

When neural connections are repeatedly used, then it is likely that they will

A. strengthen.
B. weaken.
C. be pruned.
D. disappear.

Question 5

Two bursts of brain myelination occur

A. shortly before and shortly after birth.
B. shortly after birth and during adolescence.
C. shortly before and shortly after adolescence.
D. during adolescence and shortly before adulthood.

Question 6

The last brain area to reach maturity tends to be the

A. motor cortex.
B. sensory cortex.
C. cerebral cortex.
D. prefrontal cortex.

Question 7

The case study of Phineas Gage demonstrates the effects of brain injury to the cortex in the _____ lobe.

A. frontal
B. parietal
C. temporal
D. occipital

Question 8

Spatial neglect is most commonly associated with damage in the _____ lobe.

A. frontal
B. occipital
C. temporal
D. parietal

Question 9

Motor symptoms of Parkinson's disease are believed to primarily result from

A. depleted amounts of dopamine produced in the motor cortex.
B. loss of dopamine as it travels along motor pathways.
C. over-production of dopamine in the basal ganglia.
D. depleted amounts of dopamine producing neurons in the substantia nigra.

Question 10

Parkinson's disease is best described as a _____ disorder.

A. central nervous system
B. somatic nervous system
C. cognitive
D. terminal

Question 11

A synapse is

A. a neural connection.
B. a type of neurotransmitter.
C. the place where neurons communicate.
D. the part of the neuron where small extensions (branches) grow.

Question 12

The process of eliminating synaptic connections is called

A. synaptic pruning.
B. synaptic sprouting.
C. dendritic growth.
D. recovery.

Question 13

When a brain area assumes or 'takes over' the function of an adjacent damaged brain area, this is best described as

A. synaptic pruning.
B. dendritic sprouting.
C. adaptive plasticity.
D. dendritic growth.

Question 14

Any brain injury due to neural degeneration

A. has gradual onset.
B. is a traumatic brain injury.
C. has sudden onset.
D. is idiopathic.

Question 15

Brain maturation is generally complete by the end of

A. infancy.
B. childhood.
C. adolescence.
D. early adulthood.

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (1 mark)

Explain the meaning of neurodegenerative in relation to brain injury.

Question 2 (2 marks)

Explain why a head injury does not necessarily cause a traumatic brain injury.

Question 3 (1 mark)

Describe a potential biological, psychological or social change that may be caused by a severe brain injury to the prefrontal cortex.

Question 4 (2 marks)

One characteristic of the general pattern of brain growth and development is bottom to top growth; for example, the hindbrain develops first, then the midbrain then the forebrain. What are two other characteristics?

Question 5 (4 marks)

Name and describe two processes other than genes and maturation that contribute to growth in brain size soon after birth.

Question 6 (1 mark)

Describe a potential benefit of studying changes in patients with cerebral cortex damage.

Question 7 (2 marks)

Explain why an immature or under-developed prefrontal cortex in adolescence is believed to contribute to a higher incidence of poor decision making and impulsive behaviour during that period compared with other periods in development.

Question 8 (4 marks)

(a) Explain the meaning of adaptive plasticity in relation to brain function. 1 mark

(b) When during the lifespan is adaptive plasticity more likely to assist recovery from brain injury? 1 mark

(c) Explain your answer to **(b)** above. 1 mark

(d) Give an example of a naturally occurring neural mechanism that assists recovery from brain injury through adaptive plasticity. 1 mark

Question 9 (1 mark)

Give an example of a type of study on Parkinson's disease that may be conducted using a neuroimaging technique.

Question 10 (2 marks)

(a) What is an assumption underlying animal studies on Parkinson's disease? 1 mark

(b) Give an example of a research finding from animal studies that improved understanding or treatment of Parkinson's disease. 1 mark

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.

The answers to the Section B questions are in eBookPLUS.

5 THE COMPLEXITY OF PSYCHOLOGICAL DEVELOPMENT

KEY KNOWLEDGE

- the interactive nature of hereditary and environmental factors on a person's psychological development, illustrated through twin and adoption studies
- the role of critical and sensitive periods in a person's psychological development
- the importance of attachment on an individual's emotional development: genetics; temperament and early life experiences (with reference to the work of Harlow & Ainsworth)
- the development of cognitive abilities from concrete to symbolic thinking (with reference to the work of Piaget)
- psychosocial development across the lifespan as an influence on the development of an individual's personality (with reference to the work of Erikson)

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), p. 15.

CHAPTER CONTENT

Consider some of the things you do almost daily. You tell the time, make plans, send a text message, go to an online site, buy something, use your imagination, interact with friends, acquaintances and others, wonder about what you might do in the evening, set an alarm and decide when to go to bed. All of these involve psychological, or 'mental', processes. When you were born, you were unable to do any of these. So how did you acquire the knowledge and skills to engage in these activities and the many others of which you are capable? When did you develop these abilities? What role do biological processes such as your genetic make-up play in enabling you to engage in these types of activities? What role do environmental factors play; for example, the influence of your family, friends, culture and society in general?

There are things about each of us that are like *all* other people, there are things about each of us that are like *some* others, and there are also things about us that are unique to each one of us, and like *no* others. What psychological characteristics do we share with others and what characteristics are unique to each one of us? What aspects of who we are remain the same for all of our lives and what aspects change? What influences our development in lasting rather than temporary ways? These are some of the many questions considered in the study of psychological development across the lifespan.

In this chapter we consider normal processes of psychological development and functioning, focusing on aspects of psychological development, particularly cognitive, emotional and personality development.

DEFINING DEVELOPMENT

Psychologists generally use the term **development** to refer to changes that occur over time. Many who study development focus on *lifespan development* — from birth through to and including old age. Many changes also occur during the nine months the fetus is developing in the uterus. However, psychologists focus mainly on development after birth. That doesn't mean that in utero experiences do not affect development. For example, a pregnant female who regularly drinks alcohol or is highly stressed for a considerable part of her pregnancy can adversely affect the development of her fetus, both in utero and subsequently after birth.

Psychologists who study lifespan development aim to understand, describe, explain and predict the many ways in which our thoughts, feelings and behaviour change throughout our lives. A change must be relatively permanent or 'lasting' to be considered a *developmental* change. For example, a short-term loss of memory as a result of a sporting injury, or an improvement in mood after receiving good news are not considered to be developmental changes. Both of these are changes, but they are only temporary and therefore not developmental changes.

In psychology, the study of lifespan development covers both relatively permanent changes which are common to all individuals, as well as changes which differ between individuals. Knowing the kinds of changes that might be expected at different times assists understanding of what is 'normal' (or 'typical'),

Figure 5.1 Development involves change and takes place throughout the entire lifespan.

what is ‘not normal’ (or ‘atypical’) and consequently whether professional assistance should be sought.

Psychologists also use the results from their research on human development to suggest how desirable changes can be best achieved and how undesirable changes can be avoided or overcome. For example, research studies with older people have found that keeping mentally active through regular reading and doing crossword puzzles, Sudoku puzzles and the like, can help maintain mental alertness. Undertaking a variety of novel (new), mentally challenging activities (and coupling with physical exercise) may also help reduce age-related decline in brain function, and possibly even delay the onset of Alzheimer’s disease and other forms of dementia.

Although it is defined quite simply, human development is extremely complex. It involves many different aspects and is influenced by many different variables throughout the lifespan.

LEARNING ACTIVITY 5.1

Review questions

1. Define development as it is used in psychology.
2. Explain the meaning of developmental change compared to other types of change.
3. For each of the following individuals, state whether the thought, feeling or behaviour would be considered a developmental change (D) or would not be considered a developmental change (ND). Give a reason for each answer.
   - An eight-month-old infant cries whenever her mother leaves the room.
   - A six-year-old boy has learned to play chess.
   - A 50-year-old person cannot remember anything while anaesthetised during surgery.
   - A 10-year-old girl now feels confident about sleeping away from home without becoming homesick.
   - A 70-year-old woman has learned how to use Skype.
   - A 28-year-old male believes he is ready to move out of his family home and live independently away from his parents.
4. Give an example of a change you have experienced which would be considered a developmental change and a change that you have experienced which would not be considered a developmental change.

AREAS OF DEVELOPMENT

Many different kinds of developmental change occur throughout the human lifespan. Generally, psychologists classify changes which take place in terms of four broad areas: physical, social, cognitive and emotional.

Physical development involves changes in the body and its various systems, such as development of the brain and its nervous system, bones and muscles, motor skills, and the hormonal changes of puberty and menopause.

Social development involves changes in an individual’s relationships with other people and their skills in interacting with others, such as the ability to form and maintain close relationships with others in a group situation.

Cognitive development involves changes in an individual’s mental abilities, such as reasoning, problem solving, decision making, perception, learning, memory and use of language.

Emotional development involves changes in how an individual experiences different feelings and how these feelings are expressed, interpreted

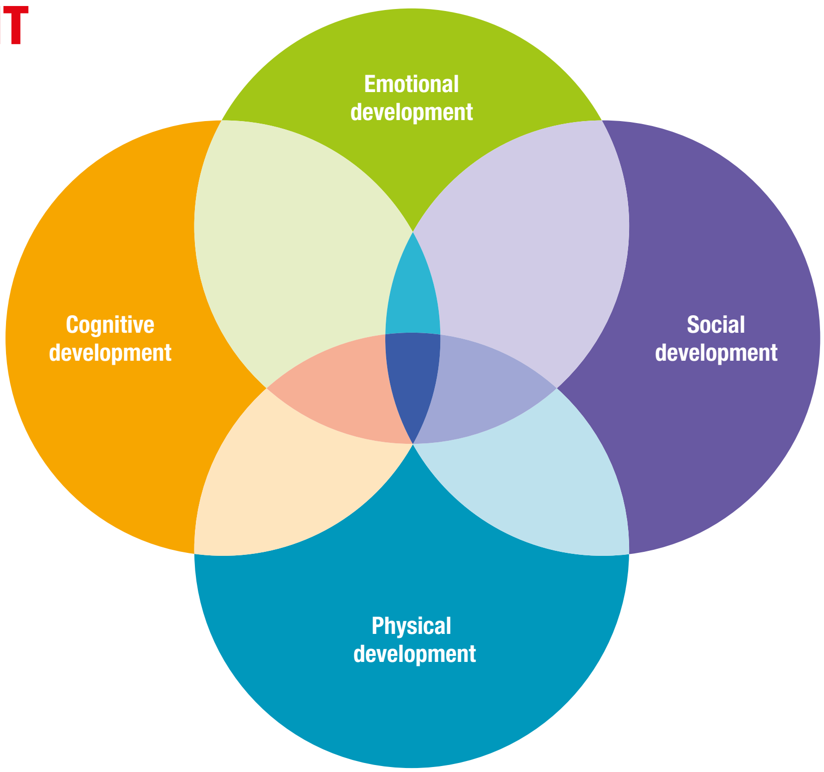

Figure 5.2 Human development is influenced by simultaneously occurring changes in physical, cognitive, social and emotional characteristics. Social, cognitive and emotional development are referred to collectively as psychological development.

and dealt with; for example, the way in which anger is expressed by a two-year-old, compared with a 16-year-old or an 80-year-old person.

Many of the changes associated with physical development, such as growth (height and weight), movement (crawling and walking) and changes in physical appearance (such as pimples and body hair), can be directly observed. In contrast, changes associated with social, cognitive and emotional development involve mental processes that occur within the individual and are therefore not directly observable or measurable. Consequently social, cognitive and emotional development tend to be referred to collectively as *psychological development*.

INTERACTION OF DIFFERENT AREAS OF DEVELOPMENT

VCE Psychology focuses on psychological development. However, physical development and psychological development do not occur independently of each other. How you think or feel can influence your physiological state in both subtle and more obvious ways. For example, consider people with the eating disorder anorexia nervosa, who may control their diet in dangerous ways because of the thoughts and feelings they have about their body image. The consequences of behaviours resulting from how they think and feel about body image can potentially have a harmful impact on their physical wellbeing, both in the short term and long term.

There are also times when your physical condition influences your thoughts and feelings, including how you think and feel about other people. For example, when you are feeling tired or stressed you may 'snap' at a friend or at a teacher in response to criticism, something you wouldn't do at a time when you were not feeling tired or stressed. Consider also cases involving people with physical disabilities and how having a disability may affect one's thoughts, feelings and social behaviour in lasting ways.

These examples highlight the complexity of human development, particularly psychological development. Although the different areas of development are interdependent and many changes occur simultaneously, psychologists often focus on specific areas and/or stages of development for research purposes. Similarly, textbooks such as this one usually present different areas and stages of development separately. This is intended to help simplify the study of how and why individuals change. However, you need to keep in mind that, in reality, divisions between different areas and stages of development are not so clear cut and that you are studying aspects of a *whole* person.

Figure 5.3 Inferences about underlying psychological processes are made from observable behaviour. What can be assumed about the cognitions or emotions being experienced by each child in this photo?

BOX 5.1 Stages of lifespan development

Psychologists specialising in the study of human development often divide the lifespan into age-based stages. This is mainly for the purposes of study, research or to describe age-related changes. Commonly used names of stages and estimates of their approximate time frames are:

infancy: birth–2 years
childhood: 2–12 years
adolescence: 12–20 years
early adulthood: 20–40 years
middle age: 40–65 years
older age: 65 years and beyond.

The age range for each stage provides only a very general idea of when each stage begins and when it ends. Each stage should not be considered as starting and ending precisely at the age shown. For example, a person doesn't suddenly move into early adulthood on their 20th birthday. Individuals differ in terms of the age at which they move from one stage of development into the next. An individual's stage of development will also depend on the age-classification system used by the psychologist. For example, some psychologists define adolescence starting at age 13 and there is an increasing tendency to refer to it as ending in the mid-20s with brain maturation.

While describing human lifespan stages in terms of labels and age ranges can assist understanding of when in the lifespan particular changes tend to occur, some psychologists consider the age-related stages of limited relevance. They believe that individuals differ too much in their psychological development and that categorising psychological development into age-related stages does not reflect this.

For example, many prefer to refer to adolescence more generally as the time between puberty and adulthood. Furthermore, the 'older age' stage is often described as two different stages called 'old age' and 'very old age' to reflect the fact that people are living much longer in many societies with improved health care.

In learning about the various changes that occur in each stage of the lifespan, it is important to keep in mind that the changes identified for each stage apply to many individuals, but not all. In addition, the kinds of changes that occur in each stage can vary considerably in different cultures and sub-cultures.

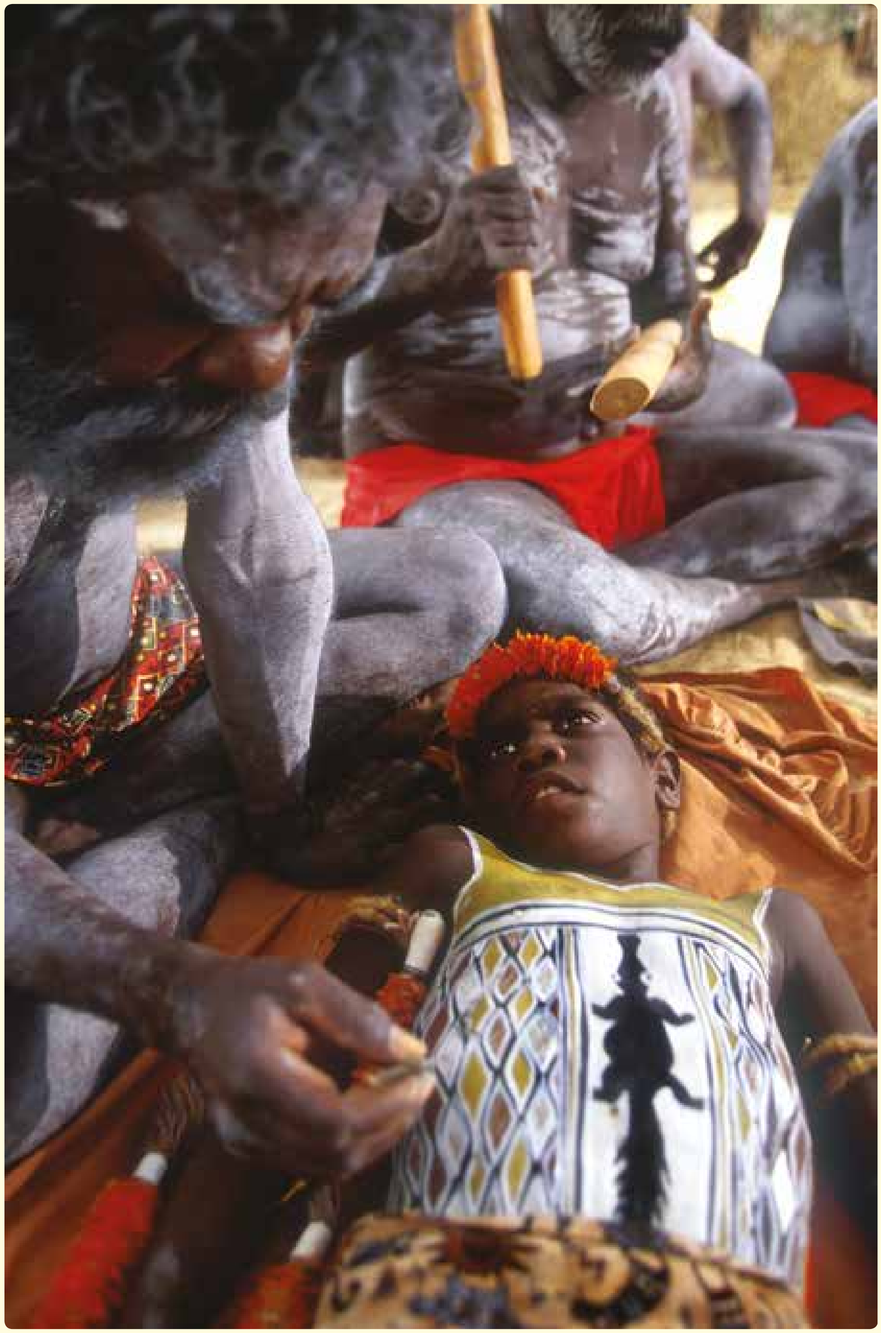

Figure 5.4 Adolescence is not viewed as a distinct lifespan stage in all cultures. For example, in some Aboriginal cultures, a child is considered to become an adult as soon as puberty is reached and a series of initiation rituals has been performed.

HOW PSYCHOLOGICAL DEVELOPMENT PROCEEDS

Psychological development is a life-long process, which begins at birth and continues through infancy, childhood, adolescence and adulthood into old age until death. People don't stop developing in any specific area just because they reach a certain age or are 'very old'. While many developmental changes and processes tend to peak in childhood and again during puberty, this does not mean that changes in one area or stage of development are more or less important than those in any other area or stage.

There are a number of different theories about the way in which psychological development proceeds as we grow older. It is generally agreed that it occurs in an orderly way in different areas simultaneously and at different rates within each individual. There remain, however, differing views on whether development is a continuous or discontinuous process.

Continuous versus discontinuous development

Think about your own psychological development for a moment. Did you gradually become the person you are, like the slow, continuous growth of a seedling into an enormous gum tree? Or did you experience sudden, distinct changes in developing into the person you are today, in the same way a caterpillar changes into a butterfly (Santrock, 1992)?

Some psychologists view development as involving gradual and ongoing change without sudden shifts. For example, abilities in the earlier stages of development provide the basis of those required for the next stages. This means that we simply get better or increase in ability with age.

However, continuous change involving increasing ability does not necessarily continue throughout the entire lifespan. Development of one or more psychological characteristics may occur on a shorter time scale. Intelligence (as measured by an intelligence test) is an example. Generally, as children grow older they become more intelligent and this tends to level off during adolescence.

Some aspects of development can also involve decreasing ability. They get worse as we grow older, not better. For example, at around six months of age, young infants can quite easily distinguish between very slight variations in non-native speech sounds — those sounds that are not a natural part of their first language. As a result of their experience with their native language, and particularly after they start to utter meaningful words at around one year of age, infants gradually lose their ability to tell the difference between speech sounds that are not used within their native language (Slater, Johnson & Muir, 2011). Despite these variations, continuous development can be generally represented as a single, smooth line, as shown in Figure 5.6(a).

Other psychologists view development as a discontinuous process. As shown in Figure 5.6(b), psychologists who support this view believe that development involves distinct and separate, step-like stages, with different kinds of abilities occurring in each stage. According to this view, the development of certain abilities in each stage, such as specific ways of thinking, feeling or socially interacting have identifiable start and end points. Although some types of thinking, feeling or behaving may seem to appear suddenly, it is likely that these have been developing gradually for some time.

Figure 5.5 Is development a slow, continuous process or are there sudden and distinct changes?

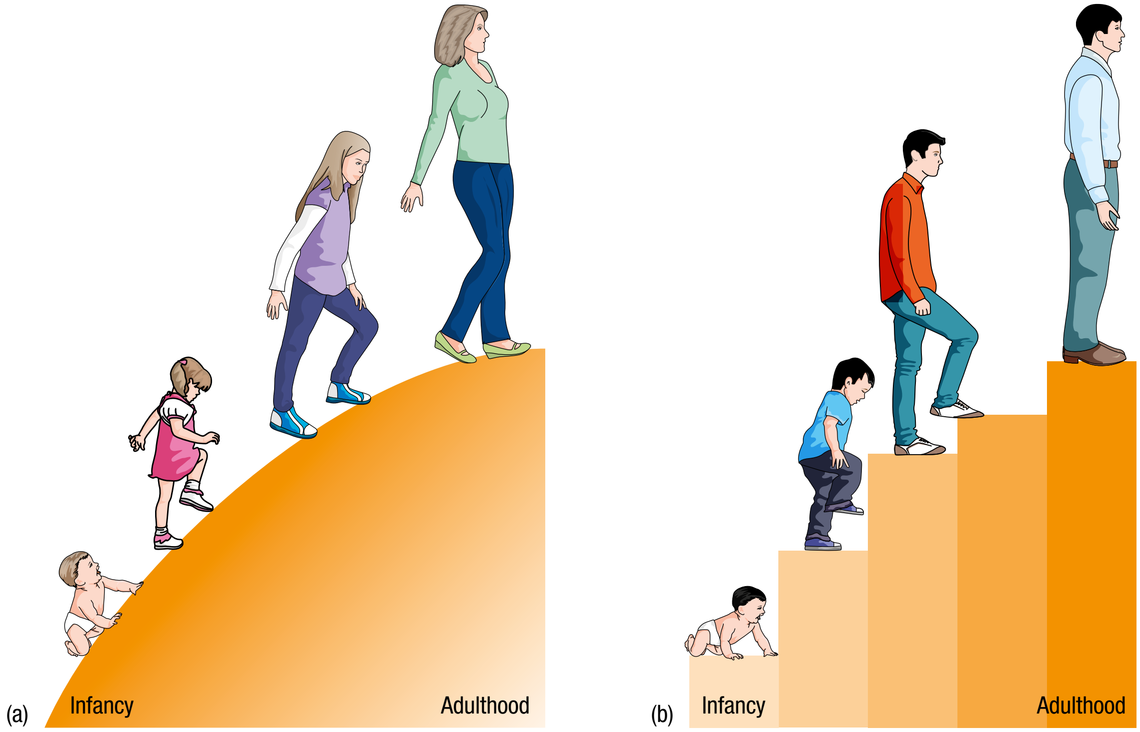

Figure 5.6 Some psychologists describe development as continuous (a), whereas others describe development as discontinuous, involving distinct and separate stages (b).

Sequential nature of development

Psychological development occurs in an orderly sequence rather than in a haphazard way. There may be bursts and spurts in development or even loss of a very specific ability, but the overall pattern is one of an orderly sequence under normal circumstances. Sequences of development usually begin with simple thoughts, feelings or behaviours and progress to more complex ones.

An overall, orderly sequence of change is observable in many areas of psychological development, such as in the use of language (from gurgling and squealing through uttering individual words to using sentences) and in the development of social play (from playing alone to playing alongside other children to playing cooperatively in a group). Although it is possible (but unusual) to skip a step in the development of a particular ability, development generally follows a particular order. For example, a person will usually be able to count before they can add numbers.

Quantitative and qualitative changes

Psychologists often describe developmental changes in both quantitative and qualitative terms. *Quantitative changes* are variations in the quantity, or 'amount' of a thought, feeling or behaviour. These changes are usually expressed as numbers. For example, the number of words spoken in relation to age is a quantitative change, as is the increase in the amount of knowledge children acquire about the world around them as they develop.

Qualitative changes are those that vary in 'quality', 'kind' or 'type'. They are changes that make the individual different from the way they were before. For example, at four years of age you probably had very little understanding about concepts such as 'justice' and 'honesty', whereas you now understand and can probably accurately describe these concepts. Unlike quantitative changes, qualitative changes are more difficult to describe precisely and are usually described in words rather than in numbers.

Individual differences in development

Although there are similarities among people in patterns of changes experienced in different areas of psychological development, no two individuals develop at exactly the same rate or in exactly the same way. There are many differences *between* individuals in their development. Some individuals develop more slowly or more quickly than others — in some, most, or all areas of development.

There are also many differences *within* individuals in their development. For example, an individual may be very shy as a child and adolescent, only to suddenly become confident and outgoing during early adulthood or middle age. Similarly, an individual may have relatively well-developed cognitive abilities, but experience difficulties in expressing emotions verbally and in interacting socially with others.

Change in different areas occurs at its own pace within an individual. Each person has a unique genetic make-up and set of life experiences which interact continuously, shaping their particular course of development throughout their lifespan.

Figure 5.7 No two individuals develop at exactly the same rate or in exactly the same way at any time in the lifespan, even if they are identical twins.

Based on extensive research findings, psychologists have described the usual development of various human characteristics and abilities such as physical development, mobility, language, emotional expression and social abilities at specific ages or stages in the lifespan. The general types of descriptions are called developmental norms.

Developmental norms typically show the patterns of development and the approximate ages at which a characteristic or ability appears in the 'average' child.

Developmental norms are compiled by measuring a characteristic or ability in a large representative sample of the population with which the study is concerned. Norms, such as average vocabularies, are then determined, often based on a simple, mathematical calculation of the average, or mean. For example, to establish the norms for intelligence of Australians aged two to 16 years old (the target population), the IQ of large samples of two- to 16-year-olds would be measured and the average IQ calculated for each age group. Care must be taken to ensure the composition of the sample is representative of all Australian two- to 16-year-olds. For instance, the sample for each age group would include people of different sexes, ethnic backgrounds, socio-economic backgrounds, geographical areas, schooling experiences and other relevant characteristics in proportions similar to the target population from which the sample is drawn.

As well as describing patterns of development which reflect average developmental trends, norms provide a way of comparing an individual's development with that of others in the same age group. Comparison can give information on the progress of development in relation to what is 'the average' for people in an age group. This is useful to professionals such as psychologists, pediatricians and teachers who monitor the physical and psychological progress of individuals.

If the normative sample is not representative, comparisons may not be valid. For example, it

Table 5.1 Examples of speech development norms

Age	Speech development
0–3 months	Communicate by crying, cooing, smiling, and making eye contact
3–6 months	Communicate by crying, cooing, smiling, making eye contact, pointing, blowing raspberries and laughing
6–9 months	Communicate by babbling, using sounds made with the lips (e.g. b and m) in sequences like 'baba' and later 'bamada'
9–12 months	Communicate by babbling, using more sounds (e.g. d, m, n, h, w, t); around 12 months begin to use words but often can't say words the same way as adults do and often simplify words (e.g. biscuit becomes 'bi')
1–2 years	Huge development in speech sounds; by 2 years, can say a range of speech sounds when talking (e.g. p, b, m, t, d, n, h, w) and there is a tripling of number of words that can be said; at 2 years, family and friends should understand half of their speech
2–3 years	By 3 years, can say even more sounds (e.g. k, g, f, s, ng); at 3 years, family and friends should understand most speech
3–4 years	By 4 years, can say most sounds correctly, including many consonant clusters, which are combinations of two or more sounds (e.g. tw, sp, gl) and many vowel sounds in words (e.g. ay, oh, ee).
4–5 years	By 5 years, anyone should understand the child's speech nearly all of the time.

Source: Based on Speech Pathology Australia (2017). *The sounds of speech* (Fact sheets). Retrieved from https://www.speechpathologyaustralia.org.au/

would be inappropriate to compare the language development of children of non-English speaking backgrounds with norms based only on a sample of children with English speaking backgrounds.

Norms do not tell us what is 'ideal development', nor do they explain development. They merely describe development, indicating what is the *average* developmental tendency for a large number of people. Norms are averages, but there is no 'average' child. Though a useful guide for comparison purposes, their usefulness for assessing the developmental progress of an individual is limited because of variations which occur due to the uniqueness of each individual. When you look at normative charts with ages for when children crawl, walk, speak in sentences and so on, you must remember that deviations from the average are not unusual. Only large variations should be discussed with a doctor or psychologist. Small variations should not be a cause for concern.

LEARNING ACTIVITY 5.2

Review questions

1. (a) Name and describe three broad areas of psychological development and give an example of a developmental change that occurs within each area.
(b) In which of the three areas of development would the collection of psychological characteristics called 'personality' be categorised, or should it have its own category? What about moral development which involves change over time in our understanding of right and wrong?
(c) Suggest another aspect of psychological development like those in (b) above which raise questions about their classification in one of the three areas.

2. What is meant by the view that 'developmental changes occur simultaneously in different areas'? Explain with reference to an example different from that used in the text.

3. In what way do continuous and discontinuous views of development differ?

4. Give an example, other than one used in the text, which illustrates the 'sequential nature of development'.

5. Complete the following table. In the left column write a list of developmental changes you have experienced that could be described as quantitative. In the right column write a list of developmental changes you have experienced that could be described as qualitative. Your first entries in each column could be the examples given in the text.

Quantitative changes	Qualitative changes

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Word copy of table

6. Explain the meaning of individual differences in development 'within the individual' as compared to 'between individuals'.

7. Outline a potential benefit and a potential limitation of organising and describing the development of human psychological characteristics in terms of age-related changes.

8. Suggest an explanation of why psychological development is often described as 'extremely complex'.

LEARNING ACTIVITY 5.3

Visual presentation showing the complexity of psychological development

Use an original example presented as a diagram(s), photo(s) or some other visual medium to demonstrate the role of each of the following concepts in psychological development:

- interaction between development in different areas
- continuous vs discontinuous development
- sequential nature of development
- qualitative and quantitative changes
- individual differences in development.

LEARNING ACTIVITY 5.4

Analysis of data on development

The following table contains data on the development of two individuals. These data show ages at which various developmental milestones were identified by the parents of each child.

Milestone	Annabelle	Habib
First social smile	4 mths	2 mths
First word	8 mths	10 mths
First cried in response to mother being out of sight	9 mths	11 mths
First counted	18 mths	22 mths
First sang a song	2 yrs	2 yrs 2 mths
Played interactively with another child	3 yrs 10 mths	3 yrs 4 mths
Read independently	4 yrs 6 mths	5 yrs 6 mths

Answer the following questions with reference to the data.

1. (a) Which developmental milestones did Annabelle reach first?
(b) Which developmental milestones did Habib reach first?

2. What do the data indicate about the variations in psychological development between individuals?

3. (a) Categorise the data into the three areas of psychological development — cognitive, social and emotional, or use one or more other categories of your own.
(b) Compare the data of the two children. What conclusions might be drawn when comparing each child in terms of cognitive, social and emotional development (or any other category you may have used)?

4. What are some possible explanations of differences in terms of socio-cultural factors?

5. Would it be accurate to explain the differences in terms of sex? Give a reason to explain your answer.

6. To what extent could the data be said to apply to other children of about the same age as Annabelle and Habib? Give a reason to explain your answer.

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Practical activity — variations in development within individuals

INTERACTION OF HEREDITARY AND ENVIRONMENTAL FACTORS IN SHAPING PSYCHOLOGICAL DEVELOPMENT

Human psychological development is a complex process that is subject to many different influences throughout the entire lifespan. Generally, the various factors influencing development of our psychological characteristics can be classified into one of two broad areas — heredity (nature) and environment (nurture).

Heredity involves the transmission of characteristics from biological parents to their offspring via genes at the time of conception. At conception, the male's sperm cell fertilises the female's egg cell (ovum). Both the sperm and ovum contain structures called chromosomes which carry the genes from each parent. During fertilisation, the sperm and ovum combine to form a new cell (zygote) with a unique combination of genes (see Box 5.3 on page 233).

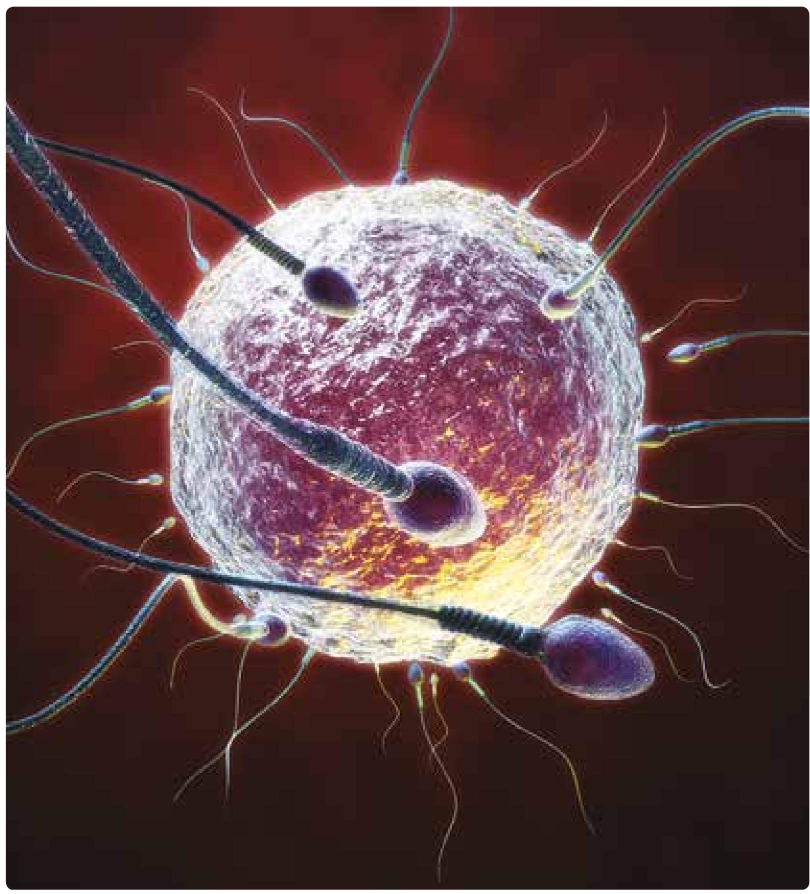

Figure 5.8 When one of the millions of sperm that surround the ovum penetrate it, conception occurs.

It is well established that the genes we inherit from our parents influence many aspects of our physical development; for example, our blood type, eye and hair colour, body shape and the likelihood of developing certain physical diseases or disorders. Our genes also influence less obvious aspects of our physical development, such as the rate at which our brain and nervous system will grow and mature, the course of their growth and maturation, our brain's chemistry and functioning, and when certain hormones will be produced, such as those that trigger the onset of puberty.

Given the important roles our brain, nervous system and hormones play in our thoughts, feelings and behaviour, it is evident that our genes also influence our psychological development. For example, it is clear that the more complex psychological characteristics, such as intelligence and personality, have a genetic component and are therefore influenced to some extent by heredity.

As with physical diseases and disorders, genes are also believed to influence the onset of some psychological, 'mental health', disorders. For example, schizophrenia, depression and use of certain types of drugs have all been linked to changes in brain chemistry and functioning. And, brain chemistry and brain functioning are genetically determined in a significant way. This suggests that these disorders probably have a genetic component. However, this does not mean, for example, that a child born to a parent with schizophrenia *will* inherit schizophrenia. Rather, research evidence suggests that having a biological parent with schizophrenia will increase the *likelihood* of developing this disorder, compared with someone who does not have a biological parent with schizophrenia (Gottesman, 1991; Plomin et al., 1998).

Environmental factors also play an important role in shaping psychological development. In psychology, the term **environment** is used to refer to all the experiences, objects and events to which we are exposed throughout our entire lifetime. Environmental factors that influence psychological development include whether you have brothers and sisters, how you are brought up, your friendship groups, schooling, job, income level, housing, whether you have a partner, your religion, ethnic origins, what you are exposed to in the print or electronic media, your use of social media, whether you experience a major stressful life event, your health, and other personal and sociocultural factors. The influence of some of these factors is less obvious or significant than others, but all can impact both individually and collectively on the kind of person we become and the psychological changes we experience during our lifetime.

Figure 5.9 The different social and cultural contexts we experience are significant environmental influences on our psychological development.

Nature versus nurture

Many of the early psychologists believed in *either* the hereditary (nature) *or* the environmental (nurture) view of development. Those who adopted a 'biological' perspective believed that heredity primarily determined our psychological development. Some even believed that, like physical development, *every* aspect of our psychological development was determined by our genes. They believed individuals, for example, inherited their social skills, musical ability, personality and intelligence. Although some acknowledged that environmental factors could influence development of psychological characteristics, essentially who we become was considered to be 'locked in' by our genes at the time of conception.

Another group of psychologists believed that heredity had little to do with the development of psychological characteristics. These psychologists adopted a strict 'behaviourist' perspective. They believed that the environment in which an individual is raised and lives, which includes all their experiences, was primarily responsible for determining what they would become.

Behaviourists almost totally ignored the influence of genes in development. Their basic assumption was that the mind of a newborn is totally empty and the development of all thoughts, feelings and behaviour could be explained in terms of a person's learning throughout their life. Any differences between people were seen to be the result of differing environmental experiences. Most behaviourists believed that, given the 'right' environment, anything was possible; for example, someone with the abilities of Wolfgang Mozart, Usain Bolt or any of the Nobel Prize winners referred to throughout this text could be produced, irrespective of their genetic make-up.

For many years psychologists debated whether it was heredity *or* environment that determined how we developed. This became known as the nature (*heredity*) versus nurture (*environment*) debate. Over time, research evidence has consistently shown it is neither one nor the other that is solely responsible for shaping development — *both* hereditary *and* environmental factors interact to shape human development.

Psychologists now consider the nature versus nurture debate to be resolved. They focus on trying to understand *how* hereditary and environmental factors combine or *interact* in influencing our thoughts, feelings and behaviour. Through their research, psychologists and other scientists also try to establish *how much* heredity and environment each contribute to the development of particular psychological characteristics.

Psychologists are in general agreement that our individual development begins with the genetic instructions we inherit at conception and that these instructions provide the building blocks, or 'blueprint', for the development of our psychological (and physical) characteristics. The environment interacts with our inherited potential to determine how the genetic plan unfolds.

Genes do not directly activate any mental process or behaviour. Instead, they consist of DNA that contains the relevant information. The expression of this information will be influenced by numerous factors, especially environmental factors (OECD, 2007).

Almost every experience a person has in their life has the potential to impact in some way on their psychological development. However, some environmental factors exert a greater influence at some stages of the lifespan than in others. The experiences that may influence one person's development may also have little or no impact on another person's development. For example, a person who has genes that may contribute to the onset of schizophrenia (called a 'genetic predisposition for schizophrenia') may not actually develop schizophrenia until they experience a major stressful life event, such as the loss of a loved one. Similarly, a person who loses a loved one and does not have a genetic predisposition for schizophrenia is less likely to develop schizophrenia (Kendler et al., 1995).

These examples also illustrate the fact that environmental experience can affect whether or not genes become active and are expressed. There is a considerable amount of research evidence that environmental experience can and does influence the expression of our genes. These research findings have emerged from the field of epigenetics.

Epigenetics is the study of factors other than genetic ones that control how and when each gene is expressed. Epigenetic factors do not change the DNA or pre-programmed instructions in genes, but they influence how our genes express the traits we inherit from our biological parents.

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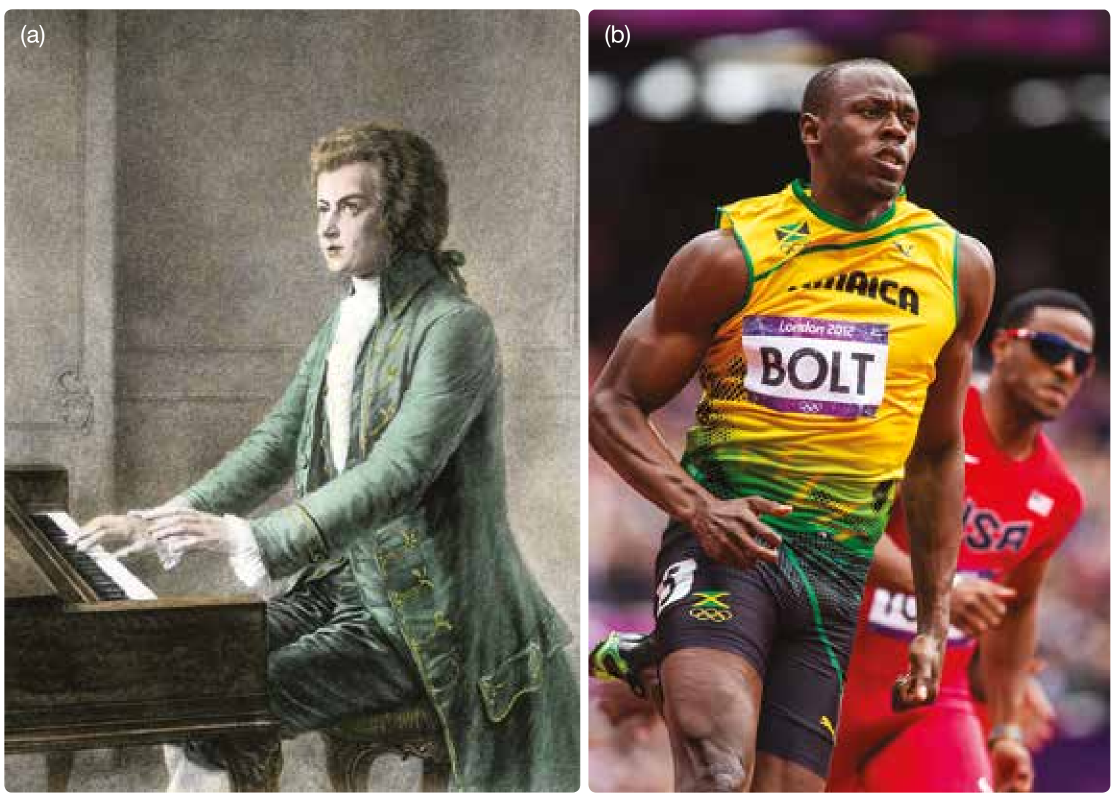


Figure 5.10 Most behaviourists believed that, irrespective of genes and given the right environment, anyone could develop the creative ability of (a) Wolfgang Mozart or the speed of (b) Usain Bolt, the fastest runner in the world.

Psychologists are particularly interested in differences in gene expression that are related to environmental factors. These types of epigenetic changes can last for a lifetime and their effects can have significant effects on how the genes work. Changes in gene expression can result from a wide range of experiences, including chronic stress, traumatic events, drugs, culture, and disease (Kolb & Whishaw, 2014).

Some psychologists have also suggested that a person's genes can influence the kind of environmental experiences they have. For example, a genetic predisposition towards antisocial behaviour may lead an adolescent to seek the company of others who engage in antisocial behaviour, in turn, encouraging further antisocial behaviour (Burton, Westen & Kowalski, 2012).

As yet, the technology available to researchers is not able to detect exactly how much of a particular psychological characteristic or behaviour may be attributable to either heredity or environment. Nor do psychologists know the specific environmental factors required to interact with genes to produce a particular psychological characteristic or behaviour (Plomin et al., 1998).

However, they do know that what was the nature *versus* nurture debate is now the nature *and* nurture debate which considers the extent of the contribution of *both* nature and nurture to development. Both are essential to all aspects of psychological development. We are all active players in the process of psychological development, starting at birth. As infants, for example, we are not passive recipients of the environment, like a blank sheet of paper on which the environment writes. All the abilities and potentials with which we are born will influence our environmental experience which may then modify our development in significant ways.

BOX 5.2 Behaviourism — anything is possible with the right environment

American psychologist John B. Watson is considered the founder of the 'school of thought' in psychology called behaviourism.

Behaviourism involves understanding and explaining how behaviour is learned and moulded by experience alone, especially rewards and punishments in everyday life. According to behaviourists, we tend to repeat behaviours that we find rewarding in some way and avoid or not repeat behaviours we associate with punishment. In this sense, we are controlled by our environment because this is the source of rewards and punishments. Through his behaviourist approach, Watson conducted research on animal behaviour, child rearing and advertising.

In 1920, Watson published a report on one of the most controversial experiments in psychology in which he and his assistant conditioned a severe emotional response in 'Little Albert', a nine-month-old infant. For example, Albert was conditioned to fear white, furry objects, such as a rat, a rabbit and cotton. This famous experiment is studied in Unit 3.

Watson (1930) is also well-known for stating:

> *Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select — doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. (p. 82)*

Figure 5.11 John B. Watson (1878–1958), the founder of behaviourism

LEARNING ACTIVITY 5.5

Reflection

Comment on whether nature or nurture has been more influential in shaping your development.

Role of maturation in development

Genes also play an important role in shaping the *course* of development through a process known as maturation. Maturation is a developmental process which is automatic and internally programmed. **Maturation** refers to the orderly and sequential developmental changes which occur in the nervous system and other bodily structures controlled by our genes.

This suggests that the development of all individuals follows the same process or pattern, unless there is significant interference from environmental factors. That is, we all go through predetermined, maturationally dependent phases. For example, in language development, the ability to 'talk' starts with sounds that are unrecognisable as meaningful words. We then develop the ability to say individual words, then the ability to string two or three words together into a phrase such as 'I want biscuit'. By about two years of age we are usually able to construct short sentences and by three years of age we can construct and use some grammatically correct sentences (see Table 5.1, page 226).

In order to speak using sentences, the relevant areas of our brain must be maturationally ready, or developed sufficiently to process sounds and enable us to understand words. In addition, the muscles in our mouth, particularly the tongue and lips, must also be sufficiently developed so that we can move and coordinate them in the manner required to form and speak words.

Many developmental changes are affected by maturation. For example, most children sit before they stand, draw shapes before recognisable objects and count before they can apply a mathematical formula. Similarly, puberty occurs for most people between 10–14 years of age and most people peak in their physical strength in late adolescence or early adulthood, then begin to decline in middle age.

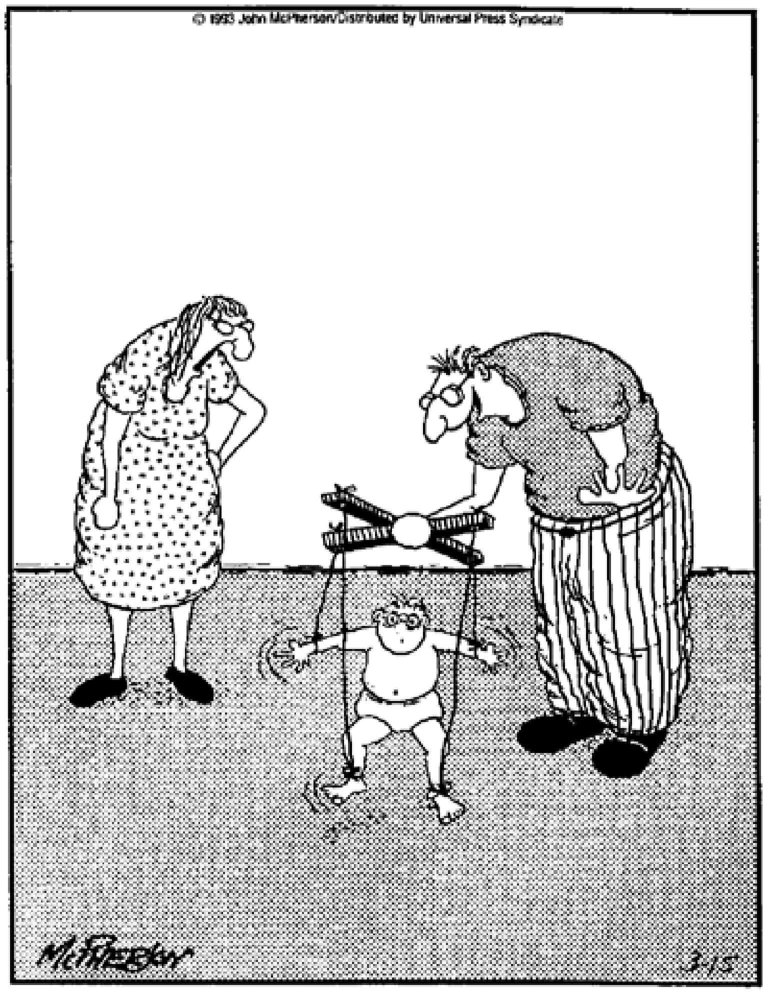
Principle of readiness

An individual's physical development lays the foundation for the onset of many aspects of psychological development. This reflects the principle of readiness, that maturation creates the readiness which determines the onset of particular mental processes and behaviours.

The **principle of readiness** states that unless the necessary bodily structures and processes are sufficiently mature, be they muscles, bones, the brain, nerves, neurons or neurotransmitters then no amount of practice will produce the particular mental process or behaviour. It is only when an individual is maturationally ready that the thought, feeling or action can occur.

The principle of readiness is used by Victorian educational authorities in determining the age at which it is appropriate for children to start formal schooling. In the past, parents could enrol their child at school after they had turned four years of age — the age at which they were believed to be maturationally ready to learn in a classroom situation. However, on the basis of psychological research evidence on the maturational readiness of children to learn in a school environment, children must now be five years of age or older by 30 April of the year they start school (or at least four years and nine months of age or older when they begin Prep).

In summary, while there are undoubtedly individual variations as to when a developmental 'milestone' occurs in any area of development, the *order* in which such milestones occur seems connected to the process of maturation.



"Stan, will you knock it off!
He will walk when he's ready to walk!"

Figure 5.12

BOX 5.3 Process of genetic inheritance

The inheritance of genetic information begins at conception. When conception takes place, the ovum (egg cell) from the mother and the sperm from the father unite to form a *zygote*. Each ovum and sperm cell contains structures called chromosomes (Figure 5.13). The zygote receives chromosomes from both the mother and the father. Chromosomes come in 23 pairs (making a total of 46). One of each pair of chromosomes comes from the mother via the ovum and one of each pair comes from the father via the sperm cell.

A *chromosome* is a threadlike structure found in the nucleus of almost every cell in the body. Each chromosome consists of a string of smaller structures called genes. The *genes* contain the instructions for the development of characteristics.

Genes are the basic unit of heredity. Genes also normally come in pairs — one gene of each pair comes from the ovum chromosome and the other from the sperm chromosome. Thus, an individual receives only half of each parent's total genes and which genes an individual receives from each parent is a matter of chance.

Genes provide the 'blueprint' or 'plan' for our development. For some characteristics, only one pair of genes determines it, as in the ability to roll your tongue. However, for most characteristics, a number of pairs of genes work together. Psychological characteristics such as personality, musical ability and abilities associated with intelligence are believed to be influenced by the interaction of many gene pairs.

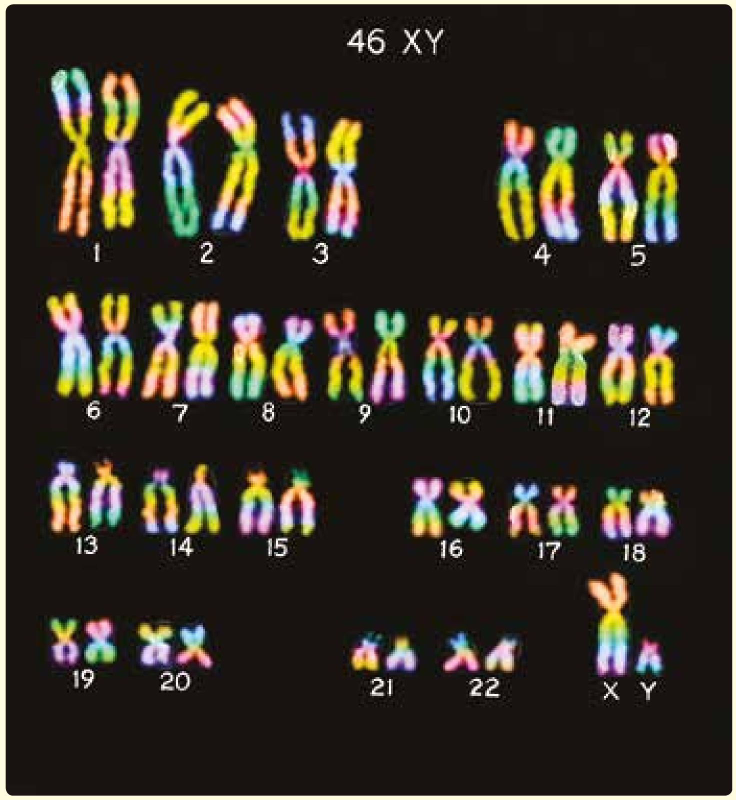
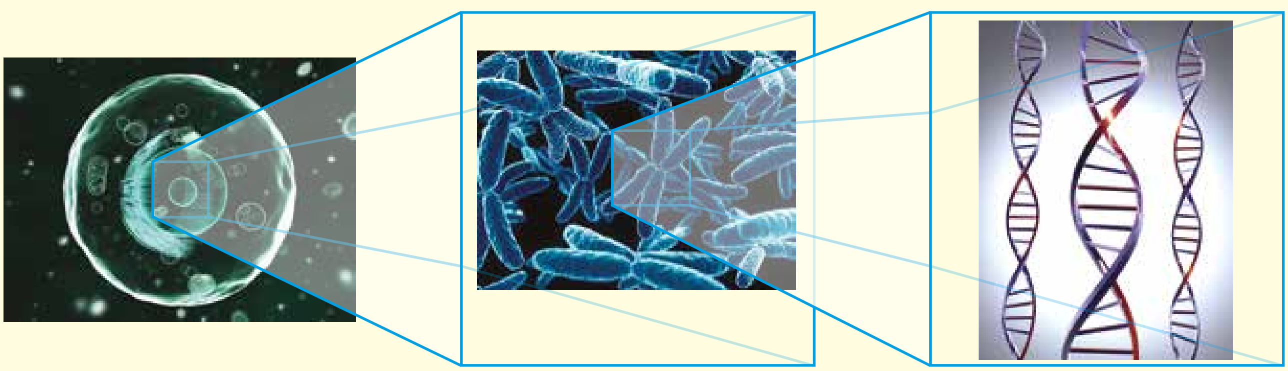


Figure 5.13 Humans have 23 pairs of chromosomes. Males and females differ only on the 23rd chromosome pair, with males having an X and Y chromosome (shown) and females having two matching X chromosomes.

Nucleus
(the inner area of a cell where chromosomes and genes are located)

Chromosome
(threadlike structure made largely of DNA)

Gene
(segment of DNA; determines our individual biological development)



Cell
(the basic structural unit of a living thing)

DNA
(a spiralling, complex molecule containing genes)

Figure 5.14 The nucleus of each of the trillions of cells in your body contains 46 chromosomes. Each chromosome contains a coiled chain of the molecule called DNA. Genes are segments of DNA which contain a code that directs the production of proteins — the building blocks of development.

BOX 5.4 Human Genome Project

The Human Genome Project (HGP) began in 1990. Its aim was to identify and develop a complete 'map' and understanding of all the human genes. Our combination of genes is known as our *genome*. Completed in April 2003, the HGP gave humans the ability, for the first time, to read nature's complete genetic blueprint for building a human being (National Human Genome Research Institute, 2017).

Researchers from various countries throughout the world collected blood and sperm samples from large numbers of donors. Female donors contributed only blood samples, whereas male donors contributed either sperm or both sperm and blood samples. Every cell in the body (including neurons and glial cells) contains a complete set of our genetic information.

By collating data from these samples, researchers have been able to determine that humans probably have about 20 500 genes, the same number as mice! They have also identified which chromosome and specifically where on the chromosome particular genes are located, creating a 'genetic map'. The function of many, but not all, genes has also been identified. For example, more is now known about specific genes which may be involved in the onset of Parkinson's disease or various mental health disorders.

The information obtained from the HGP can be thought of as the basic set of 'inheritable' instructions for the development and function of a human being. Although each human being has a unique combination of genes, the data published from the findings of the HGP does not represent an exact map of each individual's genetic make-up. Rather, it provides an overall picture of the genetic map of the human species.

One of the benefits of the HGP is that it has enabled researchers to develop more than 2000 genetic tests that enable us to find out whether we are at risk of developing a particular disorder that is influenced by one or more specific genes. Knowing in advance that there is a risk of developing a disorder enables health care professionals to research specific strategies that may delay its onset; for example, by managing diet or providing early medical intervention.

In April 2013 Barack Obama, who was then the American president, announced the BRAIN Initiative (Brain Research through Advancing Innovative Neurotechnologies, also called the Brain Activity Map Project). It is based on the Human Genome Project and has the goal of mapping the activity of every neuron in the human brain to enable understanding of the function of all the brain's neural networks.

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Weblinks

- Video: Brain Initiative introduction 4 m 58 s
- Brain initiative website

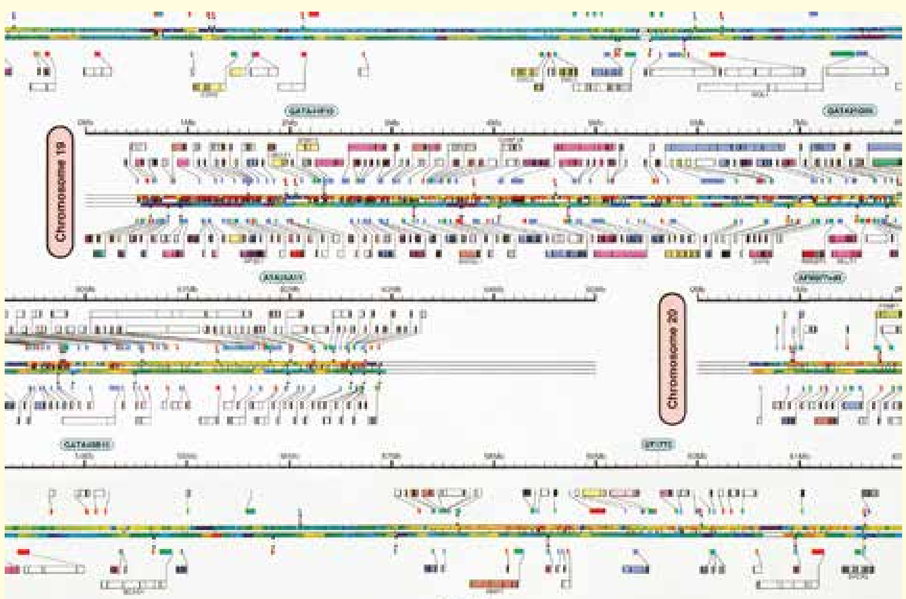

Figure 5.15 A genome map featuring some of the DNA details for two of the human chromosomes (numbers 19 and 20)

LEARNING ACTIVITY 5.6

Reflection

Do humans actively shape their own environments and contribute to their own development, or are they passively shaped by forces beyond their control?

What do you think? Briefly explain your answer.

LEARNING ACTIVITY 5.7

Review questions

1. Define heredity and environment as used in psychology.
2. Briefly explain, with reference to an example, how hereditary and environmental factors can influence psychological development.
3. What is the main focus of contemporary psychologists interested in the role that heredity and environment play in shaping psychological development?
4. (a) What is maturation?
   (b) Give examples of two different psychological abilities which are influenced by maturation in their development. Explain why maturation is relevant in each of your examples.
   (c) What is meant by the term principle of readiness in relation to maturation?
   (d) Explain with reference to the principle of readiness why some students may have difficulty understanding an algebra formula in year 7 but may understand the same formula in year 10.
   (e) What advice about maturation would you give to Stan who is shown in Figure 5.12 on page 232? Will experience help the child to walk earlier? Why?

LEARNING ACTIVITY 5.8

Identifying the influence of heredity and environment on psychological development

Construct a table with two columns, one with the heading 'Heredity' and the other with the heading 'Environment'. In each column, list several psychological characteristics which you think are more likely to be influenced by either heredity or environment.

Discuss your list with other class members. What amendments did you make to your answers on the basis of your discussion?

LEARNING ACTIVITY 5.9

Concept mapping — interaction of heredity and environment

Select a particular psychological characteristic and construct a concept map to indicate the way in which different inherited and environmental factors may interact to affect development of the characteristic.

A concept map is a diagram showing relationships between concepts or ideas. Concepts may be depicted as boxes (or circles) which are organised and connected with arrows (or lines). As shown in Figure 5.16 on the next page, these arrows are labelled with linking words and phrases to help explain the relationships between concepts.

The characteristic you select as the topic for your concept map could relate to the development of any thought, feeling or behaviour that reflects psychological development; for example, learning to solve a maths problem, developing trustworthiness or honesty, being shy or outgoing, or developing a skill in art.

You may find it helpful to follow these steps in constructing your concept map. The steps describe a paper and pencil procedure. Alternatively, you may use an app such as a concept mapping tool that is available online.

1. Select a specific psychological characteristic of particular interest to you.
2. Make a list of as many potential factors as possible which you think may influence the development of this characteristic.
3. Beside each factor, write H if you think it is mainly influenced by heredity, E if you think it is mainly influenced by environment, or H & E if you think the factor is both hereditary and environmental.
4. Write each factor (including its H, E or H & E label) on a separate small piece of paper or Post It note. (This will allow you to move around the factors as you think about the ways in which they have interacted in shaping development of the characteristic.)
5. Construct a concept map of the factors by arranging the pieces of paper in a layout which you believe best shows their relationship.
   (a) Write the specific characteristic in the middle of an A3-size sheet of paper.
   (b) Place linked factors close to each other and non-linked ones apart.
   (c) Rearrange the influences until you are satisfied with their placement. (There is no one, correct 'answer'.)
6. Stick the pieces of paper onto the A3 sheet, write the arrangement on the paper or construct the concept map on your computer.
7. Draw lines between linked (related) factors and write on each line what the relationship is. You can use words such as 'shapes', 'determines', 'influences', 'can lead to', 'contributes', 'affects' and 'assists'.

(continued)

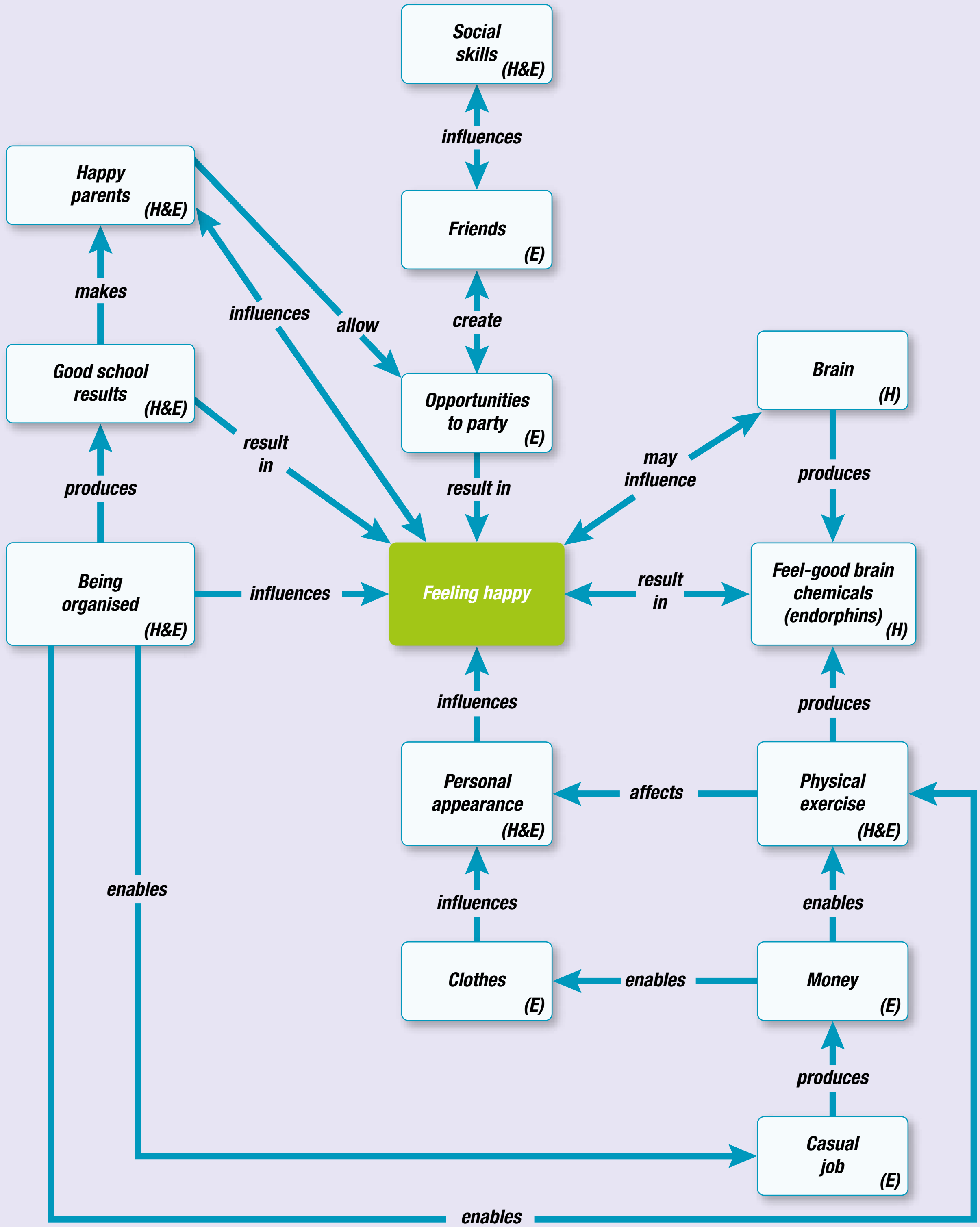

Figure 5.16 A concept map showing how various environmental and inherited factors can interact to influence an individual's feeling of happiness

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Concept mapping freeware

SENSITIVE AND CRITICAL PERIODS IN PSYCHOLOGICAL DEVELOPMENT

Many psychologists believe that there are particular times during development when environmental factors are more likely to have a greater impact on psychological development, either negatively or positively. Some also distinguish between sensitive periods and critical periods.

Sensitive periods

A **sensitive period** is a period of time during development when an individual is more responsive ('sensitive') to certain types of environmental experiences or learning. Outside this period of time, the same environmental influences need to be stronger to produce the same positive or negative effects.

Sensitive periods occur frequently during pre-natal development before birth when the individual is going through rapidly occurring changes in physical growth and development. Some psychologists have also identified sensitive periods in psychological development during the post-natal period when developmental changes are not as rapid.

Sensitive periods are sometimes described as 'windows of opportunity for learning' because they are the optimal, or best possible, times for the relevant learning to occur. For example, certain skills and knowledge, such as those of oral language acquisition, are believed to be more easily achieved during a sensitive period. If these skills and knowledge are not acquired during the sensitive period, they may be acquired at a later time, but it will usually take more time, be more difficult and the learning may not be as successful.

Generally, the sensitive period for learning to speak our native language is up to the age of about 12 years, with the window gradually closing from about age seven. At birth, however, it seems that we are ready to learn to speak the language of whichever culture we happen to be born into. For instance, we are able to distinguish almost all the differences in sounds that are expressed in the various languages used throughout the world. By the age of about one, this ability to perceive differences in language sounds is refined. We become more sensitive to the differences relevant to our language environment and less sensitive to differences important in other languages. Although we can learn to speak a second language at any time after childhood, if acquisition occurs before the ages of about five to seven years, our competence will be like that of a native speaker.

Sensitive periods indicate that brain development goes through specific periods during which some synaptic connections are most easily made and some neural pathways are most easily formed, assuming there is exposure to the appropriate environmental stimulus. The rapid increase in the number of synapses during synaptogenesis early in development may reflect the brain preparing itself to respond to certain types of experiences as if it is getting ready for the learning of 'experiences' that are 'expected' during a sensitive period.

Generally, sensitive periods tend to last for relatively short periods of time for physical characteristics and longer periods for psychological characteristics. A significant positive or negative environmental influence which occurs during a sensitive period can have long-lasting effects on the individual's development. This does not mean, however, that if disruption to development occurs during a sensitive period, any damage will necessarily be permanent and can never be made up (Kolb & Whishaw, 2014; OECD, 2007; Slater, Johnson & Muir, 2011).

Figure 5.17 The sensitive period for learning to speak our native language is up to the age of about 12 years, with the window gradually closing from about age seven.

Critical periods

A **critical period** is a specific period in development during which an organism is most vulnerable to the deprivation or absence of certain environmental stimuli or experiences. Critical periods have identifiable start and end times, thereby tending to begin and end suddenly, rather than gradually (if at all) as do sensitive periods.

For example, a brain injury or being deprived of a particular kind of environmental input at specific times after birth can significantly impact on the development of an underlying neural pathway and this becomes increasingly more difficult to correct later in life. Experiments with animals raised from birth have demonstrated this. If, for a certain time after birth, one eye of a cat, monkey or human is kept closed or does not function properly because of some abnormality such as a cataract, that eye will be forever blind. The changes responsible for this loss of visual function occur in the visual cortex. In cats, monkeys and humans, the visual cortex fails to develop normally if one eye is kept closed after birth.

However, the critical period after birth during which closing one eye can produce permanent visual problems varies between species. In cats and monkeys, the critical period extends to about 6 months of age. Over this period, the effect of closing one eye (by stitching it closed) becomes progressively less. Closing it for the first two months after birth produces a much greater visual impairment than closing it for the fifth or sixth months. In humans, the critical period seems to last for about the first six years of life. Keeping one eye closed for only a few weeks in the critical period is believed to produce a measurable visual impairment (Thompson, 2000).

Imprinting

Imprinting, which occurs early in the life of certain animals, is the best known example of a critical period in development. **Imprinting** is a type of learning in which a very young animal fixes its attention on or attaches to the first object with which it has visual, auditory or tactile experience and thereafter follows that object and seems to form an attachment to that object.

For example, a newly hatched mallard duckling will attend, attach to ('imprint on') and follow the first noisy moving object encountered after birth. Under natural conditions, this 'object' is the duckling's mother. Once it begins following the moving noisy object, it generally will not follow anything else but that object. After about 10 minutes of following the object, the duckling will have formed an ongoing attachment to it.

Imprinting behaviour was first identified by Austrian zoologist Konrad Lorenz (1937, 1972), who called imprinting 'object-fixation'. Lorenz demonstrated that the young birds would also follow him everywhere if he was the first noisy moving object they observed.

Other researchers subsequently identified a critical period during which imprinting can occur. For example, American psychologist Eckhard Hess (1972) found that if a mallard duckling is too young or too old, imprinting will not take place. But if a duckling between 13 and 16 hours old follows a moving object, then imprinting will occur. Thus, the critical period for imprinting in a mallard duckling is the three-hour period when the bird is between 13 hours and 16 hours old. After this time, imprinting is difficult to achieve. This may reflect a decline in the plasticity of the duckling's brain after 16 hours of age.

It is debatable whether any behaviour comparable to imprinting occurs among people, although human infants in all cultures do form attachments to mothers and other caregivers through prolonged experience with them following birth. However, psychologists have yet to identify any specific critical period for any human mental process or behaviour (OECD, 2007).

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Weblink
Video: Lorenz and imprinting 1 m 46 s

Figure 5.18 These young ducklings imprinted on Konrad Lorenz and followed him everywhere. There is a critical period soon after birth during which this attachment behaviour will occur under natural conditions.

BOX 5.5 Case studies of Genie and Isabelle provide insights into a sensitive period for learning language

For many years, psychologists debated the existence of a sensitive period for learning language — whether our brain is especially sensitive to learning to speak our native language during a specific period in time. Generally, psychologists who believe that a sensitive period for oral language exists, propose that the sensitive period is between infancy and puberty. They argue that if the language speaking skills and knowledge are not acquired during this sensitive period, the individual will be unable to catch up completely at a later stage, no matter how much help they get.

How can psychologists test whether a sensitive period exists? One way would be to place infants in solitary confinement until adolescence and then expose them to language for the first time. Of course, it would be unethical (and illegal) to do this. A way around this is to study the cases of infants and young children who have been abandoned or isolated by their parents and have therefore been deprived of opportunities to learn to speak their native language until they were rescued, sometimes after many years of solitude. One of the best-known case studies involved a child known as 'Genie'.

In 1970, authorities discovered 13-year-old Genie whose parents had locked her in a tiny room from the age of 20 months. During each day she was usually tied to a chair. At night she was confined to a sleeping bag that was like a straitjacket. Her abusive father rarely spoke to her except for occasional screaming or to 'bark' at her because he considered her to be 'no more than a dog'. Her mother, a physically abused wife who lived in terror of her husband, barely cared for Genie. She had as little interaction with her as possible, sometimes uttering only a word or two. There was no television or radio in the home. If Genie made the slightest sound, her father hit her with a large piece of wood.

Psychologists reported that Genie hardly seemed human when she was found. She did not know how to chew or stand up straight and she was not toilet trained. She drooled uncontrollably and often spat on anything that was nearby, including herself and other people. When she was first tested by psychologists, the only sounds she could make were high-pitched whimpers. She understood only a few words, probably learned shortly after she was discovered.

Genie was initially placed in a hospital rehabilitation clinic and then a foster home. Throughout this period, psychologists worked intensively with Genie and she made rapid progress. Genie developed physically and learned some basic rules of social behaviour. Gradually, she began to understand words and use short sentences such as 'Genie go', 'No more eat soup' and 'Another house have dog'. However, Genie's use of language continues to remain abnormal after many years. She can say many words and put them together into sentences, but she still has problems with pronunciation and can't form sophisticated sentences as most adults her age can (Curtiss, 1977; Wade & Tavris, 1990).

Evidence from case studies of children such as Genie indicates that there may be a sensitive period in oral language learning. If the child misses the opportunity to learn language during that time, it seems that learning to speak one's native language is much more difficult.

Figure 5.19 This picture was drawn by Genie, who lived in isolation and was mistreated for many years. It shows one of Genie's favourite pastimes — listening to psychologist Susan Curtiss play classical music on the piano. Genie's drawings were used with other case study information to describe and explain her psychological and social development.

Comparison with a case study of another isolated child provides additional evidence. 'Isabelle' was hidden away by her mother and given only enough care to stay alive. Her mother, who was deaf, is believed to have never spoken to her. At the age of six, Isabelle was discovered by other adults and brought into a 'normal' environment. When Isabelle was found, she could not utter any words. Assessments by a psychologist indicated that her cognitive development was below that of a normal two-year-old.

But within a year Isabelle had learned to speak many words, her tested intelligence was normal for her age and she started attending a normal school. Thus, Isabelle at seven years, with one year of intensive language practice, spoke about as well as other children in her grade at school, all of whom had about seven years of practice (Gleitman, Fridlund & Reisberg, 2004). Compared with Genie, Isabelle had been given the opportunity to learn to speak her native language during the sensitive period.

Psychologists believe that after age 12, developing fluency in speaking one's native language is difficult to achieve. Acquisition of the oral language skills and knowledge usually takes more time, is more difficult and the language learning is often not as successful.

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Mini-documentary on Genie 12 m 26 s

LEARNING ACTIVITY 5.10

Review questions

1. In what way is the timing of experience relevant to psychological development?
2. Distinguish between sensitive periods and critical periods in psychological development with reference to two key points.
3. What is a possible relationship between sensitive/critical periods and brain development in infancy and childhood?
4. (a) Why is it important that infants and children are frequently exposed to speech?
   (b) If a child has not acquired their native language by a certain age, is it possible that the child will never master the language? Explain your answer.
5. What is imprinting and what does it involve?

LEARNING ACTIVITY 5.11

Reflection

Some parents are keen to advance or 'hurry' their infants through the development sequence at a faster pace than would normally occur to give them a 'head start' in their schooling. They try to ensure their child will be ready for school and maybe even more advanced than other children so that they maintain that advantage through their school years.

Comment on this strategy with reference to psychological development concepts.

TWIN STUDIES AND ADOPTION STUDIES

Investigating the relative influences of heredity and environment on some aspect of psychological development is challenging because of the need to strictly control genetic or environmental variables of research interest to measure their effects over time. For instance, it is impossible to isolate an individual from all environmental influences to investigate the influence of genes on a specific psychological characteristic. Even keeping a person locked in a bare room without any outside human contact, despite being unethical and illegal, still provides a type of environment. For example, if a newborn infant were placed in isolation for an extended period of time and seemed to be withdrawn when they were later assessed, would this indicate that being withdrawn is genetically determined or could it be the result of the unstimulating environment?

There are, however, ways of overcoming such difficulties so that valid and reliable research data can be obtained. In an attempt to understand the relative influences of heredity and environment, psychologists have access to a number of different research methods to assist in their investigations. Two methods involve studying similarities and differences between people who share and do not share genes and environments. These research methods are commonly called twin studies and adoption studies.

Twin studies

Twin studies involve research using identical and/or non-identical twins as participants. The two types of twins result from different biological processes.

Monozygotic (identical) twins are formed when a single ('mono') fertilised egg splits into two during the first 2 weeks after conception (when a zygote). These twins share 100% of their genes since they developed from the same sperm and egg combination. Studies of monozygotic (MZ) twins can provide valuable information to psychologists because any differences which later develop between them can be attributed to differences in their upbringing and experiences — that is, their environment.

Dizygotic (fraternal) twins develop when the female produces two separate ova (eggs) which are independently fertilised by two different sperm cells. They can be the same or opposite sex and are not genetically identical. Dizygotic (DZ) twins share 50% of their genes and their genetic similarities are comparable to other brothers and sisters.

If a characteristic is mainly influenced by heredity, monozygotic twins are likely to be similar in that characteristic. However, if a characteristic is influenced more by the environment, then monozygotic twins could show significant differences in that characteristic.

Twin studies have most commonly been used to conduct research on the development of personality and intelligence as these psychological characteristics can be easily measured using standardised personality or intelligence tests. For example, in five research studies across different countries, 24 000 pairs of identical twins were compared on two personality traits believed to be present to some extent in all people — extroversion (outgoingness) and neuroticism (emotional instability). The combined data showed that identical twins living in the same family environment were more alike on these characteristics than were fraternal twins living in the same family environment. This led researchers to conclude that heredity played a significant role in the development of these broad, psychological characteristics (Loehlin, 1992).

Through studying twins, psychologists have been able to gain a better understanding of which psychological characteristics are more likely to be influenced by environmental factors.

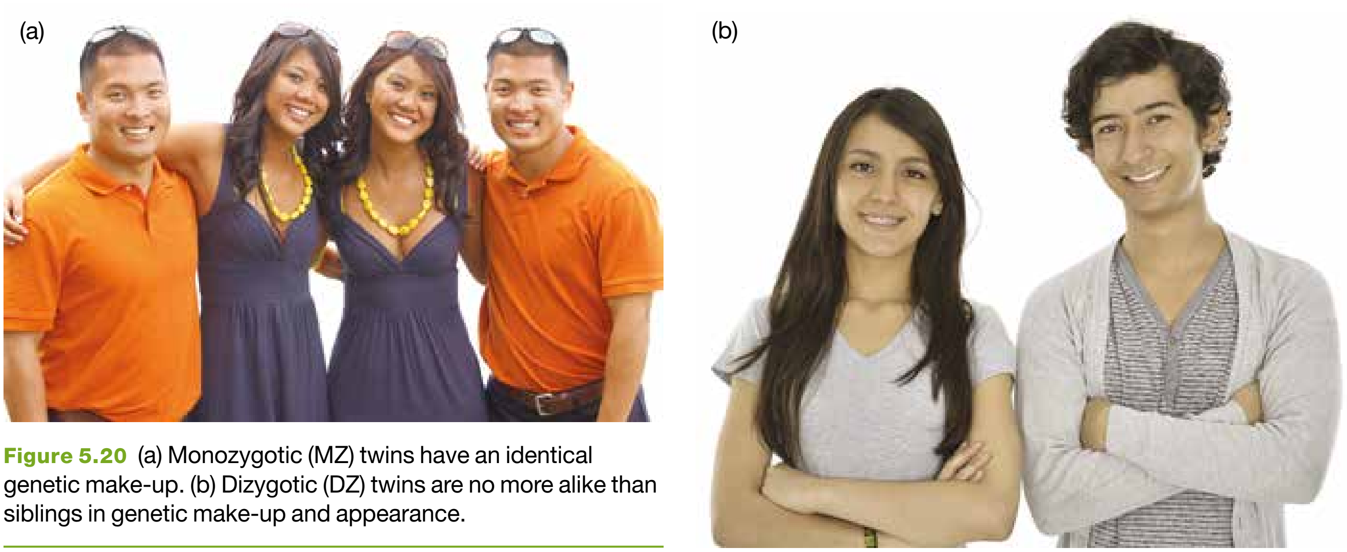

Figure 5.20 (a) Monozygotic (MZ) twins have an identical genetic make-up. (b) Dizygotic (DZ) twins are no more alike than siblings in genetic make-up and appearance.

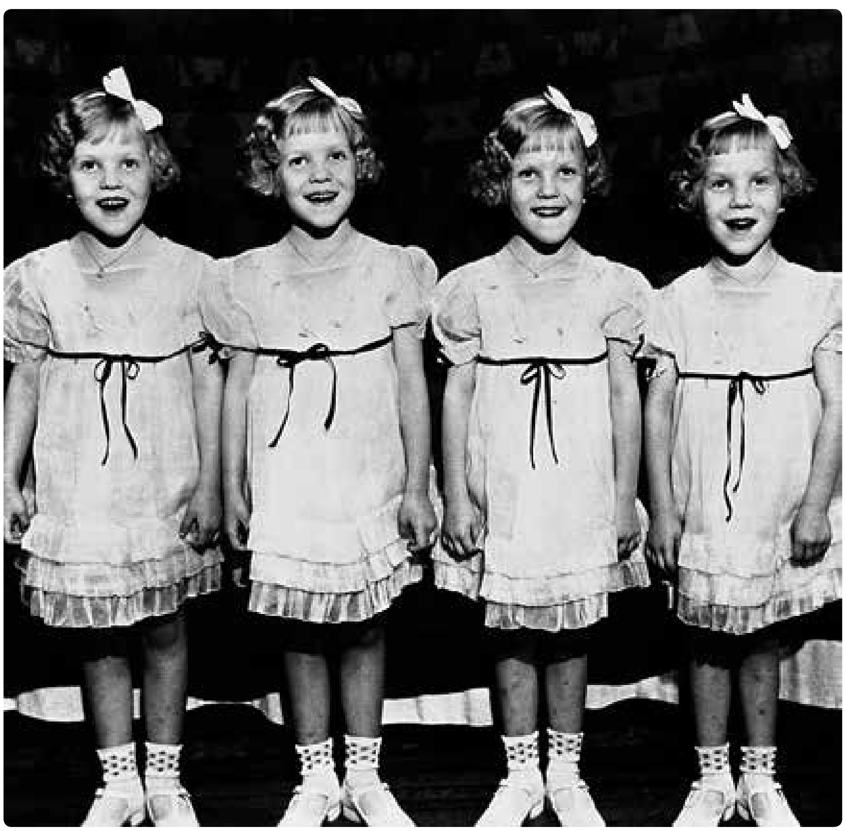

Figure 5.21 Born in 1930, all four of these monozygotic female quadruplets (with the pseudonym Genain to protect their identity) developed schizophrenia by age 24. This suggests a 'schizophrenic gene' is the main contributory factor. However, despite their identical genetic inheritance, environmental factors cannot be ruled out. For instance, their schizophrenia differed in severity, their father was physically abusive and subjected them to harsh punitive treatment, and their mother had a history of mental health problems. In sum, this case study, for which the Genains continue to participate, suggests that schizophrenia has both genetic and environmental components (Mirsky et al., 2000).

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Weblinks

- Video on twin studies 4 m 12 s
- Tutorial on twin studies and adoption studies

In one American longitudinal ('long term') study of 400 pairs of twins (both monozygotic and dizygotic) in America, researchers studied the development of intelligence of twins from birth to the early school years, periodically taking measurements of intelligence (to obtain IQ scores). From the outset, the monozygotic twins were very similar to one another in intelligence and, by the time they began school, each of the monozygotic twins showed almost identical strengths and weaknesses in their mental abilities. Fraternal twins were also similar to one another, but significantly less than identical twins (McGue et al., 1993).

This study, and others with similar findings, suggest that intelligence is, at least, partly determined by heredity. It also seems that monozygotic twins who share similar environments as well as their identical genetic structure achieve similar scores on intelligence tests.

While twin studies seem to provide a sound basis for judging the differences between the influences of heredity and environment on development, there are a number of issues to consider before accepting these findings without question.

Identical twins are often viewed by parents, and sometimes by themselves, as being a 'unit' and they are often treated in a similar manner. Identical twins may also be more inclined to do things together than fraternal twins. Thus, to say that any differences between identical twins are definitely the result of hereditary factors is risky, as identical twins may often be exposed to the same environmental factors. Some of their similarities, therefore, could also be attributed to environmental factors.

Adoption studies

Psychologists also use information from research with children who have been adopted, and therefore have no genetic similarity to their adoptive parents, to learn about the influence of heredity and environment on psychological development. These are called **adoption studies**.

By examining the similarities and differences of adopted children and their adoptive and biological parents, psychologists can gain an insight into the relative influences of heredity and environment on a range of psychological characteristics. Similarities between children and their adoptive parents would suggest environmental influence is greater, whereas similarities between adopted children and their biological parents would indicate inherited influence is greater.

Studies of adopted children have provided considerable support for the view that inheritance plays a significant role in an individual's intelligence. They show that the scores on intelligence tests achieved by adopted children are much more similar to the IQ scores of their biological parents than with those of their adoptive parents even though their adoptive parents had raised them since birth. Because the children did not spend time living with their biological parents, the most likely explanation for the similarity in IQ scores involves heredity (Bouchard & McGue, 1981; Plomin et al. 2012; Plomin & Spinath, 2004).

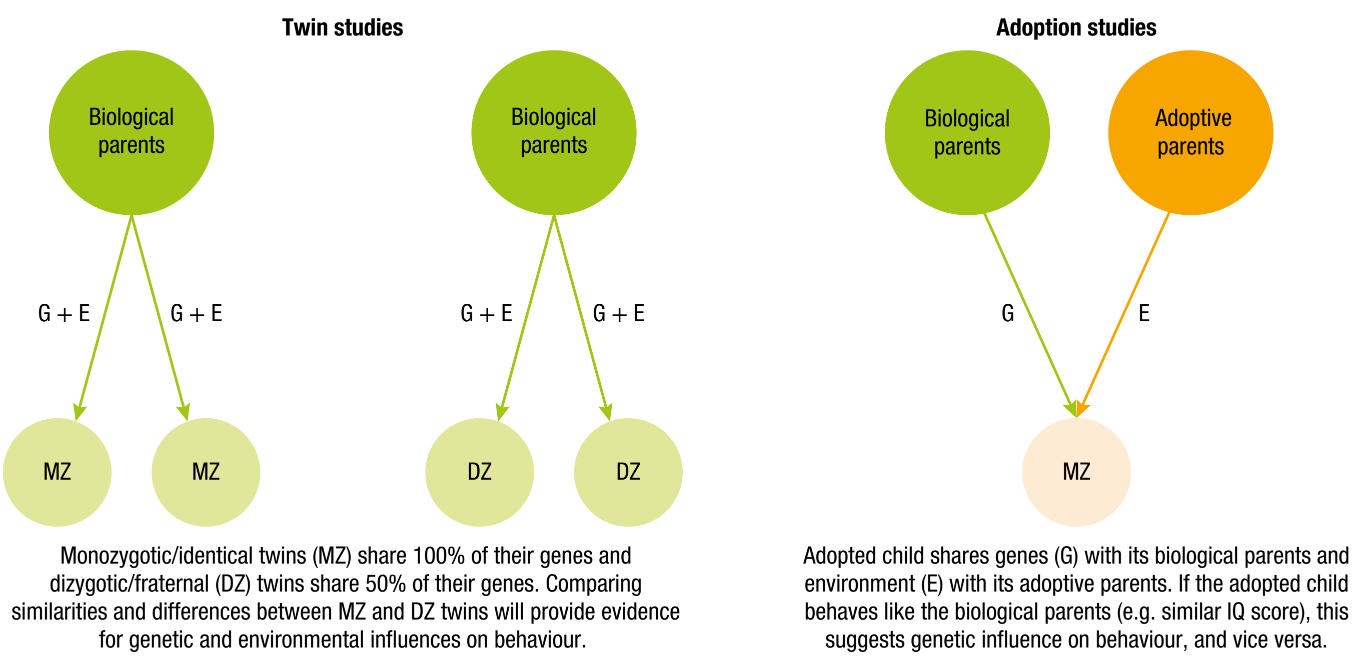

Figure 5.22 Comparing twin and adoption studies

BOX 5.6 IQ scores and genetic relatedness in shared and non-shared environments

Psychologists usually study the role of inheritance in human intelligence (as measured by IQ) by examining the IQ scores of people who are biologically related to one another in varying degrees. Figure 5.23 shows different kinds of relationships between people, with a number known as a correlation coefficient next to each kind of relationship. These numbers have been derived from the results of over 100 correlational studies — a non-experimental research method used to investigate the type and strength of the relationship between two or more variables (see Box 2.1, page 36). Unlike experimental research, there is no attempt to manipulate any variable. The researcher simply assesses the relationship between the variables of interest.

It is evident in Figure 5.23 that there is a very high correlation (0.86) between identical twins reared together and their IQ scores. This means that in the case of identical twins who are as closely related as anyone can be in terms of their genetic inheritance and who also have a largely shared environment, it can be concluded that if one such twin has a high IQ score then the other twin is likely to have a high IQ score too. Similarly, if one of these twins has a low IQ score then the other is also likely to have a low IQ score.

Note that some correlations in Figure 5.23 are not as high and therefore as strong as all others. For example, cousins, who are the least genetically related family members, have a very low correlation of 0.15. Note too that as the genetic relatedness of people becomes more remote, the strength of the correlation between genetic relatedness and IQ score decreases. This suggests that the more closely related two people are in terms of their genetic inheritance, then the more alike their IQ scores will be. Such data provide strong evidence for the role of heredity as an important factor which influences intelligence (as measured by an IQ test).

Importantly, these data also provide evidence for the role of the environment, such as where and how the children are raised. This is evident in the different correlations for identical twins reared together (0.86) and identical twins reared apart (0.72). It seems that this difference could be due to the role of environmental factors involving different life experience.

Many other research studies have established that the environment in which we are raised has a very significant effect on intelligence. For example, there is little doubt that formal education such as schooling impacts on intellectual development and IQ scores. Generally, the longer a child remains in school, the higher their IQ will be (Gazzaniga & Heatherton, 2006; Neisser, 1998; Plomin & Spinath, 2004).

It is impossible to completely separate the effects of heredity and environment on intelligence, since they interact constantly from the time of conception throughout the entire lifespan. Psychologists believe that variations in intelligence can be attributed to both hereditary and environmental factors, but which has the greater influence is very difficult to judge.

There is general agreement that inherited genes probably set the upper and lower limits of an individual's intellectual capabilities and environmental factors play a significant role in determining whether an individual will reach their genetically determined potential.

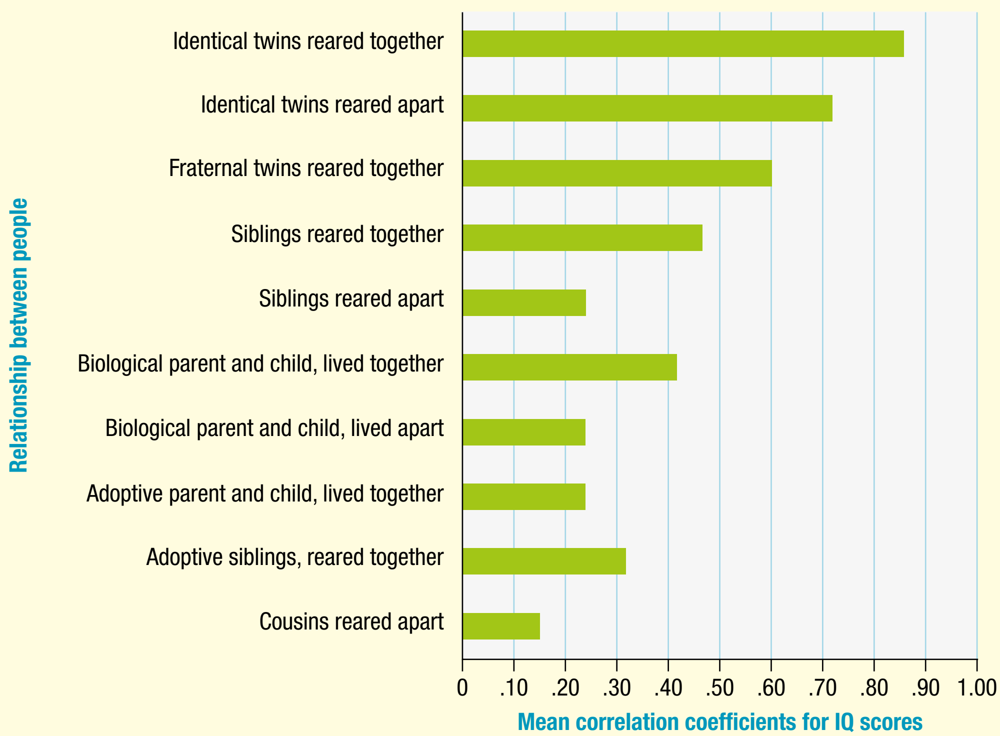

Figure 5.23 Correlations of IQ scores and genetic relatedness

LEARNING ACTIVITY 5.12

Review questions

1. Rank the pairs of people listed below from one to five, with one being the pair you would consider to have the most similar genetic make-up and five the pair with the least similar genetic make-up:
   (a) a parent who lives with their child
   (b) two unrelated children who were raised together
   (c) two unrelated adopted children who were raised separately
   (d) identical twins raised together
   (e) identical twins raised separately.
   Compare your rankings with those of other class members and give reasons for your rankings.
2. Someone not studying psychology asks what a twin study and an adoption study are. What would you tell them to help them understand?
3. (a) Explain how twin and adoption studies have been used to study genetic and environmental influences on personality and intelligence.
   (b) What have these studies found?
   (c) Explain how you could use twin and adoption studies to investigate the influence of heredity and environment on the development of aggression.

LEARNING ACTIVITY 5.13

Essay — influences of nature and nurture on development

Write an essay of about 400–500 words in which you discuss the influences of nature (heredity) and nurture (environment) on psychological development.

In your essay, ensure that you:

- define and explain the meaning of psychological development
- describe how heredity may influence psychological development
- give one or more examples of how heredity may influence psychological development
- describe how environment may influence psychological development
- give one or more examples of how environmental factors may influence psychological development
- discuss the interaction between hereditary and environmental influences on psychological development, with reference to an example and research findings
- describe how twin and adoption studies may be used in the study of psychological development
- accurately define and explain all key terms
- express your ideas in a clear and concise way
- accurately cite and reference all material.

References may be used in obtaining information for your essay.

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Sample assessment task sheet and criteria for the essay

ATTACHMENT AND EMOTIONAL DEVELOPMENT

Attachment is a relationship between two people in which each person feels strongly about the other. In infancy, **attachment** refers to the emotional bond which forms between an infant and another person.

Infants form attachments with those people who regularly care for and are most deeply involved with them, usually the main caregivers such as the mother and father. Many infants develop strong attachments to both parents. However, it is not uncommon to have a strong attachment to the mother but not the father, or vice versa. Infants are also capable of developing different and separate attachments with other people who have significant involvement in their lives, for example, an older sibling, a grandparent or childcare worker in a daycare centre.

Generally, infants under 6 months of age do not fully recognise their caregivers on an individual basis from visual cues alone. In the same way that they smile indiscriminately, they happily accept comfort from anyone who provides it to their satisfaction. Although from about two months of age they may show negative reactions when their main caregiver departs or turns their attention elsewhere, nearly anyone who provides the desired comfort or attention will quickly be accepted as a substitute.

Between about six and eight months of age there is usually a dramatic departure from the earlier pattern of accepting comfort from just about anyone. This period marks the development of a special attachment to the main caregiver who is usually the mother. Infants are likely to cry and cling when their main caregiver leaves and to react with aversion to anyone else who tries to comfort them. At this stage infants are in the process of developing their first meaningful attachment to another person. The attachment will be specific for this person, or stronger for that person than for others.

There is considerable research evidence that the attachment(s) formed during infancy, particularly in the first 12 months of life, influences the individual's emotional development, both in the short term and into adulthood. For example, early attachment is linked to the development of trust and security, whereas absence can result in anxiety and inner turmoil.

Individual differences in emotional sophistication between children of the same age have also been linked to the type of attachment relationship the child forms. Some children are very skilled in reading and analysing emotions, while others are somewhat slower in grasping the basics of emotional understanding. Similarly, some children will be more emotionally resilient than others and can therefore more easily adjust to and recover from events that cause upset or anxiety. These early differences can persist throughout the lifespan (Meins, 2011).

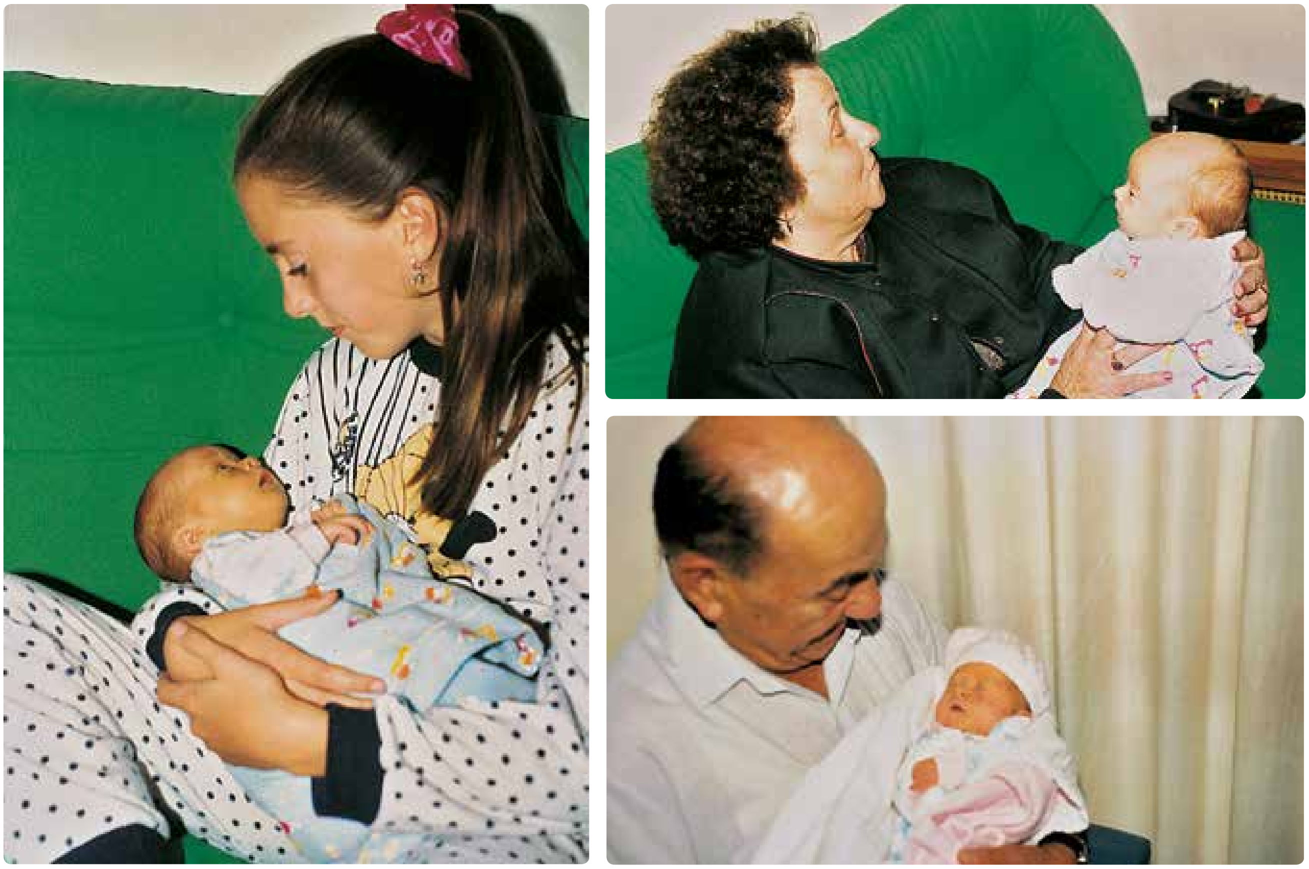

Figure 5.24 Infants are capable of developing different and separate attachments with a range of people who have significant involvement in their lives; for example, an older sibling or grandparent. Attachment is observed in all cultures, but there can be cultural differences in the nature of the attachment relationships.

Ainsworth and the Strange Situation procedure

American psychologist Mary Ainsworth (1913–1999) is one of the best-known researchers and theorists on attachment. Ainsworth and her colleagues (1978) devised a method for assessing attachment in a laboratory setting that has since been used by many other researchers. They used the term Strange Situation to describe their procedure.

The **Strange Situation** is a standardised test for measuring the attachment relationship a child has with their parent. It is typically conducted during infancy between 9–18 months of age. The infant and caregiver are taken into an unfamiliar room containing some age appropriate toys. Then the infant is exposed to a series of separations and reunions involving the caregiver, the infant and a stranger. Typically, the room is equipped with a one-way mirror, and the entire procedure is video recorded for later scoring.

An example of the sequence of separations and reunions is shown in Table 5.2 on page 246. The infant's behaviour in each episode is observed and recorded; for example, the infant's willingness to play with the stranger, their behaviour when left alone in the room and their reactions to the caregiver leaving and returning.

Ainsworth conducted many research studies on attachment using the Strange Situation procedure. She found that infants show attachment through behaviour that promotes closeness or contact with the person to whom they are attached. These behaviours included crying to attract the caregiver's attention, crying when held by someone other than the caregiver and stopping when taken by the caregiver, clinging physically to the caregiver, particularly in the presence of a stranger, looking at the caregiver when separated but in sight and lifting arms to be picked up by the caregiver. She also identified different types of attachment.

The Strange Situation continues to be used in child development research. It has further enhanced understanding of attachment and has highlighted more than just attachment types. For example, its use has identified the patterns of attachment-related behaviour called stranger anxiety and separation anxiety. *Stranger anxiety* refers to an infant's wariness or cautiousness when a stranger such as an unfamiliar adult is present. *Separation anxiety* is indicated by an infant's distress when they are separated from their main caregiver.

Figure 5.25 American psychologist Mary Ainsworth, circa 1985 (1913–1999). (Photo credit: Dr Patricia M. Crittenden)

Table 5.2 The stages of the Strange Situation test

Stage	Time frame	Episode	People in the room	Attachment behaviour observed
1	30 seconds	Experimenter leaves caregiver and infant to play	caregiver, infant, experimenter	
2	3 minutes	Caregiver sits while infant plays	caregiver, infant	Use of caregiver as secure base
3	3 minutes	Stranger enters and talks to caregiver	stranger, caregiver, infant	Stranger anxiety
4	3 minutes	Caregiver leaves; stranger lets infant play, offers comfort if needed	stranger, infant	Separation anxiety
5	3 minutes	Caregiver returns, greets infant, offers comfort if needed; stranger leaves	caregiver, infant	Reactions to caregiver's return
6	3 minutes	Caregiver leaves	infant	Separation anxiety
7	3 minutes	Stranger enters and offers comfort	stranger, infant	Stranger anxiety; ability to be comforted by stranger
8	3 minutes	Caregiver returns, greets infant, offers comfort, lets infant return to play	caregiver, infant, experimenter	Reactions to caregiver's return

Source: Adapted from Ainsworth, M.D.S., Blehar, M.C., & Walters, E. (1978). *Patterns of attachment: A psychological study of the Strange Situation*. Hillsdale, New Jersey: Lawrence Erlbaum.

Figure 5.26 A mother, infant and stranger in a Strange Situation experimental setting

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Weblink
Video showing infant responses in the Strange Situation 5 m 24 s

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Weblinks
- Video on Strange Situation research 7 m 27 s
- Video series on Ainsworth's research

Ainsworth's types of attachment

According to Ainsworth (1982), infants can form different types of attachment with a caregiver. These can vary in terms of how strong the connection is and the kind of connection. The strength of each attachment also depends to a large extent on how sensitive and responsive the caregiver(s) is to the infant's needs. The infant's responsiveness is also a factor in the type of attachment that is formed.

Following extensive research on attachment types, Ainsworth and her colleagues (1978) proposed that there are two main categories of attachment — secure and insecure attachment. Ainsworth further separated insecure attachment into two types — resistant attachment and avoidant attachment. Consequently, when Ainsworth described attachment types, she generally described them in terms of three types — secure attachment, insecure resistant attachment and insecure avoidant attachment.

Secure attachment

An infant who has formed a secure attachment shows a balance between dependence and exploration. The infant uses the caregiver as a 'home', or safe base from which to venture out and explore an unfamiliar environment, but shows some distress and decreases exploration when the caregiver departs. When the caregiver returns, the infant is enthusiastic and seeks physical contact with them.

Securely attached infants feel safe and are able to depend on their caregivers. The infant's moderate distress at their caregiver's departure suggests that they feel confident that the caregiver will return. About 65% of one-year-olds are securely attached.

Insecure avoidant attachment

The infant does not seek closeness or contact with the caregiver and treats them much like a stranger. The infant rarely cries when the caregiver leaves the room and ignores the caregiver upon their return. Research findings suggest that this attachment type may be the result of neglectful or abusive caregivers. About 20% of one-year-olds are in this category.

Insecure resistant attachment

The infant appears anxious even when their caregiver is near. They become very upset when separated from the caregiver. When the caregiver returns, the infant approaches them, cries to be picked up, then squirms or fights to get free, as though it is not sure about what it really wants.

This attachment type is thought to result from caregivers who are not very responsive to their infant's needs. It is assumed the infant feels they cannot depend on their caregiver to be available to them if needed. About 12% of one-year-olds are in this category.

Ainsworth (1982) found that the patterns of behaviour associated with each type of attachment tend not to change over time unless there are significant changes in life circumstances for either the caregiver or the infant. However, she believed the nature of the attachment may change if the caregiver substantially changes the way in which they interact with the infant, particularly the way in which they respond to the infant's expressed needs.

The different attachment types have been linked to different outcomes in the short term and long term. For example, research findings suggest that adults who formed secure attachments as infants tend to have good self-esteem, seek social support when they need it, have trusting, lasting relationships and are comfortable sharing feelings with their friends and partners. Those who have had insecure early attachment may experience anxiety, inner turmoil, lack trust in others and are reluctant to form close relationships with others (Bachman & Zakahi, 2000).

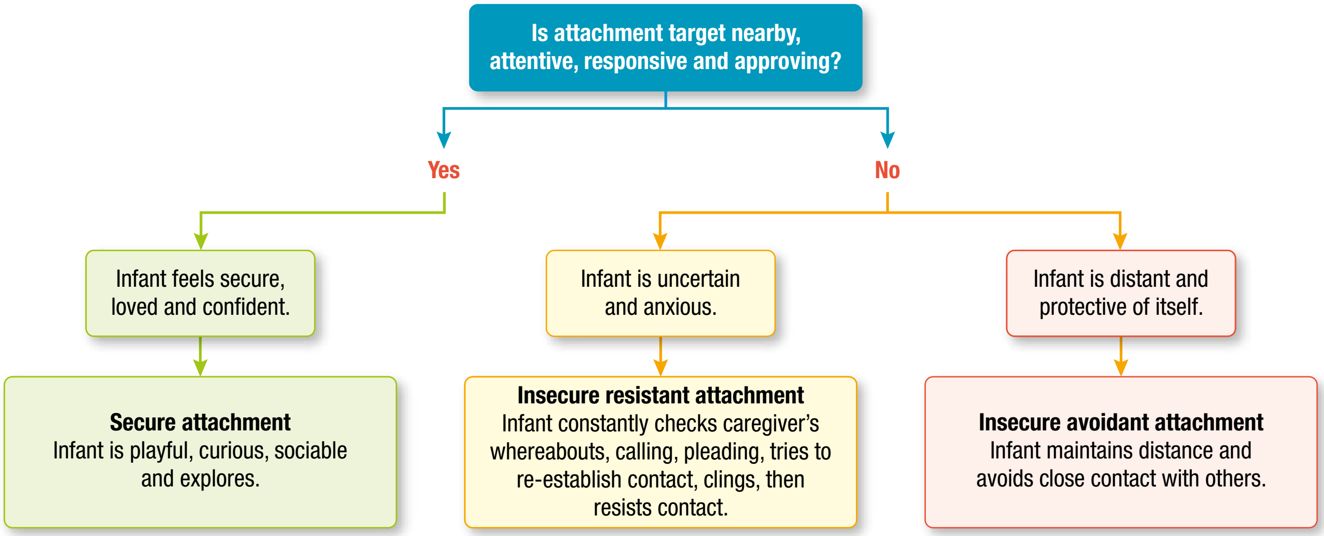

Figure 5.27 Attachment types and behaviours

Factors influencing attachment

What factors govern the development and emergence of attachment? Among those that have been proposed are a genetic predisposition to form an attachment, the infant's temperament and the infant's experiences early in life.

Genetics

The concept of attachment was first proposed by eminent British psychiatrist John Bowlby (1907–1990). Bowlby (1969) argued that all infants have an inborn, 'primary drive' to form an attachment with a caregiver. He considered the infant–caregiver bond to be important in two ways.

First, the bond forms the foundation for healthy emotional development later in life. Second, the bond has an 'evolutionary' function, which, according to Bowlby, improves the infant's chances of survival. A close emotional connection with a caregiver keeps the infant and caregiver physically close, thereby increasing the helpless and dependent infant's chances of survival. For example, when the infant is physically close, the caregiver can keep a watchful eye on their safety and intervene if danger threatens (Bowlby, 1988).

Bowlby suggested that infants use genetically inherited abilities such as crying, smiling, gazing, vocalising and clinging to get near to their main caregiver, or to get their caregiver's attention. These behaviours bring about attachment responses from the main caregiver who has a biological need to be near to and to protect their infant. For example, the main caregiver responds to the infant's 'attachment signals' by caring for it with nurturing behaviours such as feeding, touching and cuddling.

Bowlby maintained that attachment develops in a fixed, age-related sequence and that the consistency with which infants progressed through the different phases provided evidence of the biological and evolutionary basis of attachment (see Table 5.3).

Bowlby also proposed that mothers are the best caregivers for infants. He believed 'nature' intended the mother to be the primary caregiver; that is, females are genetically programmed to be the best and therefore the main caregiver.

Many psychologists also believe that infants may have a preference to form an attachment to the mother, but this is not necessarily a natural, biologically programmed tendency. Infants tend to develop an attachment to the mother because the mother is usually the person who takes on the role of main caregiver. However, research findings indicate that even when the mother is the person who performs the routine tasks of looking after the infant and spends more time with it than anyone else, she will not automatically be the infant's attachment target.

Figure 5.28 British psychiatrist John Bowlby (1969) proposed that all infants have an inborn, 'primary drive' to form an attachment with a caregiver and that mothers are the best caregivers.

Table 5.3 Bowlby's phases of attachment

Phase	Approximate age of onset and duration	Infant characteristics
1. Pre-attachment	0–2 months	Little differentiation in social responses (e.g. smiling, crying, vocalisations) to familiar and unfamiliar people. Accept comfort from anyone who provides it to their satisfaction
2. Laying foundations of attachment	2–7 months	Starting to recognise caregivers but does not usually show attachment responses upon separation
3. Clear-cut attachment	8 months–2 years	Protest or anxiety at being separated from their caregivers and become wary of strangers. May cry or cling when caregiver moves away and react negatively to anyone else who tries to provide comfort
4. Goal-directed partnership	2+ years	Increased independence and recognition that their caregivers have goals and plans that sometimes make separation necessary

Neither is there widespread agreement among psychologists that humans have a biological, pre-programmed need to form an attachment or that the infant's genes influence the quality of the attachment. A more widely held view is that humans may inherit a capability to form an attachment, but the type and quality of the attachment is influenced by a complex interaction of many different factors; for example, the respective characteristics of the infant and caregiver and the quality of the interaction which takes place between them.

Temperament

An attachment relationship is two-way. Both individuals involved in the relationship play an active role in establishing the bond. The caregiver plays an important part in the emergence of attachment, but the type of attachment formed also depends to some extent on the infant's behavioural characteristics. There is considerable research evidence that infants differ at birth in their basic response tendencies. Some will cry a lot, others will be placid, some will be active, some less so, and so on. These types of behaviours have been associated with temperament.

Temperament has been defined and measured in various ways by different psychologists who have studied it. Most definitions refer to **temperament** as our characteristic way of reacting to people, objects and events. For example, temperament may be considered as the 'style' with which we behave and includes such characteristics as the speed and intensity of emotional reaction when frustrated or uncomfortable, whether we are easy-going, calm and readily adapt, or very fussy, irritable and slow to adapt. Many psychologists believe our temperament provides the foundations of personality development or at least significantly influences its development (Thomas & Chess, 2009).

Temperament is also widely regarded as having some degree of genetic basis. Differences in temperament are found in infants across all cultures and tend to persist throughout childhood and into later years. For example, some newborns typically display positive moods, are non-irritable, relaxed and adapt easily to new routines, food, people and situations. Others are more intense, irritable, fussy and less adaptable.

Types of temperament

One of the early and best-known research studies on infant temperament classified infants as having one of three temperaments:

- *easy:* even tempered, usually content or happy, and open and adaptable to new experiences such as the approach of a stranger or their first taste of a mashed vegetable. They have regular feeding and sleeping habits, and they usually tolerate frustration (e.g. being retrained) and discomfort (e.g. dirty nappy).
- *difficult:* these infants are active, irritable, and irregular in their daily feeding and sleeping habits. They often react negatively and quite extremely to changes in their routine and are slow to adapt to new people or situations. They cry often and loudly, and are inclined to throw a tantrum when frustrated or uncomfortable.
- *slow-to-warm up:* these infants tend to be more inactive than active, somewhat moody and only moderately regular in their daily habits. Like difficult infants, they are slow to adapt to new people and situations, but they tend to respond mildly, rather than in an intense, negative way. For example, they may resist a cuddle by looking away from the cuddler rather than by screaming. They eventually adjust, showing a quiet interest in new foods, people, or places. (Thomas, Chess & Birch, 1970).

Researchers have also found that an infant's type of temperament can influence a caregiver's responsiveness to the infant and the appropriateness of their response. In turn, these can impact on the infant and influence the growth and quality of an affectionate bond. For example, the main caregiver of an 'easy' infant who is usually cheerful, relaxed, adaptable and has a regular pattern of 'eating, eliminating and sleeping' will more readily be able to identify the infant's needs and respond appropriately than would the caregiver for a 'difficult' infant who is moody, tense, fussy and has irregular habits (Bukato, 2008; Charlesworth, 2014; Sigelman & Rider, 2012).

It is also possible that a caregiver's attitudes to an infant will be influenced by the infant's temperament. For example, a caregiver may develop and show less affection for an infant with a 'difficult' temperament than they would for an infant with an 'easy' temperament.

Figure 5.29 The infant's temperament can influence a caregiver's responsiveness and the appropriateness of their response.

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Weblink
Video of two pioneering researchers discussing temperament
8 m 25 s

Early life experiences

Attachments usually form within the first 6–7 months or so. Therefore, the infant's experiences in its environment during this period are important. A great deal of the infant's time throughout this vital period is with the main caregiver who is meeting its needs. The human newborn, however competent it may be, cannot survive unless responsive adults attend to their needs and protect them from environmental hazards.

Sensitivity and responsiveness of the caregiver

It is not until about 12 months of age that most infants start to use recognisable words. Up until that time, they rely on other ways to crommunicate their moods, feelings and needs. For example, they use body language such as smiling, gazing, reaching, squirming and clinging, and vocalisations such as crying and babbling. A secure attachment is most likely to be formed with the person(s) who is most sensitive to these signals and responds appropriately. Ainsworth (1983) referred to this factor as the *sensitive responsiveness* of the caregiver and believes that it is crucial in the type of attachment formed between an infant and caregiver.

In one study, Ainsworth (1983) compared how mothers with securely attached infants and mothers with insecurely attached infants responded to signals of discomfort from their infants. She found that mothers with securely attached infants were more sensitive to their infants and responded more appropriately throughout the first year of their infant's life. They were quickest to respond when their infants cried, and were able to more accurately identify the cause of the crying and the remedy required.

Not only were they more responsive in detecting when the infants cried because of hunger, but they were also very responsive to the infants' signals in terms of when to stop feeding and how quickly or slowly the feeding should proceed. By contrast, mothers with insecurely attached infants tended to lack awareness of what their infants were feeling or needing. They had less physical contact with their infants and their caregiving activities appeared to revolve more around their own interests and moods than those of their infants. The mothers of insecurely attached infants also tended to be less interested in mothering in general. It is likely that this influenced their responsiveness and their overall style of parenting.

The sensitivity and responsiveness of the caregiver are vital aspects of early life experience and play an important role in the type and strength of attachment which occurs with an infant. Attachment appears to thrive when the caregiver is sensitive to and appropriately interprets and responds to the infant's signals. However, not all main caregivers act in this way.

One factor which may account for inappropriate responsiveness by a caregiver is their general attitude towards parenting. This is influenced by a complex interaction of many other factors, some of which can be traced to the early experiences of the parents. Situational factors can also influence the infant–caregiver relationship; for example, the type of relationship between the parents, involvement of others in the parenting, the number of other children, being in paid employment, and adequacy of the family income and housing.

The caregiver's views of their own early life experiences with their parents has also been found to be influential. American psychologists Inge Bretherton and Everett Waters (1985) interviewed parents of insecurely attached infants and compared their recollections of childhood with those of parents of securely attached infants. They found that many of the parents of insecurely attached infants had failed to form a secure attachment during their own infancy or had experienced a traumatic loss of an early attachment figure. Many also reported being rejected or feeling unloved by their parent(s) and severe loneliness during childhood.

Figure 5.30 A secure and healthy attachment is most likely when the caregiver is sensitive and appropriately responsive to the infant's signals.

Although it is reasonable to expect that secure attachment is promoted by the mental health condition of parents, especially mothers, research studies have generally provided contradictory results. A majority of studies, however, have found that mothers diagnosed as having post-natal depression were more likely to develop insecure attachment relationships with their infants (Gervai, 2009; McMahon et al., 2006).

Demographic factors

Research studies over the last three decades have also identified other factors associated with the infant's early life experience that can affect the type and quality of attachment relationships. These are often described as *demographic factors* and include family income, family size, parental age and education and major stressful life events within the family, such as loss of a parent, birth of a sibling, severe illness, marital breakdown and ongoing presence of a new romantic partner of the main caregiver (Gervai, 2009).

The infant's and caregiver's cultural background also influences their relationship. For example, German parents tend to strongly encourage independence and discourage clingy behaviour, fearing that if they are too responsive to cries they will 'spoil' their infants. This has been suggested as a reason why many German infants tend to make few emotional demands on their parents and are often classified as having an avoidant attachment when assessed in the Strange Situation. By contrast, Japanese infants, who are rarely separated from their mothers early in life and are encouraged to be dependent on their mothers, tend to become highly distressed by separations such as those to which they are exposed in the Strange Situation. As a result, they are more likely than non-Japanese infants to be classified as having a resistant attachment (Sigelman & Rider, 2012).

Disorganised attachment

In 1986 American psychologists Mary Main and Judith Solomon identified a fourth attachment type, now called disorganised attachment and involving insecure attachment. When in the Strange Situation, infants who had formed a **disorganised attachment** were often inconsistent or showed odd and contradictory behaviours when separated or reunited with their caregivers. For example, when reunited with a caregiver they might seek close contact but would do so by moving slowly back towards the caregiver or approach with their head turned in another direction as if avoiding eye contact. These infants also tended to respond to reunions with fearful or unusual behaviours such as rocking themselves, ear-pulling or freezing (Main & Solomon, 1986).

Researchers who investigated early life experiences associated with disorganised attachment have linked it to factors such as infant maltreatment, hostile caregiving, post-natal depression and the mother having an unresolved trauma or experienced loss through separation, divorce, and death. However, research studies have also found disorganised attachment among infants in families where none of these variables is evident and the 'middle-class family' lifestyle appears 'normal'. So, psychologically inappropriate parenting practices do not fully explain disorganised attachment in an infant. The origins of this attachment type seem to be highly complex and the challenge remains to untangle the influence of different variables.

Disorganised attachment has been found to be a risk factor for the development of a mental health disorder (Meins, 2011). This is studied in Unit 4.

Figure 5.31 A range of demographic factors, including cultural background, can influence an attachment relationship.

BOX 5.7 Childcare: positive or negative effects on attachment?

Some parents who contemplate childcare worry that their child will prefer a childcare provider to them and that the childcare centre will be harmful to the infant–parent attachment relationship. However, research studies show that these early separations do not weaken the attachment relationship between the parent and the infant.

For example, a longitudinal ('long-term') study was conducted in 10 different American cities to investigate the attachment relationship between mothers and their infants at one, six and 15 months of age, some of whom had been attending childcare and others who had not attended childcare. The results showed that the view that childcare had no negative effects on mother–infant attachment and children cared for out of the home actually appeared less insecure when their mothers were not in sight than did children cared for only in the home (NICHD Early Child Care Research Network, 1997).

The attachment relationship between a caregiver and child seems to be affected more by the *quality* of the time rather than the *quantity* of time they spend together. What seems to be most important is that the infants have a consistent and warm relationship with their caregiver(s) (Crockenberg & Litman, 1991). However, if a child is placed in childcare because of family breakdown or the mental or physical health of one or both parents, then a disrupted or insecure attachment may develop (Vaughan, Gore & Egeland, 1980).

As long as the main caregiver works by choice, provides 'good' quality childcare arrangements and develops a warm and caring relationship during the times they spend with their infant, the 'fear' or anxiety that the infant–caregiver attachment relationship will be adversely affected appears to be unnecessary. Some psychologists suggest that good quality childcare can actually enhance the relationship between the infant and caregiver(s) (AIHW, 2017).

Figure 5.32 Placing an infant in childcare does not necessarily weaken the infant–caregiver attachment relationship.

LEARNING ACTIVITY 5.14

Review questions

1. Explain the meaning of attachment.
2. Why is attachment described as a two-way relationship?
3. When do attachments form?
4. What is the relationship between attachment and emotional development?
5. (a) What is the Strange Situation?
   (b) List five behaviours that could be used as indicators of attachment within and outside the Strange Situation.
6. Name and describe four attachment types.
7. Construct a table to summarise factors influencing the development of attachment. Ensure you briefly describe, explain and give a relevant example(s) of each factor.
8. (a) Consider Ainsworth's research studies using the Strange Situation. Given her research had the potential to cause psychological distress to infants, what ethical standards would Ainsworth have been required to address in order to be given permission by an ethics committee to conduct her study? Explain your selection of each standard.
   (b) Do you think Ainsworth's research should have been allowed to proceed? Explain your answer with reference to relevant ethical standards.

LEARNING ACTIVITY 5.15

Reflection

Comment on the view that an infant's mother is the best person to be its primary caregiver. Ensure you consider relevant psychological theory and research evidence.

Harlow's experiments on attachment in monkeys

At around about the same time Ainsworth was developing her theory on attachment in human infants, American psychologist Harry Harlow was undertaking research on attachment in rhesus monkeys. Harlow conducted a number of experiments to investigate factors influencing the development of attachment by infant monkeys to their mothers.

In one of his best-known experiments, Harlow (1958) investigated the role of breastfeeding in infant–mother attachment. He used eight infant rhesus monkeys which had been separated from their mothers at birth.

The monkeys were individually reared in cages, each of which contained two surrogate mothers. A *surrogate* is anyone or anything which 'substitutes for' or 'plays the part of' something else.

As shown in figures 5.33 and 5.34, the surrogate mothers were made of wire mesh and were roughly the same size and shape as real monkey mothers. One of the surrogates was covered in terry-towelling cloth and the other was left uncovered. A feeding bottle was attached to one of the surrogates in the same area where a breast would be on a real mother. Half of the animals were in cages with the feeding bottle on the cloth surrogate and the other half were in cages with the feeding bottle on the wire surrogate.

Harlow proposed that if an infant's attachment to its mother was based primarily on feeding, the infant monkeys should have preferred and become attached to whichever surrogate mother had the bottle.

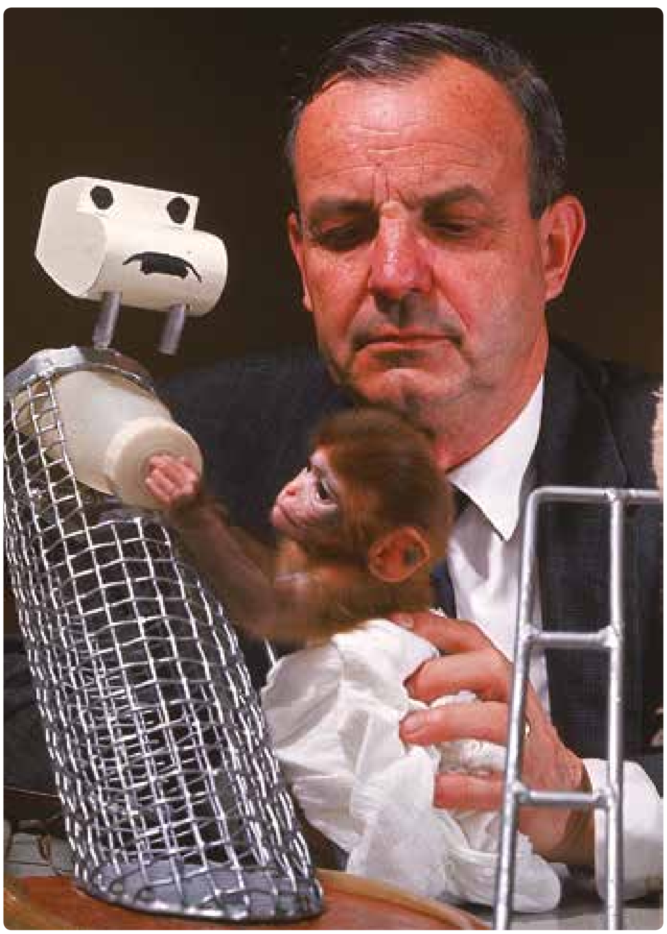

Figure 5.33 American psychologist Harry Harlow (1905–1981)

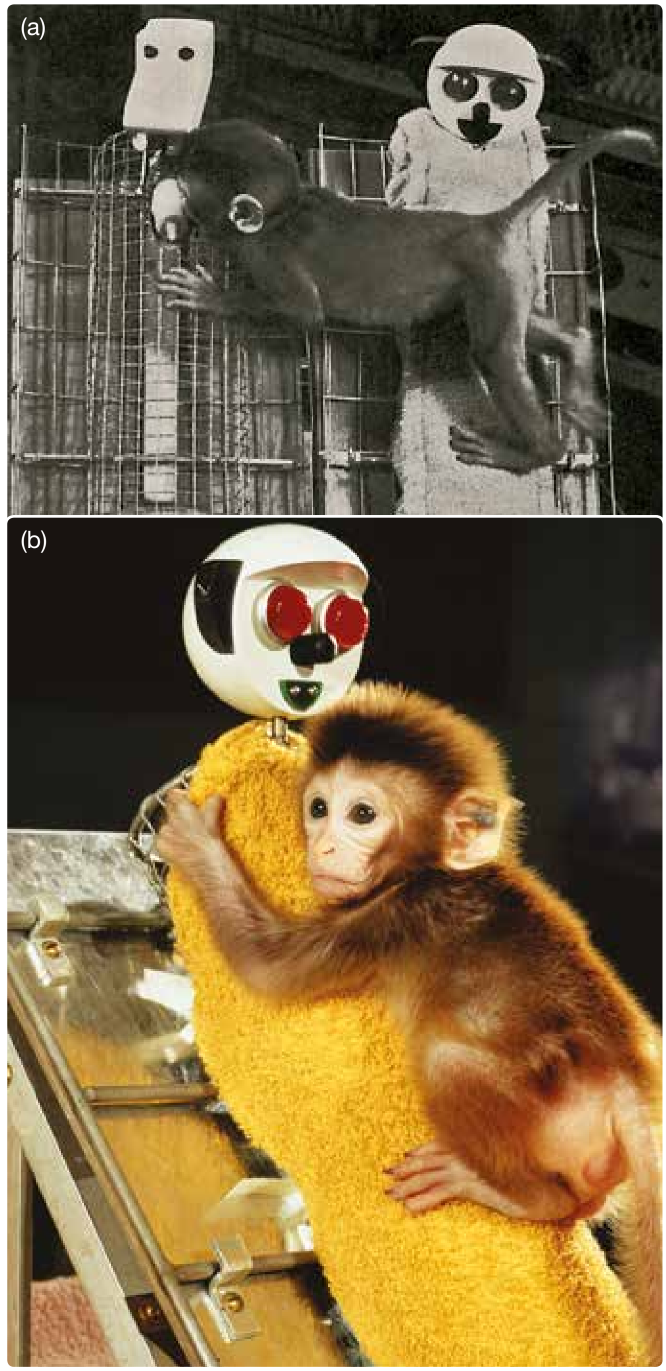

Figure 5.34 (a) Monkey feeding from wire surrogate mother (b) Monkey clinging to cloth surrogate mother

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Videos on Harlow's experiments 6 m 7 s, 4 m 11 s

Harlow found that regardless of which surrogate provided the nourishment, the infant monkeys spent more time with the cloth surrogate than the wire surrogate. Although the infants in the two groups drank the same amount of milk and gained weight at the same rate, all eight monkeys spent far more time climbing and clinging to the cloth surrogate than they did the wire surrogate. By the age of about three weeks, all of the monkeys were spending around 15 hours a day in contact with the cloth surrogate. No animal spent more than an hour or two in any 24 hour period on the wire surrogate.

The monkeys' preference for the cloth surrogate was particularly evident when they were emotionally distressed. In order to create a stressful condition, Harlow put various frightening objects in the monkeys' cages; for example, a mechanical forward-moving spider (see Figure 5.35 below), or a teddy bear that beat a drum. The frightening object was placed repeatedly in each monkey's cage and set in motion.

Harlow found that the majority of infant monkeys sought first contact with the cloth surrogate, regardless of whether or not it had the feed bottle. The terrified monkeys were observed to cling to the cloth mothers, rubbing their bodies against the cloth surrogate. Those monkeys who first sought contact with the wire surrogate through blind terror soon left it for the contact comfort of the cloth surrogate, even if the wire surrogate had the feed bottle.

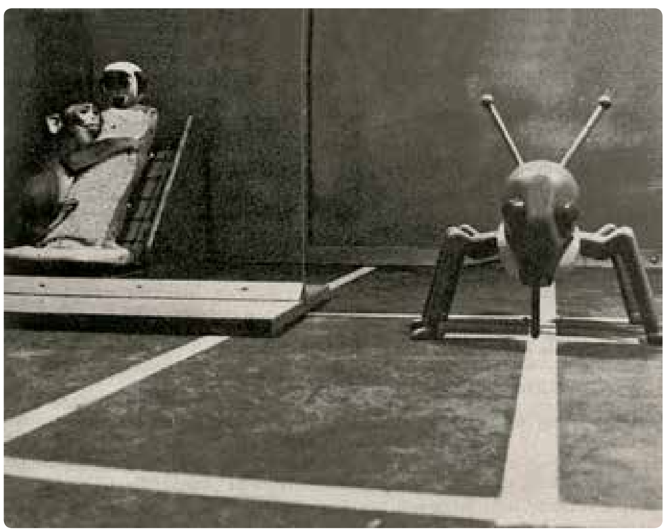

Figure 5.35 When a frightening toy spider was placed in their cage, infant monkeys tended to seek comfort from the cloth surrogate, even if the surrogate did not have the feed bottle.

On the basis of these results, Harlow concluded that 'contact comfort', which was provided by the softness of the cloth covering, was more important than feeding in the formation of an infant rhesus monkey's attachment to its mother. He generalised his findings to suggest that contact comfort was also likely to be a crucial factor in human infant–parent attachment.

Although these findings were based on monkeys, they considerably influenced the views of psychologists in relation to human infant–caregiver attachment. Until this time, many psychologists believed that infants became attached to their mothers through the simple kind of learning called classical conditioning whereby the mother became associated with food. In Harlow's experiment, attachment of the monkeys was not based on food association or any food reward associated with mother contact. Instead, contact comfort emerged as a more important factor in attachment.

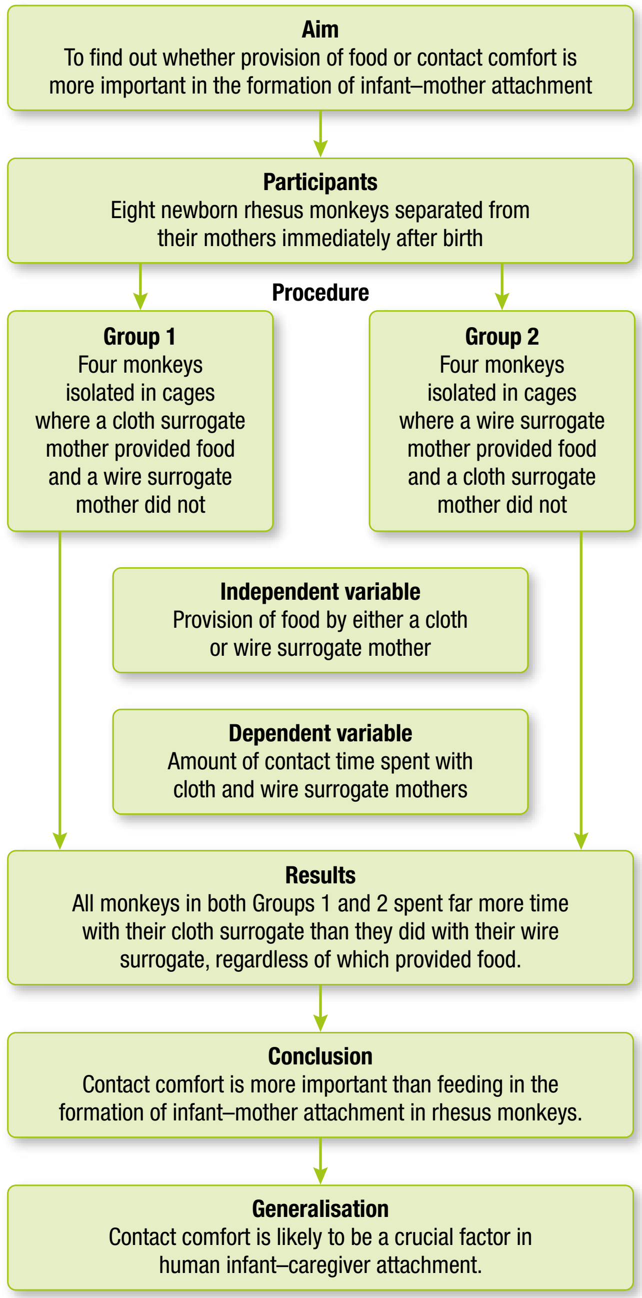

Figure 5.36 A flow chart of Harlow's (1958) experiment

Other animal experiments by Harlow

In further experiments, Harlow found that contact comfort was not the only important variable in attachment. For example, Harlow, Dodsworth and Harlow (1965) privated a group of rhesus monkeys to prevent them from having any social contact.

Privation involves removing the opportunity to satisfy a need, in this case, the need for social contact. The monkeys were taken from their mothers just after birth and totally isolated in cages. One group of infant monkeys was isolated for three months, another group for six months and a third group for 12 months. There was also a fourth group, a control group of infant monkeys who were 'normally reared' (in cages with their mothers and other monkeys).

The use of a control group enabled the three groups who experienced different periods of isolation to be compared with one another and with a group that had not experienced any social isolation. Otherwise the effects of isolation could not be measured accurately.

Harlow and his colleagues found that after three months privation, the infant monkeys were emotionally disturbed and their social behaviour was impaired. When released individually into the company of 'normally reared' same-age monkeys daily for 30-minute periods, they crouched in the corner of the cage with their heads buried under their arms, avoiding any contact and social interaction. Gradually, however, their individual and social behaviours improved. After about 12 months, their behaviour was almost the same as that of the monkeys in the control group.

The monkeys privated for six months were much more severely impaired in terms of their social behaviour. They isolated themselves even more than the three-month group, spending more time crouched in the corner avoiding social interaction. They had also developed self-destructive behaviour such as biting themselves and pulling out clumps of their own hair.

Compared to the control group monkeys, they were severely withdrawn and socially incompetent. When released into the company of 'normally reared' monkeys they preferred to be alone and would not join in the playful activities of the other monkeys. Over time, their behaviour improved until it resembled that of monkeys in the control group. But improvement occurred more slowly than that of the group privated for three months.

The infant monkeys isolated from all social contact for the first 12 months of life were extremely socially impaired. They were totally withdrawn, unable to relate socially to other monkeys, self-destructive and completely disinterested in anything going on around them. In the company of the 'normally reared' monkeys they were fearful, rarely moved about and avoided all contact and interaction. When they were housed with normally reared monkeys, their behaviour improved very slowly, but not in all areas.

Harlow also used rhesus monkeys to investigate factors influencing *maternal behaviour* in attachment. In a series of experiments, he discovered that female rhesus monkeys reared in total isolation for the first 12 months of life and then artificially impregnated (called 'motherless mothers') became completely inadequate mothers.

Each of these monkey mothers consistently avoided her baby and did not appear to care at all when separated from it. The mother would also violently abuse her baby when it approached her for contact or feeding. For example, one mother 'sometimes bit her infant' and 'occasionally crushed the infant's face and body to the floor'.

Figure 5.37 (a) Infant monkeys isolated for three months showed disturbed social and emotional responses; (b) 'Motherless mother' monkey pushing her infant's face against the floor; (c) 'Motherless mother' showing disinterest in her infant.

However, not all of Harlow's 'motherless mothers' behaved in this way. Some reared their infants in an adequate manner. These mothers had experienced some limited contact with other baby monkeys when growing up, whereas the others had not. It appeared that positive social experience with same age mates had limited the potential harmful effects of growing up motherless (Harlow, Harlow & Hansen, 1963; Seay, Alexander & Harlow, 1964).

Harlow's experiments with rhesus monkeys have enabled psychologists to better understand factors which influence attachment, and the effects of different attachment experiences on emotional and social development. However, rhesus monkeys and humans are psychologically different in many ways. Care must be taken in generalising about human experience based on animal experiments.

BOX 5.8 Harlow's views on using rhesus monkeys in experiments

Harlow elected to use monkeys in his research to overcome the limitations of using human participants. He believed they were a suitable alternative to people because, in his view, they have much in common with the human species and, therefore, results of his experiments could be generalised to people. Harlow specifically chose rhesus monkeys for what he believed were important practical advantages:

> *We use rhesus monkeys because they were the first monkeys over which one could have disease control. And they were the first monkeys that one could breed at will — our will, not theirs. Finally, the rhesus monkey is a standardised Old World monkey. New World monkeys are far different creatures and show more variability. And apes pose other problems. The chimpanzee is too big, too expensive, and too dangerous.*

In defence against criticisms that inducing stress in laboratory monkeys was 'sadistic', Harlow referred to his experiments on mental disorders and use of play therapy to treat these:

> *You will never learn the factors that produce depression and other pathological syndromes in the wild. You will never find the biochemical variables underlying such syndromes in the wild . . . You will never get definitive data by observing (in the wild). Take play. You could study play in the field for millennia and no one would have found its meaning. But our laboratory work gave the basic answer . . . (We found) that play is probably the best therapy (for depression). We know this is true for monkeys and it would probably be true for human beings (if psychologists were prepared to use it) . . . After one study in which monkeys had been totally socially isolated from birth to six months, the monkeys were completely rehabilitated through play therapy.*

Harlow also attempted to deflect criticism that the caged monkeys used in his studies tended to produce behaviours that do not occur in the wild. In his view, there was little which was 'so damn good about the wild anyway . . . The feral environment is pretty bad'.

Based on an interview with Harlow in Tavris, C. (1973, April). A conversation by way of collision, with Harry F. Harlow. *Psychology Today.* pp. 65–74.

LEARNING ACTIVITY 5.16

Analysis of research by Harlow, Dodsworth & Harlow (1965) on privation

Part A

Construct a flow chart which identifies the key features and stages in the Harlow, Dodsworth and Harlow (1965) experiment involving infant rhesus monkeys. An example of a flow chart is Figure 5.36 on page 254. Ensure you include a possible research hypothesis.

Part B

Answer the following questions.

1. What are the operationalised independent and dependent variables in this experiment?
2. What do the findings of the experiment suggest about the development and importance of infant–caregiver attachment among humans?
3. Outline one advantage of the research design. For example, why did Harlow choose to use the experimental method for this study rather than some other method?
4. What is one advantage and one limitation of using animals in psychological research?
5. Would Harlow's experiments be approved by ethics committees today? Explain with reference to relevant ethical standards and practices.
6. To what extent can the findings of animal research studies on attachment be applied to humans? Explain your answer.

LEARNING ACTIVITY 5.17

Role plays

Option 1: An interview with Harry Harlow

Working in a small group, prepare a five- to 10-minute interview between a scientific journalist and psychologist Harry Harlow. The interview should cover information on:

- what attachment is
- why Harlow chose to experiment with monkeys rather than humans (see Box 5.8)
- a description of one of Harlow's experiments and the results
- what Harlow's findings showed about the influence of infant attachments on emotional development
- whether Harlow's findings can be generalised to humans
- ethics of using animals for this kind of research
- other points of relevance or interest.

Option 2. An ethics committee meeting

Working in a small group, prepare a role play to re-enact an ethics committee meeting to evaluate a research proposal by Harry Harlow to conduct one of his experiments on attachment in rhesus monkeys. During the meeting, the committee members should ask Harlow questions about:

- the purpose of his research
- the procedure he plans to use
- potential harm to the animals
- alternative research designs
- the potential benefits of the research
- other relevant points.

At the conclusion of the meeting, a member of the ethics committee should explain the committee's findings on the research proposal and any relevant recommendations.

DEVELOPMENT OF COGNITIVE ABILITIES

Children view the world very differently from adolescents and adults. For example, it is not unusual for a young child to believe that the sun follows them from place to place when they walk outside, or that dreams come through the window at night.

As with other areas of psychological development, cognitive development cannot be directly observed. Infants and young children who have not yet adequately developed their language skills are unable to report what they are thinking or explain their actions. Therefore, much of what psychologists know about cognitive development, particularly in early infancy, must be inferred from observable behaviour.

Figure 5.38 Because she cannot tell us what she is thinking, should we assume that she is not capable of thought?

Many early psychologists believed that infants were not capable of much thinking. Infant behaviours were seen as random and occurring without purpose. Some psychologists saw infants as 'empty vessels' — as unresponsive organisms with limited perceptual abilities and little capacity to learn, remember or think.

Psychologists have since learned a great deal about the capabilities of infants and children in many areas of development. The changed view of the cognitive capabilities of infants was mainly initiated as a result of the pioneering work of Swiss psychologist Jean Piaget. His theory on the development of cognitive abilities was first translated into English in the 1920s but did not attract a great deal of attention until the late 1950s. Since then, researchers have tested and refined various elements of his theory and many current views about how thinking develops are based on Piaget's descriptions and explanations.

However, Piaget's interpretation of some of his research findings has been challenged by psychologists. It is now believed that he probably described children as having more limited cognitive abilities than they actually do and that they can think and reason in more sophisticated ways in particular stages than Piaget proposed. For example, some of the key cognitive accomplishments described by Piaget in different stages of his theory have been found to occur much earlier in development than he suggested.

Figure 5.39 Swiss psychologist Jean Piaget (1896–1980)

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Video featuring Piaget outlining aspects of his theory 13 m 4 s

Key principles of Piaget's theory

Piaget (1952, 1960) viewed cognitive development as a process of adaptation to the changing world around us. On a daily basis, **adaptation** involves taking in, processing, organising and using new information in ways which enable us to adjust to changes in our environment. This happens through two closely related processes which he called assimilation and accommodation.

Assimilation

Assimilation is the process of taking in new information and *fitting* it into and making it part of a pre-existing mental idea about objects or experiences. Through assimilation, we explain or make sense of new information in terms of what we already know. For example, a young child may see a truck and call it a car, simply because a car is the only type of vehicle for which the child has a pre-existing mental idea.

Similarly, if the child is given a toy hammer for the first time while using a wooden spoon for stirring in a pot, the hammer may also be used to stir the pot because the child has assimilated the hammer into a pre-existing mental idea. Through assimilation, both the truck and the hammer have become part of what the child knows about the world and the child will be able to recognise them in the future. However, the child will also eventually learn that a hammer is used to do things other than stirring. Pre-existing mental ideas can change through experience and doing so is evidence of adaptation.

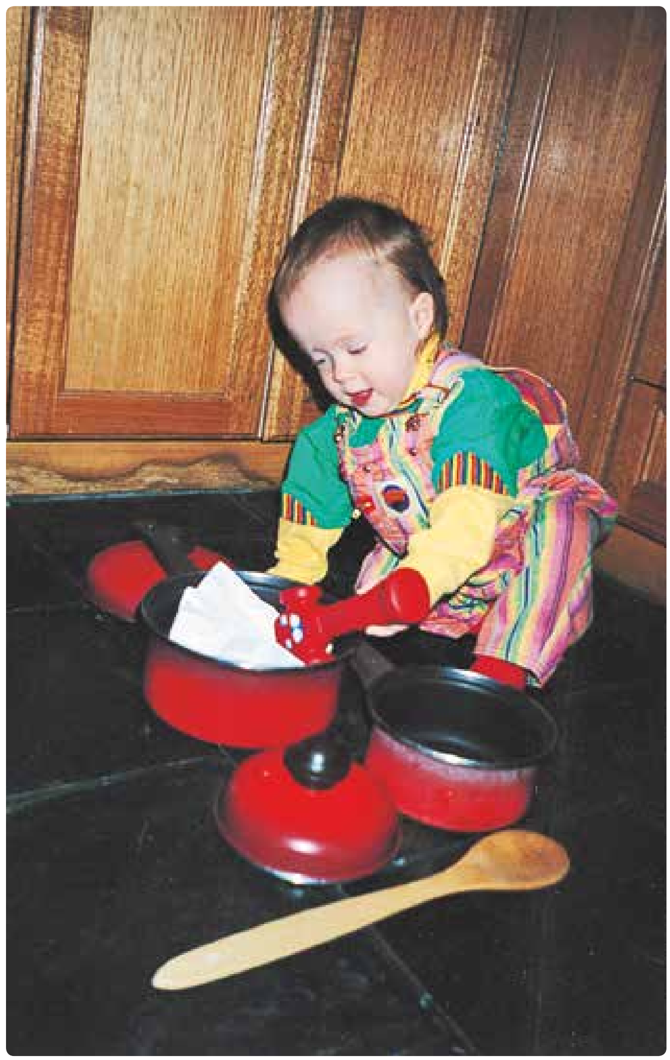

Figure 5.40 The child has assimilated the new object of a toy hammer by using it for stirring in the pot, as she does with a wooden spoon. This demonstrates the infant's attempt to understand new information (a hammer) by applying existing information (using the hammer like a wooden spoon).

Accommodation

Sometimes we cannot assimilate new information into a pre-existing mental idea, regardless of how hard we try. It simply won't fit because we can't change it in any way to link it in with what we already know. In this case, we are forced to adjust a pre-existing mental idea to deal with the new information.

Accommodation involves *changing* a pre-existing mental idea in order to fit new information. This is a more advanced process than assimilation. Whereas assimilation is used to fit new information without changing it, accommodation involves changing pre-existing information (or mental idea) so the new information may be included.

Piaget (1952) illustrated the relationship between assimilation and accommodation with an example of an infant's sucking behaviour. Infants can suck at birth. Sucking is an innate (inborn), reflexive behaviour, so it does not need to be learned. The sucking reflex is important for survival because it enables the infant to feed from a nipple on a breast.

When placed on a nursing mother's breast, infants demonstrate *assimilation* by using a nipple in the activity of sucking. However, not all objects can be sucked in exactly the same way. For example, when presented with a teat on a bottle, infants try to assimilate the teat in the activity of sucking because this new object (and situation) is like a nipple (and the situation of sucking from a nipple).

If they are unsuccessful in achieving the result they require (i.e. obtaining milk), infants have to modify their behaviour by changing the shape of their mouth, the placement of their gums, the amount of suction used, the rhythm of the activity and so on. These changes demonstrate *accommodation*.

Consider the case of 18-month-old Alexandra who points to a full moon and says 'ball'. She has assimilated the object of the moon into her existing mental idea of circular-shaped objects which is built mainly around her experience with balls. When she is older, she will be able to understand that there are differences between a full moon and a ball, even though they are both circular. When she recognises the moon as being different from a ball, she will have accommodated it.

According to Piaget, assimilation and accommodation are interrelated. Cognitive development involves an ongoing attempt to achieve a balance between assimilation and accommodation — a state of equilibrium through a process he termed *equilibration*.

Schema

Assimilation and accommodation also enable a child to form a **schema** — a mental idea of what something is and how to act on it. Piaget called these the basic building blocks of intelligent behaviour which we use both to understand and to respond to situations. *Schemata* (the plural of schema) can be thought of as 'units' of knowledge, each representing some aspect of the world. For example, your schema for Christmas may include presents, Christmas tree, Santa, shopping, money, summer and holiday. Someone else may have a different schema that includes church, Jesus, birth, family, giving and so on.

Figure 5.41 Trying to drink milk from her rattle (assimilation), this infant will eventually develop an understanding that rattles only make noise (accommodation).

We learn and develop schemata for all kinds of things — ourselves, other people, objects, school, university, jobs, actions, experiences, events and so on. For example, you might have a schema about catching a train to travel to the Melbourne CBD. The schema is in the form of a pattern of behaviour stored in your memory. It may include checking the relevant timetable, getting to the train station, validating a Myki, boarding the train when it stops at the station, and so on. Whenever you want to catch a train to the CBD, you retrieve this schema from memory and apply it to the situation.

According to Piaget (1952), we are born with some basic schemata for survival purposes, such as the sucking and grasping reflexes. These are *action schemata* which are ready for use and interaction with the world at birth. We modify these schemata and develop new schemata through everyday life experiences.

Our schemata become more and more sophisticated as we mature and our environment expands. They are continually modified as we adapt to the changing world through assimilation and accommodation. This ongoing process underlies cognitive development throughout the entire lifespan. When Piaget described the development of a person's intellectual ability, he was referring to increases in the number and complexity of the schemata that a person had learned.

Figure 5.42 A schema is a mental idea of what something is and how to act on it. We learn new schemata for all kinds of things, including how to use a Myki machine.

LEARNING ACTIVITY 5.18

Review questions

1. (a) What does cognitive development involve?
(b) Give examples of general and specific abilities which are likely to be associated with cognitive development.

2. (a) Explain the meaning of adaptation in relation to Piaget's theory.
(b) Name the two vital adaptation processes identified by Piaget.

3. (a) (i) Explain what assimilation involves with reference to an example, but not an example used in the text.
(ii) Give two examples of a situation when you were required to assimilate new information.
(b) (i) Explain what accommodation involves with reference to an example involving a child, but not an example used in this text.
(ii) Describe a situation when you were required to accommodate new information and thereby changed your view of the world or people.
(c) Describe the relationship between assimilation and accommodation.
(d) Explain the difference between assimilation and accommodation.
(e) Give an example, not used in the text, to illustrate the way in which assimilation and accommodation can work together.

4. (a) Explain what Piaget meant by the term schema.
(b) Give two examples of inherited schemata.
(c) Describe two examples of schemata you have formed, one school related and one non-school related.
(d) What role do schemata play in cognitive development?

Piaget's four stages of cognitive development

According to Piaget (1952), we all move through a predictable sequence of four different stages in developing our thinking and associated mental abilities. As we progress through these stages (and their various sub-stages), our thinking becomes increasingly sophisticated. It develops from being relatively basic and self-centred, through being able to use words and pictures to represent something (*symbolic thinking*), to not being reliant on being able to see, visualise, experience or manipulate in order to understand something (*abstract thinking*). The same sequence is followed by everyone regardless of our culture. Each stage is linked to an approximate age range. But this does not mean that we move from one stage to the next on our birthdays. Nor can a stage be skipped.

Piaget proposed that individuals do not develop the mental capabilities of a later stage without first having acquired those of an earlier stage. Furthermore, the rate at which each person passes through the stages may vary. Some people may reach a stage more quickly or slowly. This is due to differences in biological maturation (e.g. brain development) and personal experiences, both of which interact in influencing each individual's cognitive development. However, everyone will pass through the four stages in the same order. In addition, not all individuals necessarily reach stage four. For example, some people with intellectual disability or severe brain damage may never proceed beyond the first or second stage.

As well as describing a predictable sequence of four stages through which we progress, Piaget outlined key cognitive accomplishments that individuals achieve in each stage. He also described thinking styles typical of each stage. According to Piaget, what people know is not as important as the way in which they think and how they acquire mental abilities.

Sensorimotor stage (0–2 years)

This first stage spans from birth to about two years of age. In the **sensorimotor stage**, infants explore and learn about the world primarily through their senses and motor (movement) activities, hence the term 'sensorimotor'.

During the first months of an infant's life, the various types of incoming sensory information and motor skills are not coordinated. The infant does not realise that they can reach for a toy or dummy which is less than an arm's length away. After the first three months, however, most infants begin to integrate sensory and motor information and can start to coordinate their behaviour to grasp an object or turn towards a noise.

Figure 5.43 In the sensorimotor stage, infants construct their understanding of the world by coordinating their sensory experiences with motor abilities.

With increasing mobility, the infant's world expands quickly. At about the same time as the infant begins to crawl (around 8 months of age), they learn the concept of object permanence (although researchers have since found infants as young as three months may have this ability). **Object permanence** is the understanding that objects still exist even if they cannot be seen, heard or touched. Before object permanence is understood, 'out of sight' really is 'out of mind' for infants; that is, if something cannot be seen, then it does not exist.

Prior to acquiring object permanence, the infant may follow an object with their eyes, but they stop following it when it disappears from view. For example, they will watch the family dog walk past them, but if the dog goes into another room they show no interest in where it might have gone. However, once they have acquired object permanence, they will search actively for an object of interest even if they can no longer see it. For example, they might look towards where they last saw the dog before it moved out of sight.

According to Piaget, object permanence may explain why a game of peek-a-boo is so much fun for infants. Each time the object disappears, it ceases to exist for the infant. Whenever the object reappears, it is as if a whole new object has been created out of nothing. In Piaget's view, object permanence is an ability which infants gain through coordinating their sensory input, but only after much trial-and-error learning.

Piaget proposed that object permanence is a key cognitive accomplishment of the sensorimotor stage. Older people take object permanence for granted — for example, you know this textbook still exists when you look away from it or put it in your school bag.

The sensorimotor infant also develops the ability to carry out **goal-directed behaviour** — to perform and successfully complete a sequence of actions with a particular purpose in mind. This ability becomes increasingly sophisticated as the infant's sensorimotor skills mature along with the ability to coordinate these skills. For example, the infant learns that a desired object located out of reach on a coffee table may be obtained by using the table to pull themself up to a standing position and therefore to where the object is reachable.

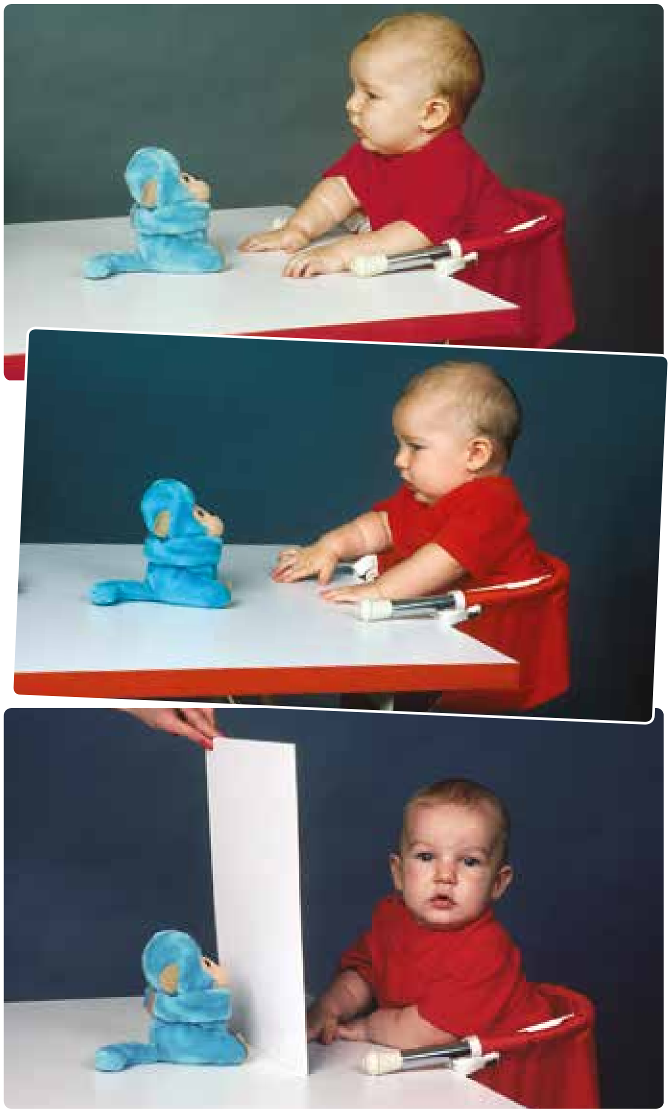

Figure 5.44 Object permanence at about 8 months of age is the key cognitive accomplishment of the sensorimotor stage. For younger infants, 'out of sight' is 'out of mind'.

LEARNING ACTIVITY 5.19

Designing a test for key sensorimotor accomplishments

Piaget described two key cognitive accomplishments of children during the sensorimotor stage:

- an understanding of the concept of object permanence
- the ability to carry out goal-directed behaviour.

For each of these accomplishments, suggest an ethically appropriate way to test whether an infant in the birth to two-year age group has accomplished the ability. The test should be suitable to investigate whether object permanence can be acquired earlier than proposed by Piaget.

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Video with demonstrations of Piaget's experiments 6 m 17 s

Pre-operational stage (2–7 years)

At about two years of age each infant moves from the sensorimotor stage to the pre-operational stage of cognitive development. This age marks the end of infancy and is also a time by which a significant amount of language acquisition has occurred. The thinking of the pre-operational child is much more sophisticated than that of one- to two-year-olds.

As children progress through the **pre-operational stage**, they become increasingly able to mentally represent objects and experiences; that is, to think about and imagine something in their own mind. This further develops their ability to think in more complex ways.

An important development during this stage is increasing use of **symbolic thinking** — the ability to use symbols such as words and pictures to represent objects that are not physically present. Evidence of symbolic thinking is seen in pretend play; for example, when a pile of sand becomes a turtle, a box becomes a television and endless numbers of make-believe friends share an imaginary tea party or adventure. Other examples of children engaged in symbolic thought can be seen in their use of language and production of drawings.

According to Piaget, children in this stage are unable to or have difficulty in considering another person's view. Piaget called this **egocentrism** — the tendency to perceive the world solely from one's own point of view. In using this concept, Piaget was not referring to selfish behaviour. He was indicating that pre-operational children are capable only of seeing the world from *their* point of view. When a young child stands in front of a TV and blocks everyone else's view or asks a string of questions while you are concentrating on your homework they are not being selfish. They are demonstrating their egocentric thinking.

Figure 5.45 'Egocentric' children think others see the world in the same way they do. When told to hide they cover their eyes; because they can't see themselves, they think others can't see them either.

It is not until towards the end of the pre-operational stage that a gradual shift from egocentric to *decentred* thinking has occurred. They no longer see themself as being at the 'centre' of the world all the time. They can think about situations from multiple perspectives, not just their own.

Children in the pre-operational stage also use a thinking style called animism. **Animism** is the belief that everything which exists has some kind of consciousness. For example, a rusty tricycle may be thought of as 'sick', a tall tree may be described as 'old' and a child who hurts their knee after bumping into a coffee table may 'smack' the 'naughty' table.

Piaget proposed that animism was linked to egocentric thinking. Pre-operational children unable to see things from another person's point of view assume that everyone and everything is like themselves. They have emotions and can feel pleasure and pain, so they think objects can too.

Figure 5.46 The snowman has collapsed and the three younger children are concerned about its welfare. One girl described it as 'sick', another as 'sore' and the other as 'hurt'.

Another key cognitive accomplishment in the latter part of the pre-operational stage is called **transformation** — understanding that something can change from one state (form or structure) to another. For example, earlier in the pre-operational stage, a child presented with an ice-block in a glass could identify both the ice-block in its solid state and the liquid after it had melted, but the child could not explain or understand the melting process.

While the thinking of a pre-operational child is significantly more sophisticated than that of one- to two-year-olds, the pre-operational child can focus on only one quality or feature of an object or event at a time. This process is known as **centration**. Five-year-old Jack's play with tokens demonstrates this. When 12 tokens are arranged into two equal lines of six opposite each other, he can correctly identify the lines as being the 'same'. However, when the second row of tokens is bunched up as a group, Jack believes there are more tokens in the line than in the group, because 'it looks more', even though he had correctly counted the tokens in both original lines and watched the second line being narrowed into a tighter group. In this test, Jack is *centring* because he appears to be focusing on only the *length* of the row in judging the tokens and he seems unable to also consider *quantity* and *space*.

This example also highlights another of the key cognitive accomplishments of children in the latter period of the pre-operational stage — reversibility. Jack is incapable of mentally reversing the process he saw. **Reversibility** is the ability to mentally follow a sequence of events or line of reasoning back to its starting point. This includes being able to recognise that something can change and then return to its original condition. It is a more sophisticated mental process than counting backwards; for example, understanding that a deflated ball can be pumped up again and put back into play, or that an ice-block that melts is not necessarily gone forever — the liquid can be frozen again to re-create the ice-block.

The following example of egocentric thinking by three-year-old Alexandra also illustrates her *inability* to use reversibility.

Adult: *Do you have any brothers or sisters?*
Alexandra: *Yes, a sister.*
Adult: *What is her name?*
Alexandra: *Sienna.*
Adult: *Does Sienna have a sister?*
Alexandra: *No.*

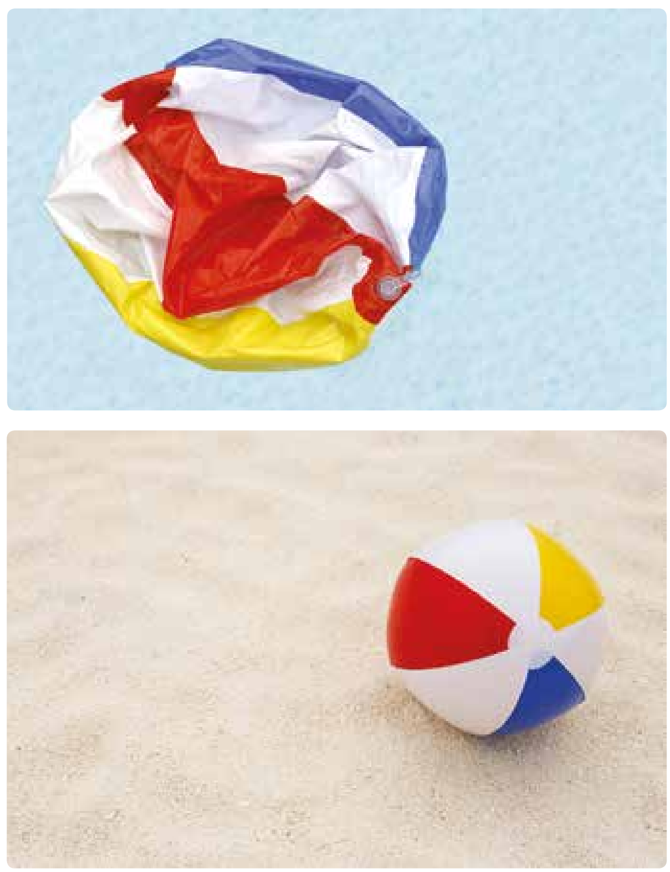

Figure 5.47 Reversibility is the ability to mentally follow a sequence of events or line of reasoning back to its starting point, such as understanding that a deflated ball can be pumped up again and put back into play.

BOX 5.9 An experiment by Piaget to study egocentrism

Piaget proposed that pre-operational children use egocentric thinking. They see things from only their own point of view and have difficulty doing so from another person's perspective.

In one experiment to study egocentrism, Piaget used a diorama apparatus. As shown in Figure 5.48, this consisted of three model mountains made of papier-mâché. Each mountain was a different size, shape and colour and each had a different landmark on top. One mountain had a hut, one had a cross and one was covered in snow.

The child was first asked to walk around the diorama and become familiar with the landscape from all sides. Once the child had done this, they were required to sit facing the three mountains and a doll was placed behind the first mountain. The researcher then asked the child, 'What can the doll see?' The child was then shown several pictures of the mountains from different viewpoints. One picture was the view of the mountains from where the child was seated. The procedure was repeated with the doll in front of the second mountain and then the third mountain. Each time, the child was asked the question about the doll's viewpoint and was required to select one of the pictures.

Piaget found that four-year-old children always selected the picture which showed what *they* could see, while six-year-olds often showed awareness of different perspectives. Only seven- and eight-year-olds consistently chose the correct picture. They had developed the ability Piaget called decentred thinking, enabling them to consider situations from different perspectives, not just their own.

Researchers have since questioned the appropriateness of the three mountains task for young children; for example, that it may not be a suitable, interesting or motivating problem. Using other test materials, such as familiar cartoon characters from popular television programs or movies, they have found the potential for understanding another's point of view is present in children as young as three and four years of age.

Figure 5.48 Piaget's three-mountain task

LEARNING ACTIVITY 5.20

Analysis of research on the ability to distinguish between appearance and reality

A psychologist observed that her 2½-year-old son became frightened when an older child put on a Batman mask. The younger child behaved as if the mask had actually changed the wearer into Batman. The psychologist was intrigued by her son's apparent confusion between appearance and reality and decided to conduct research to find out the age when children have developed the ability to distinguish between appearance and reality.

The psychologist devised an experiment using Maynard, a well-behaved black cat. Her sample consisted of four children of friends and relatives. The children were aged from 3 to 6 years, with one child aged 3, another 4, and so on. At the start of the experiment, Maynard was presented to all the children and they all said that he was a cat. After they played with Maynard for five minutes, the psychologist hid the top half of Maynard's body behind a screen while she strapped a realistic mask of a ferocious dog onto his head.

As she removed the screen, the psychologist asked a set of questions to assess the children's ability to distinguish between the animal's real identity and its appearance: 'What kind of animal is it now?' 'Is it really a dog?' 'Can it bark?' The strength of the children's ability to distinguish appearance and reality was measured on an 11-point rating scale. Children who said that the cat had turned into a dog were given a score of one, while children who said that the cat only appeared to turn into a dog but could never really become one were given a score of 11.

As shown in Figure 5.50, the 3-year-old focused almost entirely on Maynard's appearance. The child said Maynard had actually become a ferocious dog and might bite them. The 6-year old was amused by this, having understood that the cat only looked like a dog. The 4- and 5-year-olds showed considerable confusion. They didn't believe that a cat could become a dog, but they did not always answer the psychologist's questions correctly.

The psychologist concluded that young children experience confusion between appearance and reality but have a better understanding of the difference between appearance and reality by age 5. By the age of 6, it is likely that children will be able to distinguish between appearance and reality.

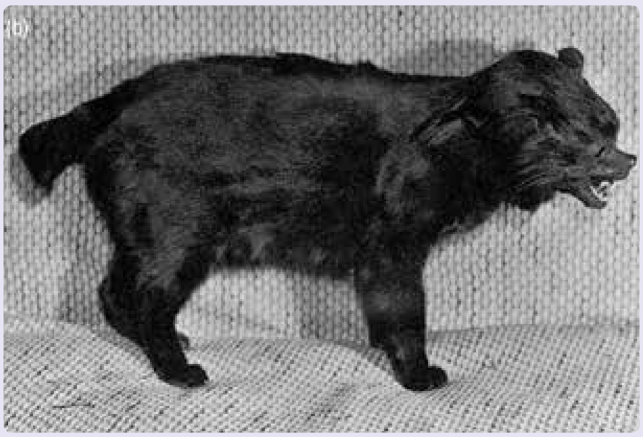

Figure 5.49 (a) Maynard the cat (b) wearing the ferocious dog mask.

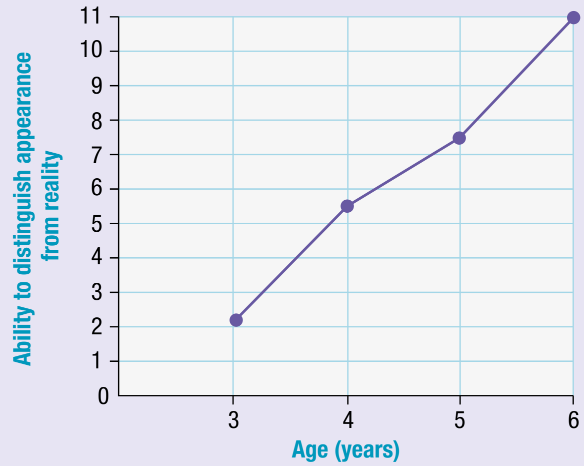

Figure 5.50 Age-related increase in children's ability to distinguish appearance from reality

1. Suggest a relevant research hypothesis.
2. Identify the experimental design.
3. Describe the results of the research.
4. What criticisms can be made of the sample in terms of:
   (a) size
   (b) representativeness?
5. Is the conclusion valid on the basis of:
   (a) sample size
   (b) representativeness of the sample?
6. Can the results be generalised to other children aged 3 to 6 years? Explain your answer.
7. Suggest a sample and sampling procedure that would better enable the results to be generalised to a specific population and have external validity.
8. Is this research ethical? Give reasons for your answer.

LEARNING ACTIVITY 5.21

Analysis of data on dreaming by pre-operational children

The following extract comes from a conversation between Piaget and a preschool child aged 6 years and 6 months. The data was collected during a case study Piaget conducted with a small group of children to find out about their dreaming.

Piaget: *Do you know what a dream is?*
Child: *When you are asleep and you see something.*
Piaget: *Where does it come from?*
Child: *The sky!*
Piaget: *Can you see it?*
Child: *Yes when you're asleep.*
Piaget: *Could I see it if I was there?*
Child: *No.*
Piaget: *Why not?*
Child: *Because you wouldn't be asleep.*
Piaget: *What do you dream with?*
Child: *The mouth.*
Piaget: *Where is the dream?*
Child: *In the night.*
Piaget: *Where does it happen?*
Child: *In the bed — on the pillow.*

Source: Piaget, J. (1929, p. 114). *The child's conception of the world*. London: Paladin.

1. What kind of data was collected in the case study — quantitative or qualitative, primary or secondary?
2. How does the child describe what a dream is?
3. Does the child think the dream comes from an 'internal' or 'external' source? Explain your answer with reference to the data.
4. What kind of thinking is the child using? In your answer, refer to Piaget's descriptions of thought processes of pre-operational children. Give evidence from the child's responses to support your view.
5. Is the thinking of the preschool child typical of children in this stage of cognitive development? Explain with reference to Piaget's theory.

Concrete operational stage (7–12 years)

The child is now capable of true logical thought and can perform mental 'operations'. According to Piaget, a *mental operation* involves the ability to accurately imagine the consequences of something happening without it actually needing to happen. For example, at this age, the child can easily tell you that if it rains when on a family picnic everyone might get wet. Similarly, adding two numbers 'in your head' is an example of a mental operation.

In the concrete operational stage, however, mental operations can only be applied to 'concrete' objects or events that are immediately present and can therefore be touched, seen or experienced in some way through the senses. This is why Piaget used the terms 'concrete thinking' and 'concrete operational'.

A key cognitive accomplishment for a child in this stage is understanding conservation. **Conservation** refers to the understanding that certain properties of an object can remain the same even when its appearance changes. The concept of conservation can be applied to any form of measurement, including volume, mass, number and length.

Piaget's best known example is *conservation of volume* using liquid poured into different shaped containers. For instance, eight-year-old Olivia can recognise that if she pours cordial from a tall, thin glass into a short, wide glass, the volume (amount) of cordial remains the same (Figure 5.51 below).

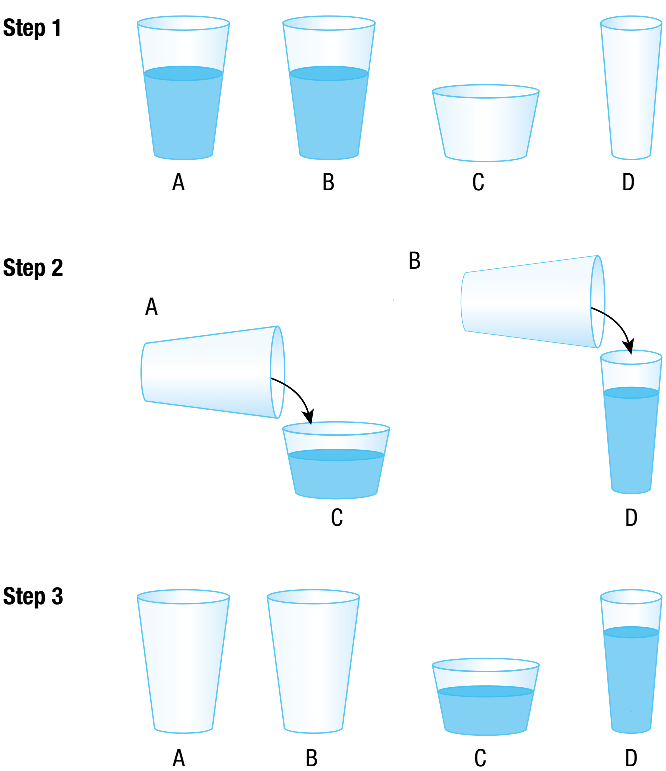

Figure 5.51 Conservation of volume. A child who understands this concept recognises at step 3 that, despite the different size of the glasses, C and D hold the same amount of liquid.

However, Olivia's four-year-old brother Sam, who is still in the pre-operational stage, will believe that the short glass has less cordial than the tall one because it is shorter.

Even if Olivia pointed out that no cordial was subtracted when pouring, and even after she poured the cordial back into the original glass to demonstrate that the amount had not changed, Sam would still claim there is less liquid in the short glass (and more in the taller glass). Sam tends to focus his attention on a single property of the glass — its height. This means that he is *centring*, a characteristic of pre-operational thinking.

Conservation of mass involves understanding that the mass (i.e. amount of matter) of an object remains the same even when it changes its appearance. This means that children are able to deal with the fact that two identical play dough balls of the same size still have equal amounts of play dough even if one is changed into the shape of a sausage or flattened to look like a disk, as shown in Figure 5.52 below. Similarly, children who can conserve mass know that their body weight will remain unchanged when they move from sitting cross-legged on the floor to standing up straight.

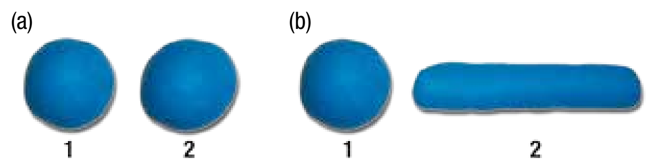

Figure 5.52 Conservation of mass. A child who can conserve mass will realise that, despite the changed shape of ball 2, in (b), balls 1 and 2 still have the same amounts of play dough.

Piaget also described a conservation in relation to number and length. In a *conservation of number* task, a child might be shown two rows of lollies, with each laid out as shown in Figure 5.53(a) below. The experimenter then makes one of the rows longer by spreading out the lollies, as shown in (b).

The child who can conserve number will realise that there are still just as many lollies in each row. In everyday life, they will also know that four biscuits or blocks will remain constant in number regardless of whether they are spread out on a table or stacked into a tower.

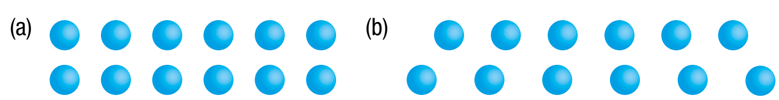

Figure 5.53 Conservation of number. (a) The child sees two identical rows of lollies (or other objects) and says there is the same number in each row. (b) The lollies in one row are spread out and the experimenter asks if the rows have the same number of lollies.

In a *conservation of length* task, a child might be presented with two objects such as pencils, as shown in Figure 5.54 below.

The child who can conserve length will realise that neither pencil has changed in length when one is moved as shown in (b). In everyday life, they will also know a skipping rope is the same length regardless of whether it is laid out straight or rolled up.

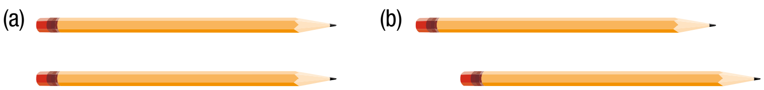

Figure 5.54 Conservation of length. (a) The child sees two identical pencils (or other objects) that are equal in length. (b) One of the pencils is moved slightly and the researcher asks if one pencil is longer than the other.

Recent research indicates that the different types of conservation are not all achieved at the same age during the concrete operations stage and there are also cultural differences. Generally, in non-Asian cultures, conservation of number tends to be achieved first, then conservation of length, mass and volume. But each type can be achieved earlier or later depending on experience and the type of test used.

Another key cognitive accomplishment in the concrete operational stage is the ability to organise objects or events into categories based on common features that set them apart from other categories. This is called **classification**.

To test this, Piaget showed children 20 wooden beads, 18 of which were brown and two were white, as in Figure 5.55 below. Each child was then asked three questions:

1. Are all the beads wooden?
2. Are there more brown beads or white beads?
3. Are there more brown beads or wooden beads?

Preoperational children usually answered the first two questions correctly but answered question 3 by stating there were more brown beads than wooden beads. Concrete operational children usually answered all three questions correctly. For question 3, they realised that there were more wooden beads because the white beads were also wooden. They had understood that the feature of colour was a sub-category of the overall category of wooden (which can have several sub-categories).

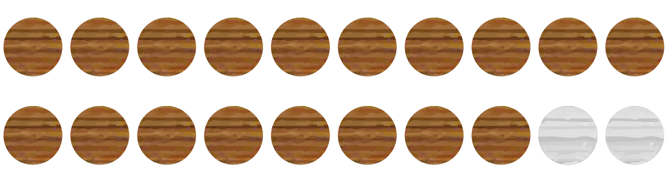

Figure 5.55 Assessing understanding of classification — are there more brown beads or wooden beads?

Formal operational stage (12+ years)

When many young adolescents enter secondary school at 12 or so years of age they are usually in Piaget's final stage of cognitive development. More complex thought processes are evident and their thinking becomes increasingly sophisticated through the combined effects of brain maturation and life experience.

Some of the tasks used by Piaget to assess formal operational thinking involved processes of scientific inquiry, as in the pendulum problem described in Box 5.10 on page 268. He believed that formal scientific reasoning is one of the most important characteristics of formal operational thinking (Inhelder & Piaget, 1958).

A key cognitive accomplishment in this stage is **abstract thinking** — a way of thinking that does not rely on being able to see, visualise, experience or manipulate in order to understand something (as required in the concrete operational stage).

For example, someone in the formal operational stage will be able to achieve an accurate understanding of the concepts of time and distance — what it means for something to have happened in 200 BC or how far 4000 kilometres really is. They will truly understand what freedom or fairness mean, the isms (such as racism, sexism and communism), the consequences of a parent losing their job, and why ethical issues need to be considered when conducting psychological research. They will also further develop their ideas about their own beliefs (such as whether God exists), their values (judgments about what is important or worthwhile in life) and morality (distinguishing between actions on the basis of 'right' or 'wrong').

Formal operational thinking also involves the ability to solve problems systematically. For example, this occurs when you develop strategies to solve a problem, identify a range of possible solutions, formulate hypotheses as possible explanations and test different solutions in an orderly way.

This type of thinking makes it easier to solve algebra and geometry problems than in any previous stage. And when considering a casual work vacancy, you may weigh up possible clashes with homework and sport training, the kind of work to be done, the pay rate, the work location, transport options, how many hours you can work and whether you are qualified before you actually apply.

Another type of logical thinking called deductive reasoning is also achieved. *Deductive reasoning* involves using logical rules to draw a conclusion from two or more pieces of information which are believed to be true. For example, consider the conclusion drawn below.

If Sam sleeps in she will be late for school.
Sam was late for school.
Therefore Sam slept in.

Deductive reasoning can be a useful way of solving some problems based on known information. However, the conclusion reached is not always correct even if it is logically reached. Consider this example.

All elephants have big ears.
My teacher has big ears.
Therefore my teacher is an elephant.

Idealistic thinking is also possible during the formal operational stage. For example, adolescents often think about the most desirable characteristics of themselves and others. They often compare themselves and others to a perfect standard and strive towards being like their ideal person. They have the ability to envisage alternatives to current national or global issues, but sometimes without fully considering what is realistically possible in a given time frame.

However, adolescents are able to realistically think about their future and what is possible, then make plans and set in place processes to achieve their goals. While a child at an earlier stage can identify that they want to be a truck driver or an astronaut, most children, prior to reaching the formal operational stage, do not have an accurate concept, or any concept at all, of what it means to be a truck driver or an astronaut. Nor do they have any real understanding of the steps involved in becoming either of these.

Figure 5.56 In the formal operational stage we can use abstract thinking to solve complex algebra problems at school.

BOX 5.10 An experiment by Piaget to assess formal operational thinking

One experiment used by Piaget to assess formal operational thinking involved the 'pendulum problem'.

Participants were shown several different weights which could be hooked on the end of a piece of string to make a pendulum. They were then asked to choose the length of the string, the weight to be attached and the height at which the weight should be released.

The problem involved working out which of the three factors (length, weight or height), or combination of factors, determines the speed at which the pendulum will swing. The solution involves changing one of the three factors while keeping the other two constant and seeing if it has any effect on speed.

Piaget found that children in the pre-operational or concrete operational stages randomly change one or more of the factors (length, weight or height), rather than changing them or testing their respective effects in a systematic and logical way. Consequently, children in these stages tend to find it difficult to solve the pendulum problem.

However, someone in the formal operational stage approaches the problem-solving task in a more systematic way and discovers more quickly that the length of the string is the factor that determines the speed of the pendulum (that is, the shorter the string, the faster a pendulum swings).

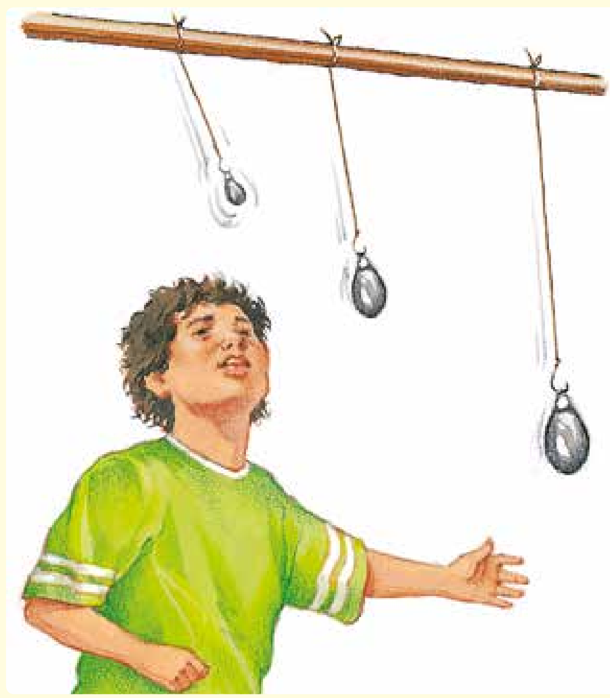

Figure 5.57 Does length, weight or height determine the speed at which a pendulum will swing?

Criticisms of Piaget's theory

Piaget's theory has had a great impact in psychology and his place in the history of psychology is significant. His research findings and theory stimulated considerable interest in the development of cognitive abilities and provided the impetus for thousands of research studies by other psychologists over many years.

Many of these research studies have confirmed various aspects of Piaget's theory or extended Piaget's theories into other areas of development. Important practical applications also come from Piaget's theory; for example, the idea that the 'developmental readiness' of young children for reading, writing, mathematics and other cognitive tasks needs to be considered before giving them such tasks. Some parents try to give their children a 'jump start' in life by enrolling them in academically demanding programs when they are quite young. On the basis of Piaget's four-stage theory, many child development experts warn that children should not be 'pushed' too early, before they have sufficiently 'cognitively matured'.

However, since the 1970s in particular, other researchers have also discovered that infants know a lot more, and know it sooner, than Piaget believed they did. It's not that the infants are 'smarter' now; rather, many researchers have found gaps in Piaget's research methods and findings. In refining Piaget's methods, they have found, for example, that key cognitive accomplishments described by Piaget for the different stages are often achieved by children much younger than the ages proposed by Piaget. Consequently, many psychologists now believe that the age ranges for each stage proposed by Piaget vary more widely than Piaget described.

For example, researchers have found that children are capable of concrete operational tasks such as conservation and classification at younger ages than described by Piaget. Pre-operational children in Piaget's studies may have been unable to do these tasks, not because they lacked these cognitive abilities, but because during testing they lost concentration, their attention wandered and they forgot parts of the problems they were given (Kail & Bisanz, 1992). It has been shown that when conservation problems are presented without distracting information, children as young as four and five years old can consistently complete them accurately (McGarrigle & Donaldson, 1974).

A further criticism of Piaget's theory is that Piaget may have overestimated young children's language ability, leading him to assume that wrong answers came from faulty thinking. An alternative explanation for a child's answer could be that the child misunderstood the task or did not explain their answer clearly (Donaldson, 1979).

Piaget's theory has also been criticised for the small number of participants in many of the experiments he conducted to test his ideas. In particular, Piaget often referred to examples involving his own children. Although qualitative data from observations of his own children provided useful descriptions not easily available using other research methods, some psychologists have expressed concerns about the generalisations Piaget made from such limited data.

A small sample size is rarely representative of the population to which the research findings will be applied. When a small sample is used, it is more likely that the participants will not match or reflect the population of research interest in personal characteristics that can influence the results of the study. In the study of cognitive development using children (including infants) as participants, personal characteristics of individual children (such as social and ethnic or cultural background, environmental experiences, attention span, language, memory, temperament, personality, sociability, physical competence and so on) can influence their performance on the experimental task. These variables can also be equally relevant to studies of cognitive development using adolescents and adults as participants. The small sample size in many of Piaget's experiments helps explain why researchers who tested his findings have found that children can acquire such abilities as conservation and classification at much younger ages than originally proposed by Piaget.

LEARNING ACTIVITY 5.22

eBook*plus*

Word copy of table

Revision questions

1. Complete the following table to summarise the various age-related stages of Piaget's theory, common ways of thinking and key cognitive accomplishments in each stage. Include a brief description of each accomplishment.

Stage	Approx. age range	Common ways of thinking	Key cognitive accomplishments

2. Briefly outline three criticisms of Piaget's theory.
3. Search the Internet for an example of a research study and its findings that shows children can perform a cognitive task at an earlier stage than described by Piaget.

LEARNING ACTIVITY 5.23

Visual presentation — Piaget's stages of cognitive development

Draw a picture, take a photo or download an image that depicts a key accomplishment of each of Piaget's stages of cognitive development. Present your graphic representation of Piaget's stages in a sequential way with a brief summary of the stage and accomplishment beneath each image.

LEARNING ACTIVITY 5.24

Visual presentation — advertising an educational toy

Select an educational toy that promotes development in an infant or a young child. Develop an advertisement to promote the toy. In your promotion, identify the age range of the children for whom it is appropriate. You should also indicate why it would be appropriate for children of that age, with reference to Piaget's theory of cognitive development.

LEARNING ACTIVITY 5.25

Reflection

Comment on whether teachers should consider Piaget's theory when planning their courses and lessons. Differentiate between primary and secondary schools if you think it relevant. You may also consider relevance to tertiary educators.

LEARNING ACTIVITY 5.26

Media analysis/response

Many YouTube videos demonstrate key cognitive abilities or accomplishments in each of Piaget's stages. Some have been prepared by professionals for educational purposes and others by parents. Some are more informative or accurate than others.

Find a short non-professional video on each of the following:

- object permanence
- conservation of volume
- conservation of mass, number or length
- classification.

For each video:

- name the cognitive ability
- identify the stage and approximate age when it is accomplished
- outline the task shown
- identify the author
- comment on how accurately the video represents the ability and its accomplishment
- include a weblink.

PSYCHOSOCIAL DEVELOPMENT

Like Piaget, the German-born psychologist and psychoanalyst Erik Erikson (1902–1994) developed a stage theory of development, but focusing on personality development. His theory describes the impact of certain social experiences on personality development at various stages of the entire lifespan.

Erikson (1950) based his theory on extensive research mainly using case studies. He studied a range of people living in different cultures (for example, Denmark, Germany, wealthy American adolescents and indigenous Sioux Indians). He also made intensive studies of the lives of important historical figures (such as Martin Luther King who led the freedom movement for African-Americans in the 1950s and 1960s).

Erikson believed that personality development occurs through a combination of the effects of psychological processes which take place within individuals (*psycho*) and the experiences of individuals during their lifetimes, particularly their interaction with other people (*social*). This is why he called his theory **psychosocial development**.

Erikson viewed psychosocial development as a progression through eight sequential stages, with each stage corresponding with a different period in the lifespan. In each of these stages, the individual has to deal with a different psychosocial crisis that is normal for people at that time in life.

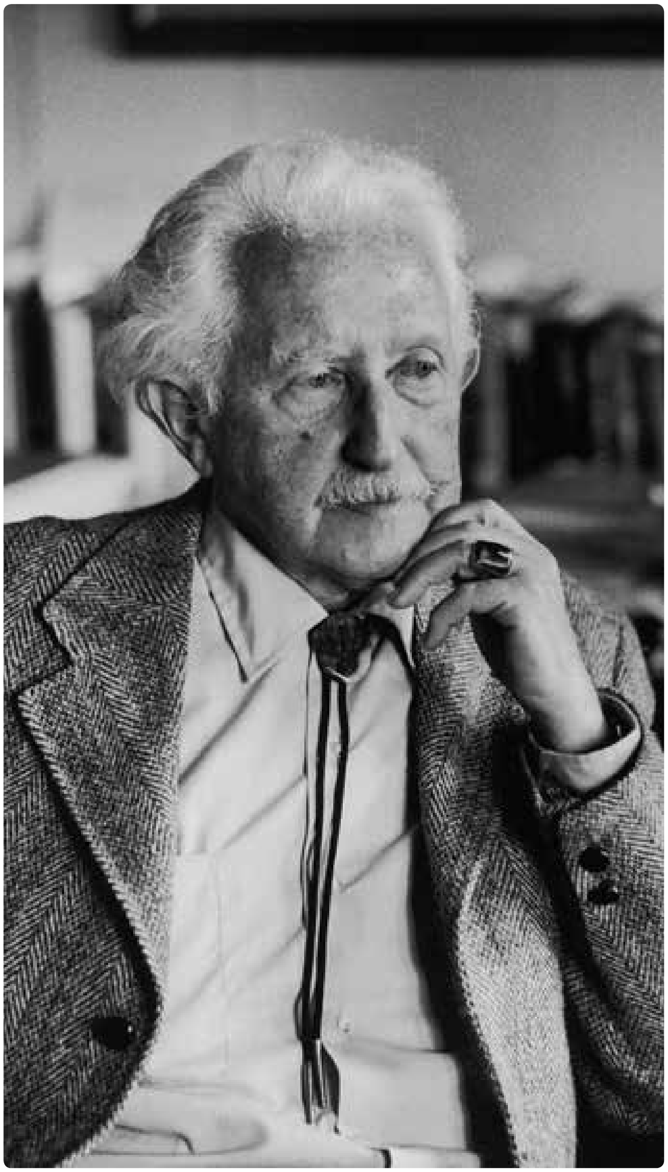

Figure 5.58 Erik Erikson (1902–1994)

eGuide*plus*

Weblink
Video showing an overview of Erikson's theory 6 m 3 s

A **psychosocial crisis** is a personal conflict an individual faces in adjusting to society. Each crisis involves a struggle between two opposing tendencies, one of which comes from our internal personal needs and the other from the demands of society, but both are experienced by the person.

According to Erikson, our personality is shaped by how we deal with or resolve the psychosocial crises. The satisfactory resolution of these crises leads to a healthy personality and a productive lifestyle.

In Erikson's theory, a *crisis* is not a catastrophe but a turning point in life. The way in which each crisis is resolved can have either a *positive* (good) or *negative* (bad) outcome, depending on the individual's ability to deal with that crisis.

Erikson used the term crisis in the way that doctors do. A crisis is like a patient being in a 'serious condition' for a period of time, at the end of which the patient takes a turn for the better or worse. However, Erikson did not believe that failure to resolve any psychosocial crisis will necessarily have consequences which are permanent or irreversible. He believed that setbacks in any stage can eventually be overcome with proper attention, care and love.

As shown in Table 5.4, each of the eight crises involves a conflict between two characteristics which are the opposite of one another. One is a positive aspect and the other a negative aspect. Erikson believed that successful resolution of each crisis should be in favour of the positive characteristic. Erikson added, however, that the opposite negative aspect must also exist to some degree if healthy personality development is to occur. Therefore, resolution of the trust versus mistrust crisis in stage 1 involves developing the right mix of trust (to allow intimate relationships) and mistrust (for self-protection).

According to Erikson, the ages at which people go through each of the eight stages can vary because of each individual's unique life experiences. However, the order in which individuals progress through the stages is fixed. Erikson believed that it is necessary to experience each crisis (but not necessarily to resolve each crisis) before proceeding to the next stage.

Erikson also believed that different stages can overlap, so it is possible for an individual to be dealing with more than one crisis at any

Table 5.4 Erikson's eight psychosocial stages

Stage	Age	Developmental period	Psychosocial crisis
1	birth to 12–18 months	early infancy	trust vs mistrust
2	18 months to 3 years	late infancy	autonomy vs shame and doubt
3	3 to 5 years	early childhood	initiative vs guilt
4	5 to 12 years	middle and late childhood	industry vs inferiority
5	12 to 18 years	adolescence	identity vs role confusion
6	18 to 25 years	young adulthood	intimacy vs isolation
7	25 to 65 years	adulthood	generativity vs stagnation
8	65+ years	late adulthood	integrity vs despair

particular time. For example, the crisis of trust versus mistrust in stage one is not necessarily resolved during the first 18 months of life. It can arise again in each successive psychosocial stage. It is possible to gain basic trust in early infancy then lose it later because of a negative experience with someone in a later stage in life. In addition, an individual may fail to resolve a crisis at one time but resolve that crisis in a later stage.

Erikson's description of the eight psychosocial stages is a 'picture' of what is *ideal*. According to Erikson, the better an individual deals with a psychosocial crisis in any stage, the healthier their psychosocial development and therefore personality development. However, not being able to resolve a crisis does not prevent the individual from moving into the next stage. Regardless of whether a psychosocial conflict is successfully resolved, individuals move into the next psychosocial stage because they mature and because of their changing social situations. However, according to Erikson, if a conflict is not resolved, it will have a negative effect on the individual's personality development and adjustment to society.

LEARNING ACTIVITY 5.27

Review questions

1. Explain the meaning of psychosocial development.
2. Describe the relationship between psychosocial development and personality development.
3. What was Erikson's main source of research data?
4. (a) What is a psychosocial crisis and why is it said to occur?
   (b) Give an example of a psychosocial crisis.
5. What is meant by the idea that resolution of a crisis should include the 'right mix' of both the positive and negative aspects? Explain with reference to an example.
6. How often might a particular psychosocial crisis occur in the course of a lifetime?

Stage 1: Trust versus Mistrust (0 to 12–18 months)

Stage 1 involves a conflict between trust at one extreme and mistrust at the other. According to Erikson, to progress through this stage in the best way, the infant needs to develop the right balance of trust and mistrust.

Erikson used the term **trust** broadly to refer to the views and expectations that infants develop about their world. He believed that when an infant has developed a healthy sense of trust, they will view the world as a predictable, safe, caring and happy place. When the world is predictable, the infant can anticipate reactions; for example, being able to rely on being fed when hungry, knowing that a cuddle and care will be given when they are hurt, or that help will arrive if they are stuck under a chair while crawling around a room. A predictable world also includes the knowledge that a frown or a firm 'no' will be a consequence of inappropriate behaviour.

According to Erikson, if an infant is to develop into a person who is trusting and trustworthy, the quality of care they receive is important. The infant whose needs are met when they arise, whose discomforts are quickly removed, who is cuddled, played with and talked to, forms a view of the world as a safe place and of people as caring, helpful and dependable.

Sometimes an infant's cry is answered immediately, sometimes it is ignored briefly then answered and sometimes the crying infant can be ignored and left for long periods. When infants' needs are not consistently recognised, their world can become unreliable and unpredictable. When care is inadequate, irregular or even rejecting, **mistrust** can develop. According to Erikson, if infants develop a strong sense of mistrust, they will become anxious and insecure. They may become fearful and suspicious toward the world and people in it, and this may continue to later stages of psychosocial development.

Figure 5.59 Infants develop trust when their world is predictable; for example, being able to rely on being cuddled when they need it.

Erikson believed that, under certain circumstances, developing a sense of mistrust rather than trust can form the basis of antisocial behaviour later in life. On the other hand, trust in infancy builds the foundation for a lifelong expectation that the world will be a good and safe place.

The trust versus mistrust crisis is generally not resolved totally in infancy. It can arise again in later stages. For example, children who enter school with a sense of mistrust may, over time, learn to trust teachers who take the time to show them that they are trustworthy. It is also possible to gain basic trust in infancy and lose it later. Sometimes people who develop a sense of trust in infancy can lose it because of experiences later in life; for example, if a trusted partner betrays you by cheating on you.

Stage 2: Autonomy versus Shame and doubt (12–18 months to 3 years)

Stage 2 involves a conflict between autonomy at one extreme and shame and doubt at the other. Erikson believed that successful attempts by infants to establish their independence as they become increasingly mobile and competent during these years contributes to a sense of autonomy.

Autonomy refers to the ability to do things independently and the feelings of self-control, self-confidence, self-reliance and competence which accompanies this. We have autonomy when we are in a position to make our own choices and act on those choices; for example, when we choose to stay where we are or to go somewhere else, or when we choose to do some particular thing or not do it.

Alternatively, a sense of being too dependent on others can lead to a lack of self-confidence, self-consciousness and feelings of **shame** and **doubt** about our capabilities. Although it is desirable for autonomy to be developed in stage 2, Erikson believed that a certain amount of self-doubt about our capabilities is appropriate. Infants need to know the right balance between what they can do, what's safe to do and what they should do, compared with the activities for which they are not yet ready.

According to Erikson, the psychosocial crisis of autonomy versus shame and doubt is based on the infant's developing motor and cognitive abilities. This is the time when infants gain more and more control over their bodies and aspects of their behaviour. They learn to control some of their impulses and to feel pride in their accomplishments. Toddlers begin toilet training in this stage and exercise autonomy when they gain some control over their bowel and bladder. Both to toddlers and to caregivers this is an important achievement. Language skills are also important in developing autonomy. As infants get better at making themselves understood, they feel more powerful and become more independent.

During the second year of life, when infants can move about on their own and have discovered that they can cause events to occur, they begin to show their independence. They often want to explore, investigate and do things by themselves. The infant not only talks and walks, but also climbs, opens and closes things, pushes and pulls, holds and lets go. They take pride in these new accomplishments and often want to do things without help; for example, feeding themselves, buttoning clothes or flushing the toilet. In many respects, this second psychosocial stage is an 'all by myself' period.

Autonomy builds on the sense of trust developed in the first stage. Erikson believed that infants who have a well-developed sense of trust are also best prepared to become autonomous. This is because the caregiver is seen as a safe 'base' from which the infant can explore the world with increasing independence.

As time passes, these infants move further from their caregivers, often happily playing by themselves with only occasional glances to check that safety and security are nearby. By gently encouraging independence, by not immediately responding to every single request from the infant and by respecting the fact that the infant is an active, inquisitive person, caregivers promote the infant's development of autonomy.

Figure 5.60 An infant's eagerness to use a spoon to eat demonstrates their increasing autonomy.

If caregivers recognise the infant's need to do what they are capable of doing at their own pace and in their own time, then the infant develops a sense that they can control their muscles, their impulses, their behaviour and their environment — they have a sense of autonomy. However, when the infant's caregivers do for the infant what the infant is capable of doing themself, they reinforce a sense of shame and doubt.

When caregivers are consistently overprotective and restrict what the infant is permitted to do, make fun of unsuccessful attempts at independence and criticise 'accidents' such as wetting, dirtying, spilling or breaking things, infants can develop an excessive sense of shame with respect to other people and they begin to doubt their own abilities to control the world and themselves.

Erikson believed that if the infant leaves this stage with less autonomy than shame and doubt, they will find it more difficult to achieve autonomy later in life. In contrast, the infant who moves through this stage with a much greater sense of autonomy than feelings of shame and doubt is better prepared to be autonomous in later stages of development.

Stage 3: Initiative versus Guilt (3–5 years)

The third stage involves a conflict between initiative at one extreme and guilt at the other. Having established a sense of trust and autonomy in infancy, children develop an increasing sense of their own power and now want to try new things and use their power. According to Erikson, **initiative** involves being able to plan, think for oneself and carry out various kinds of activities with purpose.

Children from three to five years of age (the preschool years) are very active and increasingly have more control over their bodies. They can run, jump, wrestle, climb and ride a tricycle. Their mental capabilities are also developing. They have good language skills, they are inquisitive, they participate in imaginative play, and they are beginning to understand that other people have different thoughts and feelings from them. They also start to realise they can make things happen.

Children at this age no longer merely react. They plan and think for themselves, act with purpose, explore and follow their curiosity. They can therefore initiate and carry out various activities on their own, often just for the sake of being active. They no longer just respond to or imitate the actions of other children (Erikson, 1963).

Children at this age also become increasingly aware that there are limits beyond which they must not go when showing initiative and using their powers. For example, they become aware of rules about what is (and what is not) permitted, what will (and what will not) be tolerated, and even questions they should not ask. Thus, along with initiative comes the potential for feeling **guilt** — about going too far, about overstepping boundaries, about asking too many inappropriate questions, about becoming the 'wrong kind of person' (Morris, 1990).

For example, consider the case of five-year-old Sumi who feels so angry at her little brother that she wants to hit him. Sumi also realises that hitting her brother is wrong and that this action would upset her parents. She knows she has the ability to hit her little brother, but realises she cannot always do what she wants. She also realises that she will feel guilty if she fails to control her behaviour. In the autonomy stage (stage 2), children can be made to feel ashamed by other people; whereas in this third stage they learn to make themselves feel ashamed.

According to Erikson, whether or not a child leaves this stage with a stronger sense of initiative than guilt depends largely on the way in which caregivers respond to the child's self-initiated activities. Children who are given a lot of freedom and the opportunity to initiate play activities simply for the sake of doing them will have their sense of initiative strengthened.

Initiative is also strengthened when caregivers answer their children's questions (intellectual initiative) and do not discourage or make fun of their fantasies. However, if children are made to feel that their play is silly and stupid, that their questions are annoying or a nuisance, and that fantasy is a waste of time, then they may develop a sense of guilt over self-initiated activities, feelings that may continue through later stages (Elkind, 1971).

Figure 5.61 Initiative involves being able to think for yourself and acting with a purpose. If made to feel stupid about her self-initiated 'dress-up' game, this child may develop a sense of guilt over self-initiated activities.

Stage 4: Industry versus Inferiority (5–12 years)

Stage 4 involves a conflict between industry at one extreme and inferiority at the other. During this period, which corresponds with the primary school years, children have a desire to learn how things are made, how they work and what they do. According to Erikson, children will develop a strong sense of industry, unless they are restricted by feelings of inferiority or inadequacy.

During stage 4, children gain mastery over their bodies. It is also a period during which they become capable of logical reasoning, and of playing and learning by rules. For example, it is not until this stage that children are really able to 'take turns' at games that require them to obey rules, such as when playing tag or card games.

Although play continues to be important, as it is in all other stages, this is the period when the child must learn to work and become productive. According to Erikson, children must learn the technology or 'tools' which are important for being an industrious, productive worker in their society. In New Guinea, the Arapesh boy learns to make bows and arrows and traps, and the Arapesh girl learns to plant, weed and harvest. In Western, industrialised societies such as Australia, the basic tools required to become a productive, industrious worker later in life involve literacy (reading and writing), numeracy (using numbers) and digital competency (using apps on devices such as smart phones, PCs and tablets). These tools are mainly learned in school.

At school, the child also learns to be a worker and to earn recognition by producing things of quality, both by themselves and with others. Importantly, school also exposes the child to many peers with whom they cooperate and compete, and against whom they measure their abilities and accomplishments. To the five-year-old child, entering school is like entering a new world which is different from home. In many respects, school is a social world with its own goals, rules, achievements and failures.

When children are encouraged in their efforts to get the most out of things they already have, to do practical things (whether it be to cook, assemble a jigsaw puzzle, achieve a new level in a computer game, or construct a cubby house), are allowed to finish their products and are praised and rewarded for their results, then their sense of **industry** is enhanced. But parents who see their children's efforts as 'mischief' and 'making a mess' promote the development of a child's sense of inferiority. When children feel less adequate than their peers in achievements, skills and abilities, they develop a sense of **inferiority**.

The child's school experience also affects their industry–inferiority balance. For example, a child who has difficulties with schoolwork can have a particularly unhappy school experience, even when their sense of industry is encouraged and rewarded at home. This child may be 'too bright' to be in special classes, but 'too slow' to compete with children of average ability. Consequently, the child regularly experiences failure in academic efforts and this reinforces their sense of inferiority. However, children who have their sense of industry 'squashed' at home can have it revitalised at school through a sensitive and encouraging teacher.

Therefore, whether the child develops a sense of industry or inferiority does not depend solely on the caregiving efforts of the parents (as it does in earlier stages), but on other significant adults in the child's life as well (Elkind, 1971).

Figure 5.62 In stage 4, children learn the basic 'tools' that will enable them to become productive, industrious workers later in their lives. Reward for effort or achievement enhances our sense of industry.

Stage 5: Identity versus Role confusion (12–18 years)

Stage 5 involves resolving the conflict between identity at one extreme and role confusion at the other. During this period, which corresponds with adolescence, the psychosocial crisis is about developing a sense of identity. Failure to resolve this crisis produces some degree of 'role confusion'.

Erikson used the term **identity** to refer to the overall image individuals have of themselves. He believed that identity is something all people seek and that the search for identity is a lifelong search. However, it first comes into focus during adolescence.

During adolescence, the individual matures cognitively as well as emotionally and physically. In addition to the new feelings, sensations and desires that are experienced as a result of bodily changes, the adolescent develops a variety of new ways of looking at and thinking about the world. Among other things, adolescents can think about how other people think and contemplate what others think of them. They can also form clear ideas about ideal families, religions, cultures and societies which they can then compare with their own experiences of family, religion, cultures and societies.

Erikson believed that the task of this fifth stage is for adolescents to use their cognitive abilities to bring together all the things they have learned about themselves in the various roles they have undertaken in life; for example, as a son or daughter, brother or sister, student, sportsperson, friend, leader, follower, musician, employee and so on. The different images of the self learned through these different roles need to be combined into a complete image of the whole person that makes sense and that shows continuity with the past while preparing for the future. The adolescents who succeed at this task develop a psychosocial identity, a sense of who they are, where they have been and where they want to go in life.

If the person has reached adolescence with a healthy sense of trust, autonomy, initiative and industry, then their chances of developing a meaningful sense of identity are much better. The opposite is true for the person who enters adolescence with considerable mistrust, shame, doubt, guilt and inferiority. According to Erikson, preparation for a successful adolescence and forming an integrated psychosocial identity must, therefore, begin in infancy.

When young people do not attain a sense of personal identity, they show a certain amount of **role confusion** — a sense of not knowing who they are, where they belong, to whom they belong or where they are headed in life. According to Erikson, such confusion is often seen in 'delinquent young people'. Some young people seek a 'negative identity' opposite to the one that their parents and relatives would prefer them to have; for example, an identity as a 'delinquent', 'metal head' or a 'petrol head'.

Role confusion may also be evident when a young person takes an excessively long time to reach adulthood. However, a certain amount of role confusion is normal and, according to Erikson, helps explain the inconsistency, or changeable nature, of much adolescent behaviour, as well as adolescents' self-consciousness about their appearance.

Failure to establish a clear sense of personal identity during adolescence does not mean that a person is a failure or will never establish a strong sense of who they are. People who attain a sense of identity in adolescence will still come across challenges to that identity as they move through life (Elkind, 1971; Grotevant, 1992; Harter, 1990).

Figure 5.63 Role confusion can cause some young people to adopt a 'negative identity', which is opposite to their parents' preferences.

Stage 6: Intimacy versus Isolation (18–25 years)

The sixth stage of psychosocial development involves a conflict between intimacy at one extreme and isolation at the other. Failure to resolve this conflict results in avoiding interpersonal relationships and experiencing a sense of isolation. Erikson used the term **intimacy** to refer to the ability to share with and care about another person without fear of losing oneself in the process. **Isolation** refers to the sense of being alone without anyone to share one's life with or care for.

During later adolescence and the early years of adulthood, it becomes possible for the first time to engage in a truly intimate relationship with another person outside the family; to love another person for their real qualities and not just for the satisfaction that can be obtained from the relationship.

According to Erikson, this kind of relationship cannot occur earlier in life because a person cannot establish true intimacy without first developing a strong sense of personal identity and independence and being secure in their place in the world. People who do not fully understand who they are find it difficult to deal with the complete and open sharing that is required in an intimate relationship.

Erikson's description of intimacy versus isolation may provide some insight into people who avoid commitment to another person in a relationship. Furthermore, a person without a strong sense of identity tends to frequently seek praise, flattery and adoration from others, and this interferes with the shared commitment and honest communication that are essential for an intimate relationship to develop and last. People who lack a sense of identity tend to isolate themselves, or form superficial or shallow relationships with others (Grotevant, 1992; Morris, 1990).

According to Erikson, intimacy does not necessarily involve sex and it includes the relationship between friends. For example, soldiers who have served together under the most dangerous circumstances often develop a sense of commitment to one another that illustrates intimacy in its broadest sense. If a sense of intimacy is not established with friends or a partner, the result, in Erikson's view, is a sense of isolation (Elkind, 1971).

As with other psychosocial crises, the development of intimacy does not occur only during the stages of late adolescence and young adulthood. Nor do individuals stop seeking intimacy after the early adulthood stage. Intimacy, like identity, continually changes over time and is influenced by experiences later in life.

Figure 5.64 Intimacy involves sharing and caring with someone else without fear of losing oneself in the process.

Stage 7: Generativity versus Stagnation (25–65 years)

Stage 7 corresponds with adulthood and involves a psychosocial crisis of generativity at one extreme and stagnation at the other. **Generativity** refers to a person's concern with others beyond their immediate family, with future generations and the nature of the society and world in which those generations will live. Basically, people who achieve generativity build their lives around doing things that help others, will leave a lasting mark on future generations and will make the world a better place in which to live.

Erikson believed that people go through this psychosocial crisis towards the middle of the seventh stage when they look ahead to the latter half of their lives and feel a need to participate in the continuation of life. According to Erikson, if this need is not met, people develop a sense of stagnation. **Stagnation** refers to a sense of 'sameness', inactivity, boredom, too much concern with personal needs and comforts and a lack of personal growth.

According to Erikson, having children is an important part of generativity for many people. He did not believe, however, that everyone needs to become a parent in order to be generative. Nor did he believe that parenthood guarantees that someone will be generative.

Generativity is sometimes achieved by becoming involved in activities which promote the development of younger people; for example, as a sport coach, member of a school council or involvement with some other youth organisation.

Generativity can also be achieved by actively participating in groups concerned with social or environmental problems, such as youth unemployment and climate change. Similarly, work with community agencies, volunteer work for welfare groups and service on committees dealing with social or environmental problems provides opportunities for generativity. In all these examples, the act of helping is in itself satisfying and recognition or reward is not sought.

Many adults also achieve a sense of generativity through their paid work. Working creatively, skilfully or productively in a job that has a lasting influence on the lives of other people can help develop a strong sense of generativity and a lasting feeling of pleasure and satisfaction. This could apply to jobs in fields such as teaching, nursing, legal aid, social work, scientific research and engineering. Some people in middle adulthood change careers in an effort to find a job that provides a greater sense of generativity and lasting satisfaction (Morris, 1990).

Figure 5.65 Generativity can be achieved by becoming involved in activities which promote the development of younger people.

According to Erikson, becoming generative is not always easy. It depends on the successful resolution of the crises in each of the previous six stages. Furthermore, the attainment of generativity can be difficult in a youth-oriented society that seems eager for older people to step aside and let younger, more 'technologically savvy' workers take over. Thus, older workers can lose opportunities for generativity by not being able to pass on the wisdom and skills they have developed over the years (Dacey & Travers, 1991).

As in Erikson's other psychosocial stages, it is the balance of the positive and negative aspects of the crisis which is important. For example, some stagnation can provide a break that leads to greater generative activity in the future. However, too much stagnation can result in an obsession with oneself, severe depression or despair in the next stage.

Stage 8: Integrity versus Despair (65+ years)

The eighth and final stage occurs when most of a person's life's work is nearing completion and there is time for reflection. The last psychosocial crisis to be faced is integrity versus despair.

According to Erikson, the sense of integrity arises from the individual's ability to look back on their life with satisfaction. **Integrity** refers to a sense of satisfaction with one's achievements in life and a belief that all that happened in the course of one's life has been useful, valuable and meaningful. The major part of life has been lived and the crisis of integrity involves an examination of that life and a judgment of whether that life, with all its ups and downs, gains and losses, good decisions and mistakes, pleasures and pains, was worthwhile.

Figure 5.66 Integrity develops from looking back at achievements in life with satisfaction.

At the other extreme is the individual who looks back on life with a sense of despair. **Despair** involves bitter feelings of hopelessness, involving lost opportunities, mistakes that were made and the sense that life has been meaningless and empty. In the latter years of life, the individual may realise with despair that time seems to have run out and it is too late to do all the things they want to do.

While a person must achieve a greater sense of integrity than despair for the successful resolution of the final crisis, Erikson believed that some despair is inevitable. For example, he suggested that even if someone felt completely fulfilled with their life, the fact that other people have suffered throughout their lives may make them feel some despair.

Criticisms of Erikson's theory

Erikson's psychosocial theory provides a useful outline for understanding aspects of personality development and interpreting some of the major changes that occur at different times throughout the lifespan. Unlike many other theories on development, Erikson's theory describes changes which take place across the entire lifespan from birth to older age.

Another positive feature is that it describes how healthy personality development is achieved. For example, the theory explains how each stage of development can have a positive outcome as well as a negative outcome. Many other theories of personality, including widely adopted contemporary theories such as the Five Factor Model on page 13 focus on assessing and describing personality, overlooking factors influencing development.

Criticisms of Erikson's theory have been based on the lack of experimental evidence to support it. The theory is developed mainly from case studies of people in several different cultures and on Erikson's experiences with individuals he counselled, rather than scientifically controlled research.

Experimental evidence for the theory has been difficult to obtain. For example, it is hard to define 'trust' or 'generativity' precisely enough for thorough scientific testing under controlled conditions. However, in the past 20 or so years, various research attempts have been made to test Erikson's theory using cross-sectional and longitudinal studies. Findings from these studies provide some empirical evidence that supports various aspects of Erikson's theory (Bradley & Marcia, 1998; Marcia, 1999).

Another criticism of Erikson's theory is that it does not consider how socio-cultural influences can have differing effects on males and females. For example, the theory does not describe female personality development in general and primarily focuses on males.

Criticisms have also been made about more specific aspects of the theory; for example, Erikson's belief that identity is found in adolescence. Australian psychologists Lindsay Gething and Desmond Hatchard (1989) have argued that people continue their search for identity well into young adulthood. They also criticise Erikson's theory for overlooking the role of work in identity formation of the young adult. They believe this is a big gap in the theory, especially as Erikson strongly argued about the importance of industry in childhood and the importance of career preparation in adolescence.

Many recent studies of adult development have shown that undertaking a career during adulthood is a major path in the search for identity. Furthermore, experiences at the workplace can affect our personality development as much as people with whom we have relationships. Erikson's theory states that *all* people experience a 'mid-life crisis' during adulthood. However, research which has tested this proposal suggests that this is not the case. Many adults do not experience a mid-life crisis, both in Western societies and in many non-Western societies and cultures (Costa & McCrae, 1994).

Erikson's theory prompted and continues to stimulate considerable research since it was first published. For example, some psychologists have studied ways in which specific life and cultural experiences affect personality development. It has been found that *when* and *where* people are born and grow up can significantly influence personality development (Elder, 1998). For example, people who were children during the Great Depression (1929–39), when they had very little, were always careful with their money even when they were financially secure years later.

LEARNING ACTIVITY 5.28

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Word copy of table

Review questions

1. Complete the following table to summarise Erikson's psychosocial theory of personality development by including a name and description of each psychosocial crisis.

Stage	Age	Developmental period	Psychosocial crisis	Description of crisis
1	Birth to 12–18 months	Early infancy		
2	18 months–3 years	Late infancy		
3	3–5 years	Early childhood		
4	5–12 years	Middle and late childhood		
5	12–18 years	Adolescence		
6	18–25 years	Young adulthood		
7	25–65 years	Adulthood		
8	65+ years	Late adulthood		

2. Identify the psychosocial crisis most likely to be unresolved in each of the following examples. Explain the person's feelings and behaviour in terms of Erikson's theory.
   (a) A new employee is reluctant to do a task on their own for fear of making a mistake.
   (b) A 38-year-old has had three broken engagements in the past 10 years.
   (c) A solicitor decides to take up politics and runs for a state government seat in parliament because she is passionate about 'making a difference' to the environment.
   (d) An adolescent boy is reluctant to develop friendships with females after his girlfriend was unfaithful.
   (e) An adult wishes they could relive their working life so they could do it better.
   (f) A 10-year-old continually misbehaves in class to avoid doing schoolwork.
   (g) An adolescent always waits to be asked to join in social activities.
   (h) An adolescent goes through a 'stage' of wearing black clothes.
3. Describe three criticisms that have been made of Erikson's theory.
4. Why is it important for a theory to be based on experimental research evidence?

LEARNING ACTIVITY 5.29

Reflection

What insight has Erikson's theory enabled about your own personality development? How useful is it for *describing* your personality?

LEARNING ACTIVITY 5.30

Role play — interview with a developmental theorist

Working with a partner, prepare a five- to 10-minute interview conducted by a science journalist with Piaget, Erikson or another developmental theorist you have studied

In your interview, ensure you include one or more questions on each of the following topics:

1. what the theory is about
2. how development occurs
3. key concepts in the theory
4. everyday examples to describe the theory
5. research findings that may or may not support the theory
6. possible limitations or criticisms of the theory
7. possible areas for further research
8. other relevant information.

CHAPTER SUMMARY

- **THE COMPLEXITY OF PSYCHOLOGICAL DEVELOPMENT**
  - Defining development
  - Areas of development
  - Interaction of different areas of development
  - How psychological development proceeds
    - Continuous versus discontinuous development
    - Sequential nature of development
    - Quantitative and qualitative changes
    - Individual differences in development
  - Interaction of hereditary and environmental factors in shaping psychological development
    - Nature versus nurture
    - Role of maturation in development
  - Sensitive and critical periods in psychological development
    - Sensitive periods
    - Critical periods
  - Twin studies and adoption studies
    - Twin studies
    - Adoption studies
  - Attachment and emotional development
    - Ainsworth and the Strange Situation procedure
      - Ainsworth's types of attachment
      - Factors influencing attachment
      - Disorganised attachment
    - Harlow's experiments on attachment in monkeys
  - Development of cognitive abilities
    - Key principles of Piaget's theory
      - Assimilation
      - Accommodation
      - Schema
    - Piaget's four stages of cognitive development
      - Sensorimotor stage (0–2 years)
      - Pre-operational stage (2–7 years)
      - Concrete operational stage (7–12 years)
      - Formal operational stage (12+ years)
    - Criticism of Piaget's theory
  - Psychosocial development
    - Key principles of Erikson's theory
    - Erikson's eight stages of psychosocial development
      - Trust vs Mistrust (0 to 12–18 months)
      - Autonomy vs Shame and doubt (12–18 months to 3 years)
      - Initiative vs Guilt (3–5 years)
      - Industry vs Inferiority (5–12 years)
      - Identity vs Role confusion (12–18 years)
      - Intimacy vs Isolation (18–25 years)
      - Generativity vs Stagnation (25–65 years)
      - Integrity vs Despair (65+ years)
    - Criticisms of Erikson's theory

KEY TERMS

abstract thinking p. 267
accommodation p. 259
Ainsworth p. 245
adaptation p. 258
adoption study p. 244
animism p. 263
assimilation p. 258
attachment p. 244
autonomy vs shame and doubt p. 271
centration p. 263
classification p. 267
cognitive accomplishment p. 257
concrete operational stage p. 266
conservation p. 266
critical period p. 238
development p. 220
disorganised attachment p. 251
dizygotic twins p. 240
egocentrism p. 262
emotional development p. 244
environment p. 229
Erikson p. 270
formal operational stage p. 267
generativity vs stagnation p. 271
genetics p. 248
goal-directed behaviour p. 261
Harlow p. 253
heredity p. 228
idealistic thinking p. 267
identity vs role confusion p. 271
imprinting p. 238
industry vs inferiority p. 271
initiative vs guilt p. 271
insecure avoidant attachment p. 247
insecure resistant attachment p. 247
integrity vs despair p. 271
intimacy vs isolation p. 271
maturation p. 232
monozygotic twins p. 240
nature p. 229
nature vs nurture p. 229
nurture p. 229
object permanence p. 261
physical development p. 221
pre-operational stage p. 262
principle of readiness p. 232
psychological development p. 257
psychosocial crisis p. 271
psychosocial development p. 270
reversibility p. 263
schema p. 259
secure attachment p. 247
sensitive period p. 237
sensorimotor stage p. 261
social development p. 221
Strange Situation p. 245
symbolic thinking p. 262
temperament p. 249
transformation p. 263
trust vs mistrust p. 271
twins study p. 240

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 286–9. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about the complexity of psychological development	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
• **Defining development**			
– Areas of development			
– Interaction of different areas of development			
• **How psychological development proceeds**			
– Continuous versus discontinuous development			
– Sequential nature of development			
– Quantitative and qualitative changes			
– Individual differences in development			
• **Interaction of hereditary and environmental factors in shaping psychological development**			
– Nature versus nurture			
– Role of maturation in development			
• **Sensitive and critical periods in psychological development**			
– Sensitive periods			
– Critical periods			
• **Twin studies and adoption studies**			
– Twin studies			
– Adoption studies			
• **Attachment and emotional development**			
– The Strange Situation procedure			
– Ainsworth's types of attachment			
– Disorganised attachment			
– Factors influencing attachment			

Key knowledge I need to know about the complexity of psychological development	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
• **Harlow's experiments on attachment in monkeys**			
• **Development of cognitive abilities**			
– Key principles of Piaget's theory			
◦ assimilation			
◦ accommodation			
◦ schema			
• **Piaget's four stages of cognitive development**			
– Sensorimotor stage			
– Pre-operational stage			
– Concrete operational stage			
– Formal operational stage			
• **Criticisms of Piaget's theory**			
• **Psychosocial development**			
– psychosocial crises			
– link between psychosocial and personality development			
• **Erikson's theory**			
– Stage 1: trust vs mistrust			
– Stage 2: autonomy vs shame and doubt			
– Stage 3: initiative vs guilt			
– Stage 4: industry vs inferiority			
– Stage 5: identity vs role confusion			
– Stage 6: intimacy vs isolation			
– Stage 7: generativity vs stagnation			
– Stage 8: integrity vs despair			
• **Criticisms of Erikson's theory**			

CHAPTER 5 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

Which of the following can be considered to be a developmental change?

A. being in a good mood after getting back a maths test result
B. trying bungee jumping for the first time
C. having a good night's sleep after not having slept well for three nights
D. regularly speaking in public without getting anxious after having learned a strategy to manage anxiety

Question 2

Maturation means that

A. physical development and psychological development occur independently of one another.
B. the brain and nervous system need to be sufficiently developed before someone can think, feel or behave in a particular way.
C. psychological development does not occur in a sequential way.
D. if someone practises any skill they will become competent at that skill.

Question 3

A person's genetic make-up is determined

A. at conception.
B. at birth.
C. during childhood.
D. when they reproduce.

Question 4

In psychology, nature refers to

A. the natural tendency to control one's own development.
B. the influence of genetic inheritance on development.
C. the influence of an individual's experiences throughout infancy.
D. the influence of an individual's experiences throughout their lifetime.

Question 5

Which of the following statements about the effects of heredity and environment on psychological development is most correct?

A. Heredity is more important than the environment in shaping psychological development.
B. The environment is more important than heredity in shaping psychological development.
C. Environmental influences are stronger than the influence of heredity in psychological development.
D. Genes provide the plan for how development will proceed and environmental influences determine how that plan unfolds in determining psychological development.

Question 6

The correct sequence of the stages of cognitive development described in Piaget's theory is

A. sensorimotor, concrete operational, pre-operational, formal operational.
B. sensorimotor, formal operational, concrete operational, pre-operational.
C. sensorimotor, pre-operational, concrete operational, formal operational.
D. pre-operational, sensorimotor, formal operational, concrete operational.

Question 7

According to Ainsworth's attachment theory, infants form the strongest attachment to

A. people most closely involved with them.
B. people they like.
C. people who spend the most time with them.
D. only one person.

Question 8

Infants who form a secure attachment are likely to

A. treat their caregiver as a stranger.
B. feel safe and able to depend on their caregiver.
C. feel safe in the presence of all people.
D. show some distress but gradually increase exploration when the caregiver departs.

Question 9

An infant who demonstrates an insecure resistant attachment pattern of behaviour

A. avoids forming an attachment.
B. will not seek to be close to their caregiver.
C. seeks to be close to the caregiver then wriggles to be freed from them.
D. will not be distressed when separated from their caregiver.

Question 10

Trinh believes that the clouds 'look sad today'. Piaget refers to this way of thinking about objects as

A. animism.
B. centricism.
C. classification.
D. transformation.

Question 11

According to Piaget, logical and abstract thinking are not consistently apparent until an individual has reached the ______ stage.

A. sensorimotor
B. pre-operational
C. formal operational
D. concrete operational

Question 12

In developing his theory of personality development, Erikson primarily relied on evidence from

A. case studies.
B. experiments.
C. cross-sectional studies.
D. observational studies.

Question 13

Bree and Emma's father bought them a strawberry Big M each while out shopping. He decides to pour the milk out of each carton into different glasses and his daughters watch him do this. Emma's glass is much wider than Bree's glass and she complains that Bree has been given more milk than she has.

It is likely that Emma has yet to develop an understanding of

A. classification.
B. conservation of mass.
C. conservation of volume.
D. conservation of length.

Question 14

How many stages are there in Erikson's theory of personality development?

A. 5
B. 6
C. 7
D. 8

Question 15

Erikson proposed that the order in which people go through his stages is

A. varied.
B. fixed.
C. age-related.
D. sex-related.

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (1 mark)

According to Harlow's research, ______________________________ is a vital factor influencing attachment in rhesus monkeys.

Question 2 (2 marks)

Explain the meaning of attachment in relation to psychological development.

Question 3 (4 marks)

Describe two factors that influence the development of attachment and how each factor can influence that type and quality of an attachment.

Question 4 (2 marks)

Compare and contrast sensitive and critical periods in development with reference to two key differences.

Question 5 (3 marks)

Explain why the results of adoption studies may be compared with those of twin studies to understand how nature and nurture can influence psychological development.

Question 6 (3 marks)

Distinguish between Piaget's processes of assimilation and accommodation with reference to an example.

Question 7 (3 marks)

(a) What is abstract thinking? 1 mark

(b) Give an example of abstract thinking. 1 mark

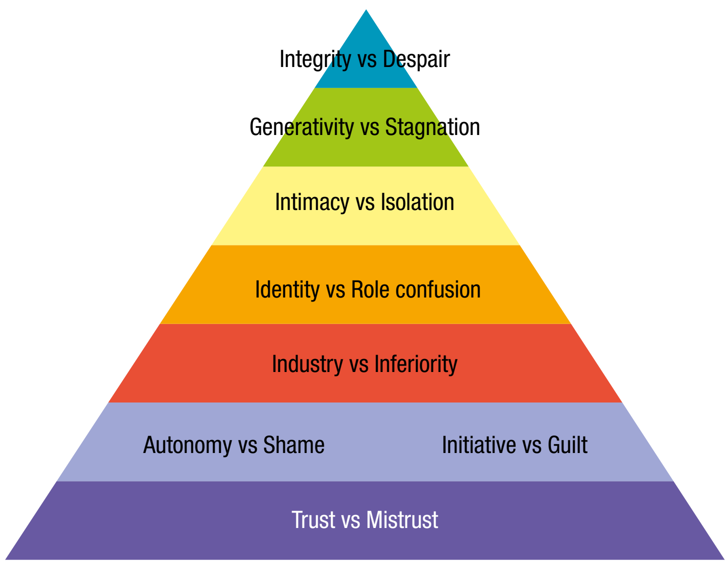
(c) In which stage of Piaget's theory is it accomplished? 1 mark

Question 8 (3 marks)
A child is unable to classify correctly. Explain this inability with reference to centration.

Question 9 (8 marks)
(a) Explain what a psychosocial crisis is with reference to one of the crises identified by Erikson. Ensure you correctly name the crisis. 2 marks

(b) How do psychosocial crises shape personality development? 1 mark

(c) Discuss how accurately the following diagram represents Erikson's theory. 5 marks



Question 10 (2 marks)
Describe two common criticisms of Erikson's theory **or** Piaget's theory.

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.
The answers to the Section B questions are in eBookPLUS.

6 ATYPICAL PSYCHOLOGICAL DEVELOPMENT

KEY KNOWLEDGE

- the conceptualisation of normality including typical and atypical behaviours; adaptive and maladaptive behaviours; and mental health and mental disorder as a continuum
- mental health as a product of internal and external factors which assist individuals to cope with change and challenge
- major categories of psychological disorders: addiction disorders; anxiety disorders; mood disorders; personality disorders; and psychotic disorders
- the 'two-hit' hypothesis as an explanation for the development of particular psychological disorders, illustrated by schizophrenia

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), p.15.

CHAPTER CONTENT

Sometimes psychological development does not occur as it should. An individual may think, feel or behave in a markedly different way from how they usually do, or their development may not be at the same rate as others of about the same age. How they go about their daily life may also differ from what is considered to be 'typical' when compared to others of the same age, sex and cultural group. In such cases, development may be described as atypical.

Atypical development is development that is *not* typical — it noticeably differs in a significant way from what is usual or appropriate. It may involve the developmental process or its outcomes. Small delays, bursts of rapid progress and other individual differences that occur naturally are to be expected. These are not considered atypical unless they are so unusual that they 'stand out' to the extent that they can't be overlooked.

The terms *normal* and *typical* are often used interchangeably. Knowing what is normal (or typical) is important because it assists understanding of what is *abnormal* (or *atypical*). But there is not always a clear line between psychological development or functioning that can be considered normal or abnormal.

Sometimes it is quite easy to distinguish between normal and abnormal behaviour. For example, you would probably agree that thanking a friend for a birthday present is normal behaviour. And that it is normal to smile when feeling happy and to feel saddened by the loss of a loved one. Likewise, you would probably agree that the behaviour of a man at a shopping centre insisting to all passers-by that he is the bushranger Ned Kelly is abnormal. And that the behaviour of the lady who avoids television sets because she believes they are used by aliens to read her thoughts is abnormal.

In some cases, however, it is much more difficult to decide on what is normal and abnormal. For example, is it normal to be scared of hairy spiders? To change your plans because of a horoscope prediction? To feel shy and awkward at parties? To be in love with someone you only meet on the internet? To achieve an extremely high IQ score on an intelligence test? To constantly worry about VCE results? To prefer to live alone and isolated from others?

You probably found that you experienced difficulty in deciding what is normal and abnormal for some of these events. You may have even thought 'It depends . . .' This is not surprising because, even in psychology, the meanings of normality and abnormality can vary.

Figure 6.1 Is it normal to be in love with someone you only meet on the internet? Is it normal or abnormal to feel shy and awkward at parties?

APPROACHES TO DESCRIBING NORMALITY

Throughout the history of psychology, there have been many different approaches to describing *normality* in relation to mental processes and behaviour. Six that have been influential are the socio-cultural, functional, historical, medical, statistical and situational approaches. Each of these approaches views normality from a different perspective and has a different emphasis on how normality is best described.

Socio-cultural approach

Thoughts, feelings and behaviour that are appropriate or acceptable in a particular society or culture are viewed as normal and those that are inappropriate or unacceptable are considered abnormal. For example, in some cultures, loud crying and wailing at the funeral of a stranger is expected and considered normal, whereas in other cultures it would be considered abnormal as it is inappropriate in that culture to wail at the funeral of a stranger.

Figure 6.2 Kashmiri women in Pakistan trying to comfort a distraught mourner at a funeral

Functional approach

Thoughts, feelings and behaviour are viewed as normal if the individual is able to cope with living independently (i.e. 'function') in society, but considered abnormal if the individual is unable to function effectively in society. From this perspective, being able to feed and clothe yourself, find a job, make friends, and so on, is normal, but being so unhappy and lethargic that you cannot get out of bed each morning, do not eat properly, cannot hold a job and avoid relationships with others is abnormal.

Historical approach

What is considered normal and abnormal in a particular society or culture depends on the era, or period in time, when the judgment is made. For example, in many western societies prior to the 20th century, if a parent severely smacked their child for misbehaving, few people would have considered this abnormal, but in many western societies and cultures today such behaviour by a parent is considered abnormal and may even be illegal.

Medical approach

This approach views abnormal thoughts, feelings or behaviour as having an underlying biological cause that can be diagnosed and treated, in much the same way as a disorder with physical health. For example, if someone commonly thinks in a disorganised way, sees or hears things that are not really there, and always showers in their swimming costume because they believe they are constantly under surveillance by ASIO, then this pattern of thoughts, feelings and behaviour could be diagnosed as a psychotic disorder due to an underlying brain disorder and require treatment with prescribed medications.

Statistical approach

The statistical approach is based on the idea that any behaviour or characteristic in a large group of individuals is distributed in a particular way; that is, in a normal distribution. Generally, if a large majority of people, called the 'statistical average', think, feel or behave in a certain way, it is considered normal. For example, by this definition, it is normal to laugh when tickled, because most people do. If the thought, feeling or behaviour is shared by a small minority of people, called the 'statistical extremity', then it is considered abnormal. So, to laugh when a loved one dies might be considered abnormal because very few people do this.

Situational approach

Within a society or culture, thoughts, feelings and behaviour that may be considered normal in one situation may be considered abnormal in another. For example, if you were to come to school wearing pyjamas, most of your classmates would think that your behaviour was abnormal, yet it is considered normal to wear pyjamas to bed.

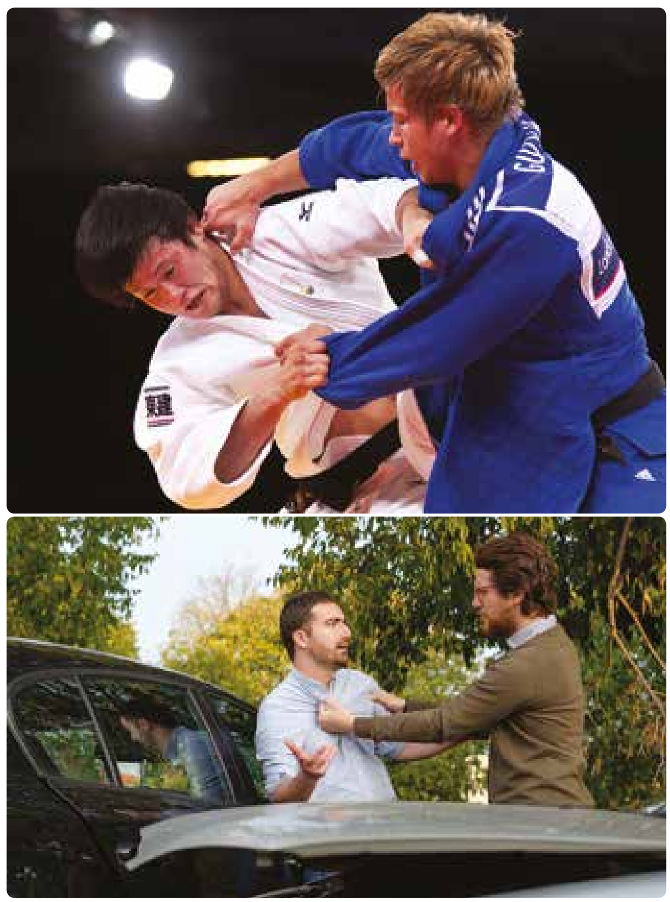

Figure 6.3 What is accepted as normal in one situation may be considered abnormal in another. For example, (a) aggressively tackling a stranger is considered normal and expected in a judo bout, (b) but tackling a stranger in a public place for no good reason is considered abnormal and unacceptable.

Contemporary psychologists recognise that none of these approaches to describing normality is entirely satisfactory on its own. However, each approach has contributed to the understanding of normality (and abnormality) — in particular, understanding of the various factors that need to be considered when using the terms in relation to someone's thoughts, feelings or behaviour. This is important as the way normality and abnormality are viewed and described provides the basis of diagnosing and treating mental disorders.

CONCEPTUALISATION OF NORMALITY

There is no universally accepted single definition of normality in psychology and psychologists tend to avoid defining it. Instead, psychologists focus on the concept, or 'idea', of normality, how it can be recognised, and key characteristics for doing so. This conceptual approach provides a basis for describing and explaining abnormality, which is particularly useful for the diagnosis and treatment of mental disorders. Two characteristics for distinguishing between normality and abnormality emphasise behaviour — typical and atypical behaviours, and adaptive and maladaptive behaviours.

Typical and atypical behaviours

As with development, **typical behaviour** in relation to individual behaviour means that, at most times, the person acts as they usually ('typically') do. There may be some occasions when behaviour is quite different or inconsistent with how it normally occurs, but such variations are temporary. By contrast, **atypical behaviour** means that the person acts in ways that are unusual ('atypical') for them. Essentially, they are behaving 'out of character'. For example, if a usually friendly, outgoing person becomes withdrawn, does not talk or interact with others and stays in their bedroom alone for extended periods of time, they would be considered to be behaving in a way that is atypical for them.

Of course, whether a person's behaviour is typical or atypical depends on such factors as the specific situation and cultural context in which their behaviour occurs. For example, a rock star who is usually well-spoken and polite when out of the public eye may dress, speak and behave outrageously as part of their performance and the public image they wish to portray. Their performance is atypical of their normal, everyday behaviour but not of their behaviour when on stage. However, this does not mean their atypical behaviour when performing is a symptom of a mental health problem that needs to be treated.

Atypical behaviour raises mental health concerns when it is persistent, is evident across different situations in everyday life, and is maladaptive.

Figure 6.4 Is Miley Cyrus's onstage behaviour during a live performance typical or atypical of her normal everyday behaviour?

Adaptive and maladaptive behaviours

Adaptive behaviour is any behaviour that enables the individual to adjust to the environment appropriately and effectively. It involves actions that enable a person to satisfactorily carry out their everyday life tasks, such as being productive at school or work and participating in their relationships with others. Basically, the individual is able to 'adapt' to the demands of daily living in age-appropriate ways and do so relatively independently in a variety of settings.

Generally, examples of adaptive behaviour you may carry out on a daily basis include eating dinner, brushing your teeth before bed, having a 'good night's sleep', setting an alarm if a late awakening is undesirable, waking up in time to get to the first scheduled activity at school, dressing yourself in an appropriate way for school, performing all the actions that usually enable you to get to school on time, greeting friends, controlling your impulses if a teacher treats you unfairly, and so on. Adaptive behaviour is generally considered to be positive, constructive and age-appropriate within the individual's socio-cultural environment.

By contrast, **maladaptive behaviour** is any behaviour that interferes with the individual's ability to adjust to the environment appropriately and effectively. It involves actions that impair a person's ability to satisfactorily carry out their usual everyday tasks and to cope with or adjust to the demands of life.

Maladaptive behaviour is sometimes called dysfunctional behaviour because it disrupts everyday 'functioning'. There is a reduced ability to do the things one normally does each day, such as attending to personal hygiene, sleeping well, eating and preparing food, speaking, decision making, learning, remembering things, going to school or work, and maintaining relationships with others.

Because of its impairing nature, maladaptive behaviour is often the target of intervention. For example, maladaptive behaviour associated with phobias and obsessive-compulsive disorder can hinder a person in carrying out what are ordinarily regarded as basic, everyday tasks. A fear of driving, flying, open or enclosed spaces may stop someone from going to school or work, putting out the bins, hanging up washing in the backyard, shopping at the local supermarket, and so on. Similarly, someone with a fear of contamination may repeatedly wash their hands. Washing hands is in itself not a maladaptive behaviour. However, it would be considered maladaptive when it requires so much time and effort each day that it interferes with the ability to get on with everyday living.

Maladaptive behaviour is often described in terms of a scale or continuum ranging from relatively minor and less impairing behaviours (such as nail biting or a tantrum) to major and severely impairing behaviours (such as self-harm or addiction) that seriously interfere with everyday functioning and adjustment. However, maladaptive behaviour that seems to be relatively minor can also be severely impairing, especially when it is recurring and persists, as with the handwashing shown in Figure 6.5 below.

Figure 6.5 (a) Tantrum behaviours such as screaming and parental resistance are considered maladaptive. Although viewed by many people as age-appropriate in toddlers, the tantrum is often an attempt to decrease anxiety and gain control. Its non-adaptive nature can prevent effective adjustment to and participation in family activities and other aspects of everyday life. (b) Hand washing would only be considered maladaptive if it is done so many times each day that it interferes with the person's ability to effectively carry out their usual daily activities.

LEARNING ACTIVITY 6.1

Review questions

1. Explain the difference between the following with reference to a relevant example:
   (a) typical and atypical development
   (b) typical and atypical behaviour
   (c) adaptive and maladaptive behaviour.

2. When would atypical behaviour be of concern to a mental health professional?

3. (a) Explain the meaning of 'target of intervention' in relation to maladaptive behaviour.
   (b) Does all maladaptive behaviour require intervention? Give an example to support your view.
   (c) Under what circumstances would maladaptive behaviour most likely require intervention?

4. Explain the meaning of normality with reference to an example.

5. Name and outline the main approaches psychologists have used over time to describe normality and to differentiate between normality and abnormality.

6. (a) Describe two examples not used in the text of normal behaviour in Australian society that may be considered abnormal in another society.
   (b) Give two examples not used in the text of normal behaviour in a cultural group within Australian society that may be considered abnormal by another cultural group in Australia.

MENTAL HEALTH AND MENTAL DISORDER

For most people, the distinction between physical health and physical illness is quite clear. When we are physically healthy, our bodies are functioning as we know they should and we have no aches, pains or problems that cause us concern or prevent us from doing the things we normally do.

Our physical health can be viewed as being somewhere along a continuum ranging from extremely healthy, when we have no physical 'complaints' or concerns, to extremely unhealthy. There are also different levels of physical wellbeing in between the two extremes. For example, muscle soreness after having played a sport for the first time might cause mild discomfort and be considered a problem for a day or so, but it would not be considered serious. While the discomfort might remind you of the need to be fitter, it is unlikely to prevent you from washing the dishes, attending school, going to your casual job, or having a driving lesson. However, an excruciating pain in your knee may indicate that you have a more serious problem. A physical health problem for which your discomfort is severe and/or lasts for an extended period of time will often lead you to see a doctor for a diagnosis and a treatment plan.

Mental health is similar to physical health in several ways; however, mental health primarily involves the mind, whereas physical health primarily involves the body. When we are mentally healthy, we think, feel and behave in ways that enable us to cope with change and the challenges arising in the course of everyday life. Good **mental health** is widely defined as a state of wellbeing in which an individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community (World Health Organization [WHO], 2017a).

According to this definition, good mental health means that we are *mentally healthy*. It is a positive concept that generally relates to the enjoyment of life, ability to cope with stress, the fulfilment of goals and potential, and a sense of connection to others. Psychologists view mental health as a vital part of overall health and wellbeing. It is a desirable quality in its own right and is more than the absence of mental ill-health.

Good mental health does not mean we do not have times of sadness, anger or anxiety. Good mental health is reflected in how well we deal with the positive and negative emotions associated with the various events in our lives. For example, a mentally healthy student who is preparing to do their first of six exams in two days time may feel anxious and be grumpy or short-tempered. However, they will probably still be able to eat, study, sleep, remember what to take to the exam, hold a conversation with friends and laugh when something funny happens.

In addition, mental health is not something we either have or do not have. Instead, we may be more or less mentally healthy (or not healthy). Therefore, like physical health, mental health is often represented as being on a continuum.

As shown in Figure 6.6 opposite, a mental health continuum may range from mentally healthy, when we are functioning well and coping with the normal stressors of everyday life, through to a mental health problem that interferes with functioning but is mild and temporary, or to a diagnosable mental disorder that tends to be more serious, longer-lasting and likely to require treatment.

Although degree of severity is shown to increase from left to right and lines may be used, there are no clear-cut dividing lines between different points along the continuum. Similarly, mentally healthy and mental disorder are represented at different ends, but this does not mean that they are entirely separate, can be compartmentalised, are polar opposites, or that a continuum cannot extend beyond the end points shown.

The location of an individual's mental health on the continuum is also unstable. This means that it is not fixed because it may vary or fluctuate over time depending on circumstances. A range of internal and external biopsychosocial factors combine to influence our mental health at different points in time. For example, the mapping of an individual's mental health on a continuum such as in Figure 6.6 may shift from the left to right side following exposure to a stressful life event, then back to the left side when the stressor passes or following intervention through the use of a stress management technique to help cope with the stressor.

Mental health problems are common and usually impair functioning. Their experience is sometimes referred to as a 'rough patch', a 'low point' or 'the blues'. As shown in Table 6.1 opposite, mental health problems can cause a range of personal difficulties such as worry, inability to concentrate for as long as usual, loss of motivation, social withdrawal and changes in appetite and sleep. However, mental health problems do not usually meet all the criteria for a diagnosable mental disorder.

A **mental health problem** most often occurs as a result of a life stressor, and is usually less severe and of a shorter duration than a mental disorder. It will often resolve with time or when the stressor changes or passes. However, if a mental health problem persists or increases in severity, it may develop into a mental disorder. Examples of mental health problems include the sadness and despair associated with loss and grief, and symptoms associated with stress (Hunter Institute of Mental Health, 2017).

Mental disorder, also called *psychological disorder* or *mental illness*, involves a combination of thoughts, feelings and/or behaviours which impair the ability to function effectively in everyday life. There is a wide range of mental disorders, each with different symptoms (WHO, 2017b). As shown in Table 6.1, examples include depression and schizophrenia.

The essential characteristics of a mental disorder are:

- the disorder occurs within the individual and results from dysfunction within the individual
- there is clinically diagnosable dysfunction in thoughts, feelings and/or behaviour, for example, low levels of functioning, social and emotional wellbeing
- the disorder causes significant personal distress or disability in functioning in everyday life
- actions and reactions are atypical of the person and inappropriate within their culture
- the disorder is not a result of a personal conflict with society (American Psychiatric Association [APA], 2013).

Each of these characteristics (called 'diagnostic criteria') captures a part of what a mental disorder is. All must be evident for a particular mental disorder to be diagnosed, but the diagnosis of a disorder does not necessarily mean that there is a need for treatment. Generally, a mental disorder usually lasts longer than a mental health problem and causes more distress and disruption to a person's life.

As with physical illnesses, mental disorders differ in severity and involve variable amounts of impairment and distress to the individual. It is also possible for a person to feel 'mentally ill' even though a doctor or mental health professional cannot find evidence of any known disorder.

The symptoms of most mental disorders can be successfully treated. It is rarely possible for a mental disorder to 'go away' without treatment from a qualified professional. Professional help may include psychotherapy ('talking therapy') and/or medication. This may be complemented with a community program such as participation in a social support group.

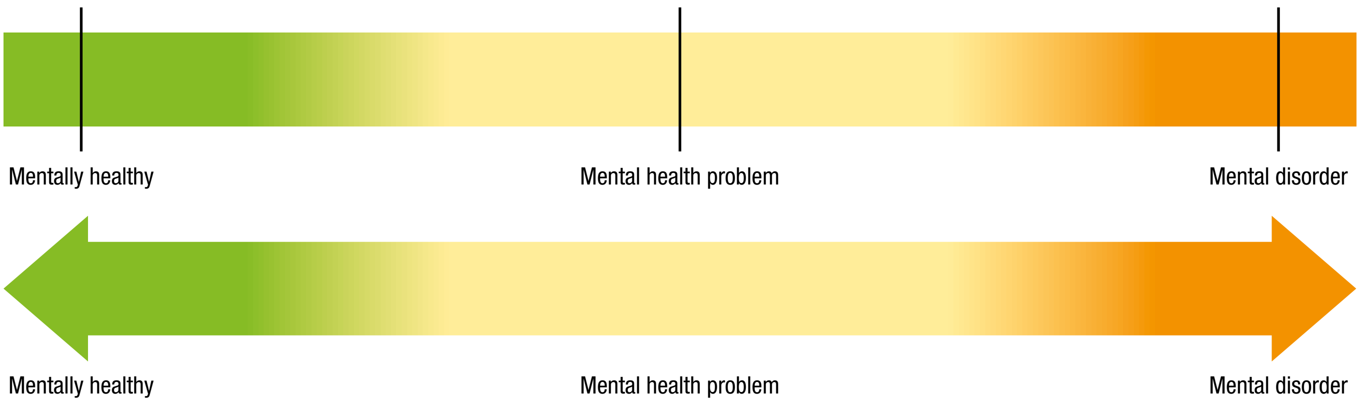

Figure 6.6 Although severity is shown to increase from left to right and lines may be used, there are no clear-cut dividing lines on a mental health continuum. Similarly, mentally healthy and mental disorder are represented at different ends, but this does not mean that they are entirely separate, can be compartmentalised, are polar opposites, or that a continuum cannot extend beyond the end points shown.

Table 6.1 Characteristics of being mentally healthy, having a mental health problem or a mental disorder

Mentally healthy	Mental health problems	Mental disorder
People who are mentally healthy usually can: • function at a higher level than people who have a mental health problem or disorder • use their abilities to reach their potential • cope with and manage life's challenges, including change, uncertainty and challenges that are stressors (e.g. a good level of resilience) • work productively at school or in paid employment • contribute constructively to their community • form and maintain good relationships with other people (i.e. good social wellbeing) • feel, express and manage a range of positive and negative emotions (i.e. good emotional wellbeing) • learn from their experiences • think logically and clearly • enjoy and appreciate other people, day-to-day life and their environment.	People with a mental health problem may: • feel worried, tense, low, irritable, quiet, confused, angry (often in response to a stressor) • feel sadness or despair associated with loss or grief • have difficulties concentrating, making decisions and thinking clearly • become forgetful • experience changes in sleep and appetite • experience a loss of energy and motivation • feel that things are somehow 'different' • socially withdraw • develop negative feelings or attitudes to themselves, school or work, and life in general.	People are diagnosed with a specific mental disorder such as a: • mood disorder, e.g., depression, bipolar disorder • psychotic disorder, e.g., schizophrenia, delusional disorder • personality disorder, e.g., antisocial personality disorder, narcissistic personality disorder • addiction disorder, e.g., gambling • anxiety disorder, e.g., specific phobia, separation anxiety disorder.

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Weblink
Explanation of the mental health continuum 3 m 37 s

eGuide*plus*

Weblink
Animation on 'mental health wellness' continuum 2 m 17 s

BOX 6.1 Common myths about mental disorder

Many myths are associated with mental disorder (or illness). These false beliefs or misunderstandings often lead some people to discriminate against those with a mental disorder by treating them in inappropriate ways; for example, by rejecting them or refusing to employ them on the grounds that they have a mental disorder. These myths have also been the cause of the negative labelling, that is often attached to people with a mental disorder and which underlies the 'stigma' (negative views and shame) many experience.

Myth: *Mental disorder affects only a few people.*

Fact: Mental disorder is common. One in five Australians will experience a mental disorder. It affects people of all ages, educational and income levels and cultures.

Myth: *Children don't experience mental disorder*.

Fact: Even very young children may show early warning signs of a clinically diagnosable disorder.

Myth: *Mental disorder is caused by a personal weakness*.

Fact: Having a mental disorder is not a character flaw. It is caused by the complex interaction of biological, psychological and social factors. Seeking and accepting help is a sign of strength.

Myth: *Bad parenting causes mental disorder*.

Fact: No single factor can cause a mental disorder. A mental disorder is a complex condition that arises from a combination of biopsychosocial factors. Parents and other family members play a big role in providing support.

Myth: A *mental disorder is a type of intellectual disability.*

Fact: A mental disorder can impair thinking, but it is not a type of intellectual disability. A mental disorder is not necessarily associated with low intellectual functioning. Like physical illness, mental disorder affects people with low, average and high intellectual functioning.

Myth: *People can get rid of their mental disorder just by 'getting on with life'*.

Fact: It is rarely possible for someone with a mental disorder to make the symptoms go away just by adopting a positive attitude. With the right kind of help, most people recover and lead healthy, productive and satisfying lives.

Myth: *People with a mental disorder are violent or dangerous.*

Fact: People with a mental disorder are no more likely to be violent or dangerous than anyone else. They are more likely to harm themselves — or to be harmed — than they are to hurt other people.

Myth: *People with a mental disorder should be isolated from the community.*

Fact: With appropriate treatment and support, people with a mental disorder can live successfully in the community. In fact, most people with a mental disorder live independently in the community. Hospitalisation is not necessary for the great majority. Some may require hospital care, but often only for a brief period of time.

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Practical activity — survey on myths about mental disorder

Figure 6.7 A common misconception about mental disorders is that they usually involve isolation from the wider community.

LEARNING ACTIVITY 6.2

Review questions

1. Define the meaning of mental health.
2. Distinguish between mentally healthy, mental health problem and mental disorder with reference to characteristics commonly associated with each state.
3. Does maladaptive behaviour necessarily indicate the presence of a mental disorder? Explain your answer.
4. In what way are mental and physical health likely to be related?
5. For each of the following four examples, indicate with the appropriate letter(s) (a–e) which characteristic(s) of a mental disorder is apparent.
   (a) the disorder occurs within the individual and results from dysfunction within the individual
   (b) there is clinically diagnosable dysfunction in thoughts, feelings and/or behaviour
   (c) the disorder causes significant personal distress or disability in functioning in everyday life
   (d) actions and reactions are atypical of the person and inappropriate within their culture
   (e) the disorder is not a result of a personal conflict with society

   Example 1
   Jan collects old newspapers and uses them as 'wallpaper'. She has two rooms completely wallpapered with the newspapers from the last three months. She has started on her third room and intends to 'wallpaper' her entire house, including the ceilings.

   Example 2
   Khalid recently started to feel sad and lonely. While still able to function at school, go to his casual job and fulfil other commitments, Khalid feels 'down' most of the time. He worries about what is happening to him.

   Example 3
   Chrissy is a successful businesswoman, but has recently stopped showering. She refuses to leave her apartment or see any of her friends, and spends her whole day watching television talk shows. This behaviour has been continuous for three weeks. Visits by her family and friends and the threat of losing her job have failed to bring Chrissy back to 'reality' and she continues to spend her days staring blankly at the television screen.

   Example 4
   Zophia is afraid to leave her house. For the past three years, she has 'forced' herself to go out in order to maintain contact with her friends and family. More recently, she has felt physically sick whenever she goes beyond the front gate. Consequently, she spends most weekday evenings worrying about whether she will be able to get beyond the front gate in the morning so that she can get to work.

LEARNING ACTIVITY 6.3

Rating mental health issues

On a mental health continuum like one shown in Figure 6.6 on page 297, indicate where you consider each of the following individuals is best placed and explain your decisions. Compare your mental health estimations and explanations with others in the class. Explain differences in ratings by class members.

1. Trinh usually copes with stress well but today he is feeling very anxious before an important job interview. Last night he didn't sleep as well as usual and this morning he hardly had anything for breakfast. He is looking forward to catching up with his friends this evening, unwinding and getting on with what he normally does.
2. In the 48 hours following his grandfather's death, Hamish has no energy, stays in bed for hours during the day, does not eat much, does not shower, experiences a constant headache, stays awake all night and has bouts of uncontrolled crying.
3. Over a period of four months after her grandfather's death, Ismail has no energy, stays in bed for hours during the day, does not eat much, does not shower often, experiences a constant headache, stays awake all night and has bouts of uncontrolled crying.
4. Sienna worries about how she looks before going to a party, but goes and has a good time.
5. Kania is so worried about how she looks before going to a party that she doesn't go.
6. Jack is angry with his brother for using all the hot water in the shower.
7. Olivia is so angry with her brother for using all the hot water in the shower one day that she does not talk to him for six months.
8. Arup is 41 years old. He has been working as a car salesperson at a well-known dealership but has found this increasingly difficult due to feelings of extreme lethargy and tearfulness. Arup used to get a great deal of pleasure selling cars but it now doesn't bring him any joy at all. For the past couple of months he has been struggling to get out of bed to get to work. A week ago, Arup felt overwhelmed and quit his job without giving any notice to his manager. Since then, he hasn't left his home and spends most of his time feeling sad for no particular reason, watching TV mindlessly, eating an occasional pre-prepared meal and sleeping.

LEARNING ACTIVITY 6.4

Reflection

Mental health problems affect many families, yet most people struggle to have an open and honest conversation about these issues. Why might this occur and how might it be overcome?

MENTAL HEALTH AS A PRODUCT OF INTERNAL AND EXTERNAL FACTORS

Our mental health is influenced by a wide variety of internal and external factors throughout our entire lifespan. These influences can be organised into three different domains, or areas, within a framework called the biopsychosocial model. They may also be organised in terms of the risk and protective factors that are elements of the 4P Factor model. Both models are closely related. The 4P Factor model is sometimes described as a subset of the biopsychosocial model.

Biopsychosocial model

The **biopsychosocial model**, sometimes called the *biopsychosocial approach* or *theory*, is a way of describing and explaining how biological, psychological and social factors combine and interact to influence a person's mental health. The model is based on the idea that mental health is best understood by considering specific factors from within each domain and how these factors may combine and interact to influence our wellbeing.

- **Biological factors** involve physiologically based or determined influences, often not under our control, such as the genes we inherit, balances or imbalances in brain chemistry, brain and nervous system functioning, hormonal activities and bodily responses to stress.
- **Psychological factors** involve all those influences associated with mental processes such as our beliefs, attitudes, ways of thinking, prior learning, perceptions of ourselves, others and our external environment, how we learn, make decisions, solve problems, understand and experience emotions, respond to and manage stress, and reconstruct memories.
- **Social factors** include our skills in interacting with others, the range and quality of our interpersonal relationships, the amount and type of support available from others when needed, exposure to stressors, poverty, level of education, employment history, risks of violence, access to health care, and specific cultural influences such as our values and traditions.

The biopsychosocial model reflects a *holistic* view of mental health — the individual is considered as a 'whole person' functioning in their unique environment. The focus is not just on the individual's mental condition ('within the individual'), but also on their wider social setting and circumstances ('outside the individual'). In addition, focusing on the influence of factors from one or two domains, rather than all three, is likely to give an incomplete and therefore inaccurate picture of a person's mental health. This also applies to a mental health problem or mental disorder an individual may have and the treatment that may be required.

According to the model, factors from each of the three domains are equally important for mental health (or disorder). However, it is recognised that specific factors may have more or less influence on an individual's mental health and put the individual at more or less risk for having good mental health or developing a mental disorder.

Figure 6.8 Biological, psychological and social factors interact to influence mental health.

Factors from within each domain *affect* and are *affected* by one another. For example, factors within each domain may combine with other factors in the same domain, as well as with factors in the other two domains. This complex interaction of multiple factors helps account for individual differences in mental health, as well as mental health problems and disorders. For example, as shown in Figure 6.9 opposite, depression could be explained by the combined effects of genes and brain chemistry (biological), negative ways of thinking and prior learning experiences (psychological) and environmental conditions (social).

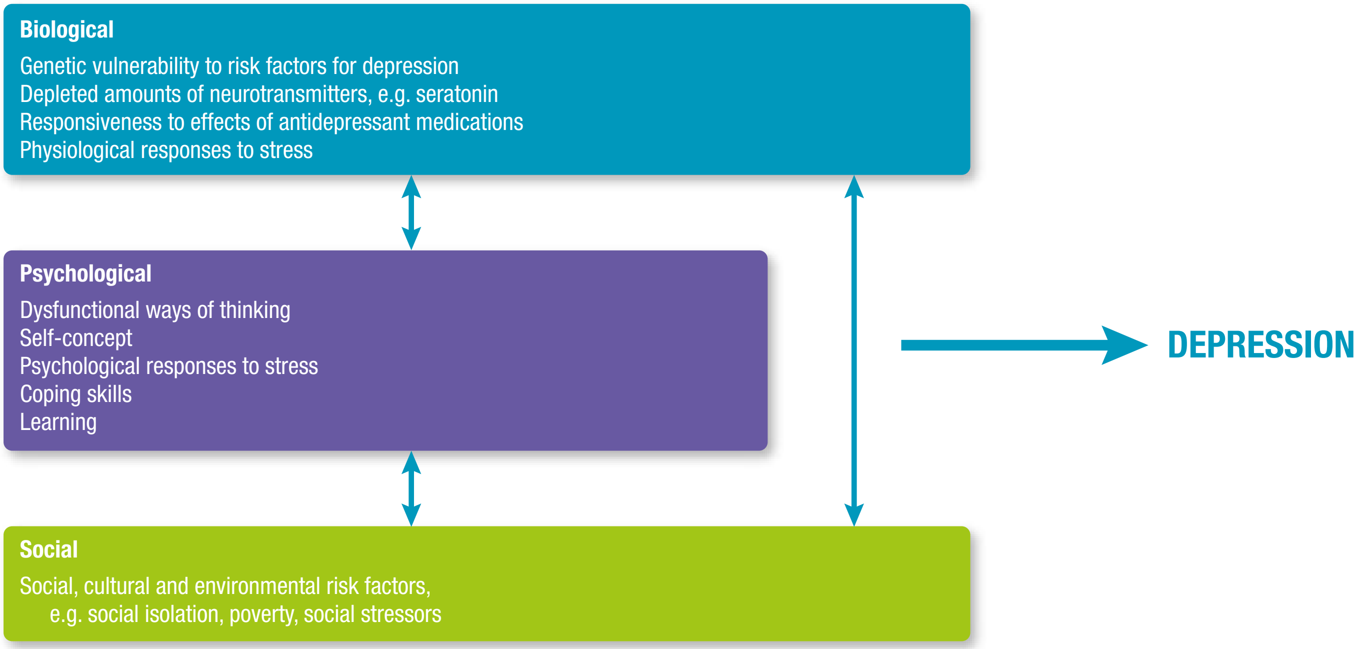

Figure 6.9 An explanation of depression using the biopsychosocial model. Note how factors from within each domain affect and are affected by one another. Nor is there an even number of factors from each domain.

4P Factor model

The **4P Factor model** describes four influences on mental health and occurrence or re-occurrence of a mental disorder. These may be biological, psychological or social in nature and are also classified as risk factors or protective factors.

In the 4P Factor model, **risk factors** *increase* the likelihood that a mental disorder will develop, or increase in severity or duration when it occurs, or will hinder recovery from a disorder. By contrast, **protective factors** enhance and safeguard mental health and *reduce* the likelihood that a mental disorder will develop or re-occur.

A **predisposing risk factor** increases susceptibility or vulnerability to developing a mental disorder. For example, a family history of a specific mental disorder, brain injury, low levels of particular neurotransmitters, substance abuse, low self-esteem, loss of a loved one, chronic ('long term') poor sleep or a serious medical condition can all be predisposing risk factors, depending on the individual and their circumstances.

A 'predisposition' does not mean that an individual will inevitably develop a disorder at some time in their life, so it is not a 'causal' factor. Certain risk factors, however, 'predispose' an individual to developing a specific disorder. For example, experiencing a traumatic event places an individual at a higher risk of developing posttraumatic stress disorder than someone who has not been exposed to a traumatic event. Similarly, parental separation or loss during childhood is *associated* with anxiety disorders and depression.

A **precipitating risk factor** increases susceptibility to and contributes to the occurrence of a specific mental disorder. Precipitating factors typically hasten the onset of a disorder and commonly precede or are present at the time of onset. For example, an individual may have a genetic predisposition for developing schizophrenia as both their parents have the disorder. However, they do not develop symptoms requiring intervention until they are exposed to a major stressor and seek relief from their stress through excessive cannabis use. In this case, the individual's weak stress coping skills and cannabis use were precipitating risk factors that contributed to the onset of schizophrenia.

As with predisposing risk factors, two different people may experience the same precipitating event but react differently depending on their personal attributes, life experiences and current circumstances, including exposure to other predisposing and precipitating risk factors.

A **perpetuating risk factor** maintains or prolongs the occurrence of a specific mental disorder (i.e. 'perpetuates') and inhibits recovery. These are the factors that are causing a person's symptoms to continue or progressively worsen and thereby hinder or prevent recovery. For example, continuing to use a particular substance may perpetuate an associated substance use disorder and also prevent recovery from the disorder. Other perpetuating risk factors could be unresolved predisposing or precipitating factors, ongoing bullying, being in an abusive relationship or dysfunctional family environment, a chronic ('long-term') medical condition, homelessness, poverty, insomnia and personal characteristics such as poor coping skills and lack of resilience.

A protective factor helps prevents the occurrence or re-occurrence of a mental disorder. These factors typically vary in relation to a specific disorder. For example, lack of substance use would help prevent onset of a substance use disorder (or 'relapse'). Some of the more generic protective factors that tend to be relevant to many disorders include having good relationships with family and friends, an easy-going temperament, high levels of emotional and social wellbeing, good physical health, having an adequate diet, good sleep habits, regular exercise, not being in poverty and personal characteristics such as resilience, good coping and stress management skills, high self-esteem and average or above average intelligence.

All risk and protective factors occur within the context of everyday life. Generally, risk factors are considered undesirable and therefore negative influences on mental health, whereas protective factors are considered desirable and therefore positive influences.

Although the presence of risk factors does not necessarily mean that an individual will develop a mental disorder, they tend to increase the likelihood of this happening. In addition, the more risk factors there are in a person's life, the greater the chance of their developing a mental disorder, and, the more protective factors, the lower the chance of their developing a disorder. However, some people who are challenged by many risk factors do not develop a mental disorder. Different risk factors can combine in multiple ways to influence individuals in different ways. The potential influence of many risk factors can also be neutralised or counterbalanced by the presence of protective factors.

As shown in Table 6.2, the 4P Factor model can be used to bring together and organise the variety of biopsychosocial factors believed to contribute to the development and maintenance of a mental disorder in any individual. This assists the mental health professional to understand why the person developed a disorder and why it is progressing as it is, taking account of the relative contributions of different types of factors. In addition, knowledge of specific protective factors as well as risk factors can be used to devise a treatment or management plan that deals with symptoms, facilitates recovery where possible and reduces the likelihood of re-occurrence ('relapse').

Figure 6.10 The 4P Factor model describes four influences on mental health and occurrence or re-occurrence of a mental disorder. These may be biological, psychological or social in nature and are also classified as risk factors or protective factors. Regular opportunity for relaxation is considered a protective factor for many disorders.

Table 6.2 Integration of the 4P Factor and biopsychosocial models for an individual diagnosed with obsessive compulsive disorder

4P Factor model	Biopsychosocial approach		
	Biological factors	**Psychological factors**	**Social factors**
Predisposing risk factors *(increase susceptibility)*	• imbalances in neurotransmitters — serotonin, dopamine, glutamate • family history — parents, grandparents • prolonged labour, forceps delivery, birth trauma	• insecure attachment • insecure marital relationship • intolerance of mistakes and imperfections • 'control freak' • unrealistic estimation of threats in real-life • narcissistic traits, e.g. inflated sense of physical appearance and importance	• imitating parental OCD behaviour • parental insults at family gatherings • need for attention to detail/ perfection at work (designer)
Precipitating risk factors *(increase susceptibility and contribute to the occurrence)*	• autoimmune neuro disorder — Group A streptococcal infection (which causes basal ganglia inflammation and dysfunction) • traumatic brain injury in late adolescence	• stress or trauma • unwelcome or intrusive thoughts that are catastrophised	• stressful life events — marital conflict, work deadlines, starting a new job, poor performance of investment portfolio/concern about financial security
Perpetuating risk factors *(maintain occurrence and inhibit recovery)*	• poor response to medication due to genetic factors	• making associations between objects/events and fear • misinterpreting thoughts • self-rewarding of ritualistic behaviour (e.g. feeling better/less anxious after checking front door is locked multiple times)	• personal values that emphasise self-management • shame/embarrassment (stigma) related to receiving treatment
Protective factors *(prevent occurrence or re-occurrence)*	• good sleep habits • adequate diet • regular relaxation • regular exercise	• enhanced understanding of OCD • identifies cognitive distortions • practices relaxation techniques	• family and friends challenge ritualistic behaviour and unrealistic thoughts

LEARNING ACTIVITY 6.5

Review questions

1. (a) What is the biopsychosocial model?
(b) Name and describe the three domains in the model with reference to relevant examples.

2. Briefly describe three key characteristics of the biopsychosocial model's explanation of mental health.

3. Write a series of questions a psychologist who has adopted the biopsychosocial model may ask a patient or client presenting with symptoms of a mental disorder.

4. Consider a recent time when you were feeling stressed. You do not have to identify the source of your stress.
Copy the following table and identify factors from each domain that may have contributed to:
(i) the onset of stress
(ii) recovery from stress.

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Word copy of table

Stress	Biological factors	Psychological factors	Social factors
(i) Onset			
(ii) Recovery			

5. (a) Explain what the 4P Factor model is.
(b) Distinguish between risk and protective factors with reference to their potential impact on mental health.
(c) Name and describe the four factors with reference to examples different from those in the text.

6. Describe the relationship between the 4P Factor and biopsychosocial models in relation to mental health.

7. Explain why exposure to and influence of risk or protective factors may be considered unique to each individual.

CATEGORIES OF MENTAL DISORDERS

All sciences classify. For example, botanists classify plants into categories and subcategories according to species. Astronomers classify the stars, planets and other astronomical bodies according to colour, size and temperature. The medical profession classifies diseases according to symptoms and the organ or system affected.

Likewise, clinical psychologists, psychiatrists and other mental health professionals classify mental disorders in different categories according to characteristic patterns of thoughts, feelings and behaviour. When certain symptoms regularly occur together and develop or progress in a particular way, they are considered to be typical of a specific mental disorder. When someone displays this particular pattern of symptoms they are said to fit the category and therefore have the disorder to which those symptoms belong.

The most widely adapted system with categories of mental disorders that is used for diagnostic purposes in Australia and throughout the world is called the *Diagnostic and Statistical Manual of Mental Disorders*, or DSM for short. It was first developed by the American Psychiatric Association in 1952 and is now in its fifth edition, called DSM-5. As indicated in its title, the DSM uses the term 'mental disorder' rather than 'mental illness' or 'psychological disorder'.

The DSM provides:

- a system for classifying and diagnosing mental disorders based on recognisable symptoms that are precisely described
- information on the typical course of each disorder, that is, a description of how the disorder will progress
- information on the age at which people are more likely to develop the disorder
- information on the degree of impairment
- information on the prevalence of the disorder (how commonly it occurs)
- whether the disorder is likely to affect others in the family
- the relationship of the disorder to gender, age and culture.

An important feature of the DSM is that it does not suggest specific causes of any disorder unless a cause can be definitely established. It simply names the disorders and describes each in detail. There are 21 major categories of mental disorders in the DSM-5 and numerous sub-categories. Some of the major categories are outlined in Table 6.3 on page 305.

A diagnosis of a mental disorder should always be made by a qualified mental health professional. This usually occurs through an assessment which can involve several lengthy consultations. During the assessment, the mental health professional talks with the individual to find out what their issues, concerns and symptoms are. They then consider their symptoms with reference to DSM guidelines for diagnosing a disorder. The ICD-10 published by the World Health Organization is another widely used system, but includes physical disorders as well as mental disorders.

Once a diagnosis is made, the mental health professional develops a treatment or management plan for the specific disorder that has been diagnosed. Sometimes, a person may be diagnosed as having more than one disorder. The term *comorbidity* is used to describe the experience of more than one disorder at the same time.

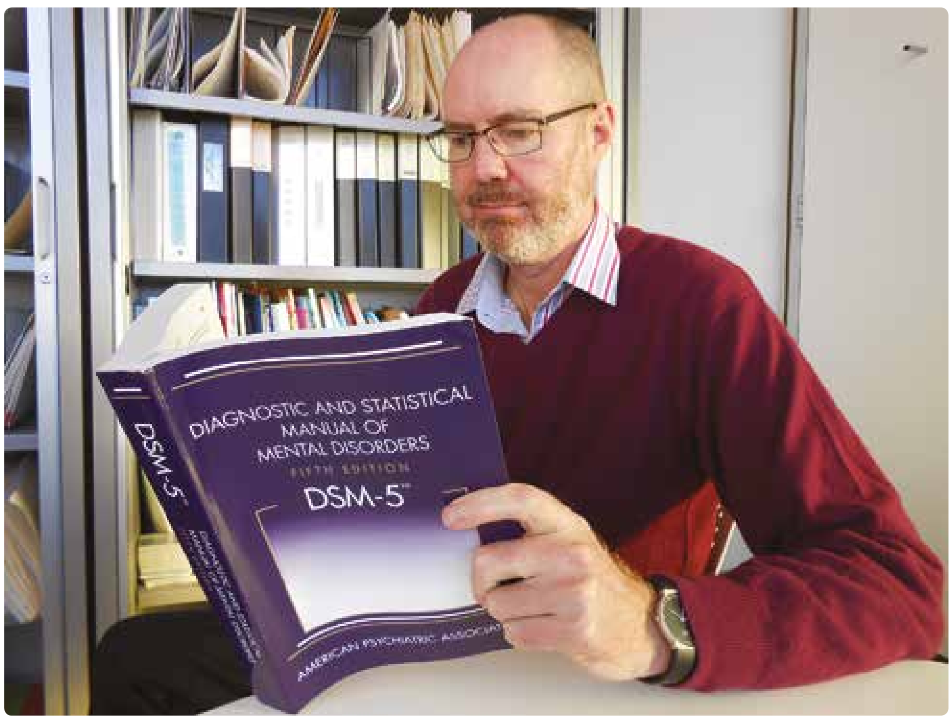

Figure 6.11 The DSM-5 published by the American Psychiatric Association is the most widely used system for the classification and diagnosis of mental disorders.

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Weblinks

- Explore the DSM-5
- The ICD-10 online

Table 6.3 Examples of DSM-5 categories of mental disorders

Category	Description
Neurodevelopmental disorders	These disorders often emerge before starting school. They include *autism*, *Attention-Deficit/Hyperactivity Disorder (ADHD)*, *intellectual disability* (with onset early in development) and various learning and motor disorders which first present early in the lifespan.
Neurocognitive disorders	Include disorders involving major or minor impairment to cognitive functioning, such as those due to *Alzheimer's disease*, *Parkinson's disease*, *Korsakoff's syndrome*, *traumatic brain injury* and *delirium*.
Substance-related and addictive disorders	Include *alcohol-related disorders*, *cannabis-related disorders*, *hallucinogen-related disorders*, *stimulant-related disorders* and *gambling disorder*.
Schizophrenia spectrum and other psychotic disorders	Common symptoms include delusions, hallucinations and disorganised thinking.
Depressive disorders	Characterised by severe lowering of mood for an extended period of time. Include *major depressive disorder* and *premenstrual dysphoric disorder*.
Bipolar and related disorders	Characterised by severe disturbances of mood involving alternating episodes of mania (e.g. elation, high energy and activity) and depression (e.g. sadness, low energy and activity).
Anxiety disorders	Include *phobias*, *panic attack*, *panic disorder*, *separation anxiety disorder* and *substance/medication-induced anxiety disorder*.
Obsessive–compulsive and related disorders	Characterised by recurring thoughts and/or impulses that are difficult to control. Include *obsessive–compulsive disorder*, *hoarding disorder*, *trichotillomania (hair-pulling disorder)* and *excoriation (skin-picking) disorder*. Obsessions are thoughts, images or impulses (e.g. contamination, doubts about performance, need for orderliness, aggressive impulses) that recur or persist despite efforts to suppress them. Compulsions are behaviours or mental actions that are repeated over and over according to certain rules or in a ritualised manner.
Feeding and eating disorders	Include avoidant and restrictive food intake of infancy and early childhood, and serious eating disorders more common in adolescence such as *anorexia nervosa*, *bulimia nervosa* and *binge-eating disorder*.
Sleep wake disorders	Characterised by persistent sleep problems. Include *insomnia*, *narcolepsy*, *substance/medication-induced sleep disorder* and breathing related sleep disorders such as *sleep apnea*.
Disruptive, impulse-control and conduct disorders	Characterised by problems in behavioural and emotional self-control. Include *kleptomania*, *pyromania* and *intermittent explosive disorder* (i.e. aggressive outbursts).
Personality disorders	Include *general personality disorder*, *narcissistic personality disorder*, *antisocial personality disorder* and *dependent personality disorder*.

Source: American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC.

Incidence of mental disorder in Australia

The Australian Institute of Health and Welfare (2016) estimates that almost half of Australians will experience a common mental disorder in their lifetime. About 1 in 7 young people aged 4–17 are likely to be assessed as having a mental disorder. And as shown in Figure 6.12 on the next page, about one in five (20%) adult Australians will experience a mental disorder ranging from mild to moderate at some stage in their lives. Many will live with more than one mental disorder at a time, such as anxiety and depression, which commonly occur together.

Episodes of a mental disorder can come and go during different periods in our lives. Some people experience only one episode and fully recover. For others, however, a mental disorder may recur throughout their lives.

The incidence of mental disorder has steadily increased over the past 25 years but this does not mean there is a mental disorder 'epidemic' in Australia. Rather, greater community awareness of mental disorders, and media campaigns that encourage people to recognise and seek support for mental health issues, may explain the recent increase in self-reports of mental disorders.

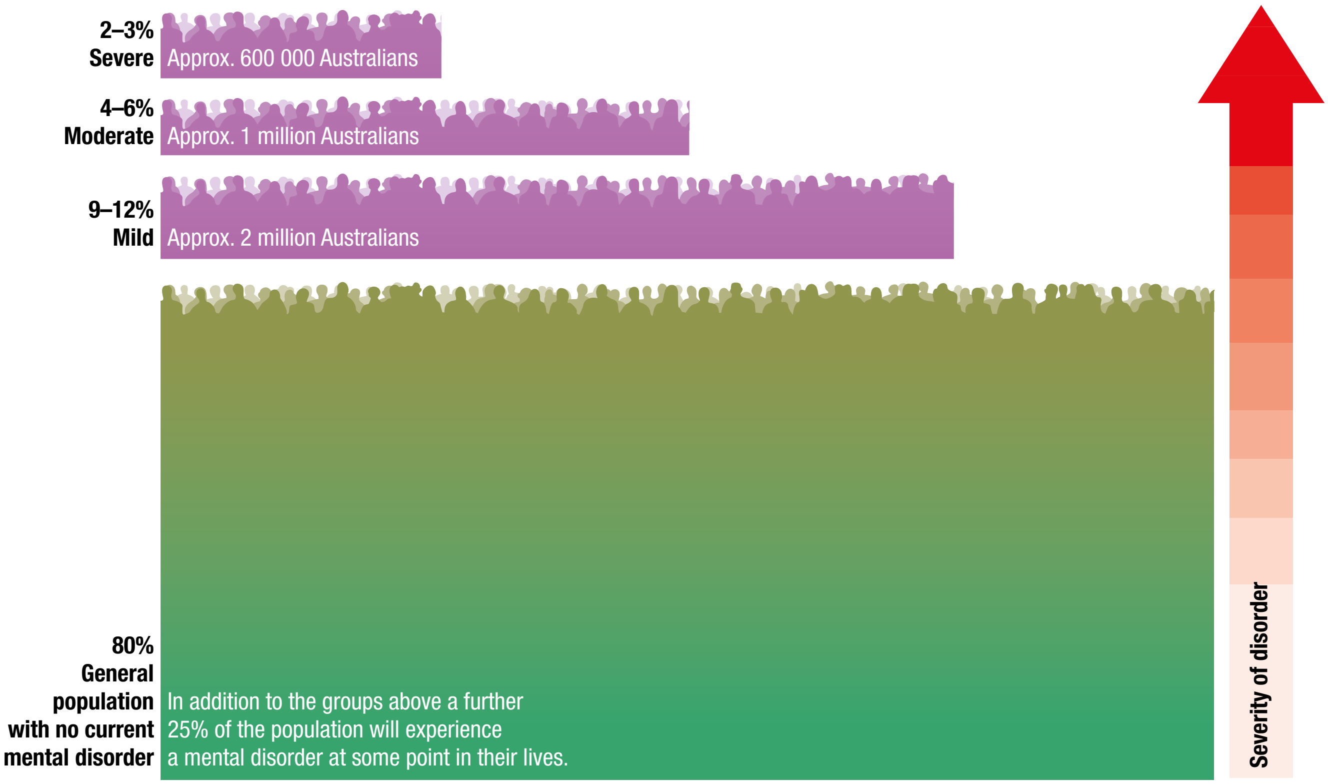

Figure 6.12 Twelve-month prevalence estimates of mental disorder in the Australian population by severity level, based on diagnosis, disability and chronicity (with a long duration)

Source: Department of Health and Ageing (2013). *National Mental Health Report 2013: Tracking progress of mental health reform in Australia 1993–2011*. Commonwealth of Australia, Canberra.

Table 6.4 Principal condition by age group

Disorder	4–11 years (%)	12–17 years (%)	4–17 years (%)
Any anxiety disorder	5.7	5.0	5.4
Major depressive disorder	0.6	3.8	2.0
Attention-Deficit/Hyperactivity Disorder	6.3	4.5	5.5
Conduct disorder	1.0	1.1	1.1
Any disorder	**13.6**	**14.4**	**13.9**

Source: Lawrence, et al., (2015). *The mental health of children and adolescents: Report on the second Australian child and adolescent survey of mental health and wellbeing*. Department of Health, Canberra.

Table 6.5 Prevalence of mental disorders among 4- to 17-year-olds by sex in 2014

Disorder	Males population estimate	Males prevalence (%)	Females population estimate	Females prevalence (%)	Persons population estimate	Persons prevalence (%)
Anxiety disorders	145 000	7.0	133 000	6.8	278 000	6.9
Major depressive disorder	50 900	2.5	61 300	3.1	112 000	2.8
Attention-Deficit/Hyperactivity Disorder	215 000	10.4	83 200	4.3	298 000	7.4
Conduct disorder	52 400	2.5	31 200	1.6	83 600	2.1

Source: Lawrence, et al., (2015). *The mental health of children and adolescents: Report on the second Australian child and adolescent survey of mental health and wellbeing*. Department of Health, Canberra.

LABELLING SOMEONE WITH A MENTAL DISORDER

The term **labelling** is sometimes used to describe the process of classifying and naming a mental disorder following a diagnosis. Labelling can be useful. For example, it can help psychologists (and psychiatrists) recognise and specifically describe a mental disorder and assist them in working out an appropriate treatment or management plan. It is also helpful when mental health professionals communicate with one another about a client's mental health. The names of the different categories and subcategories provide concise terms for describing and discussing disorders and help ensure a common understanding of what is being discussed. Similarly, labelling is useful when reporting research on mental disorders in journal articles and posters.

However, labelling a particular pattern of thoughts, feelings and behaviour as a specific type of mental disorder can also have a negative effect on the individual being labelled and result in their experiencing stigma. **Stigma** is a sign of social unacceptability or undesirability, often involving shame or disgrace.

Social stigma refers to the negative attitudes and beliefs held in the wider community that lead people to fear, reject, avoid and discriminate against people with a mental disorder. It can influence how people with a mental disorder think and feel about themselves and the way they believe they are viewed by others in the community. For example, individuals can develop self-stigma. **Self-stigma** occurs when an individual accepts the negative views and reactions of others, internalises them, and applies them to themselves, thereby affecting how they feel about themselves and leading to low self-esteem and low self-confidence in their abilities (called low *self-efficacy*). Self-stigma can inhibit people from seeing a mental health professional for assessment and diagnosis, or from seeking help, thereby increasing the harmful impact of the disorder by increasing the duration of the untreated symptoms. Reducing self-stigma is considered vital for promoting recovery. To be effective, any activities with this goal need to be integrated with programs to reduce social stigma or stigma generally (SANE Australia, 2017a).

Once a label has been given to a person, it may be there for life and consequently can affect the way that individual is treated by others. For example, consider how you might be affected by being told you have schizophrenia and require hospitalisation to stabilise your symptoms and work out the right mix of medication. After you are discharged and go home, the fact that you are now a 'former mental patient' could have a great impact on your life. Friends or loved ones may now treat you differently and employment could be difficult to obtain if you mention that you have schizophrenia.

There is little doubt that labelling can have these and many other negative consequences. It is clear from existing research that the general public holds very negative views and misunderstandings of mental disorder and that people with a disorder and their families often experience stigma. In an attempt to help deal with this problem, it is now standard practice to use language that describes the psychological concept rather than the person; for example, using the phrase 'a person with schizophrenia' rather than the term 'a schizophrenic'.

Figure 6.13 Labelling someone with a mental disorder is associated with stigma — negative attitudes and reactions that often result in embarrassment or shame for the individual involved.

Rosenhan's (1973) research on labelling

A research study by American psychologist David Rosenhan (1973) is commonly used to demonstrate some of the problems of labelling. Rosenhan and his colleagues set up a situation where eight people who had never experienced symptoms of any mental disorder presented themselves to various psychiatric hospitals and told the medical staff they had been hearing voices.

All of the pseudopatients were admitted to the hospitals and diagnosed as suffering from schizophrenia. From the moment they were admitted they behaved as they normally would and no longer faked the symptoms of schizophrenia. Their stay in the hospitals ranged from seven to 52 days. None of the medical staff identified them as fake patients; however, some of the actual patients recognised them as frauds. When the pseudopatients were finally discharged, it was on the grounds that they were 'in remission'. None of them was seen as being 'cured', suggesting that the symptoms could recur.

Rosenhan concluded that medical staff, including psychologists, could not recognise 'normal' behaviour and once a person was labelled as having a specific mental disorder, all of their subsequent behaviour was interpreted as part of their disorder. For example, while the pseudopatients were in hospital, they openly made notes relating to Rosenhan's research study. However, the staff interpreted this activity as part of their 'schizophrenic behaviour'. After Rosenhan's findings were published, the hospital staff said that, in order for this to be a fair assessment, they should have been warned of the experiment.

In a follow-up study, Rosenhan told staff at one hospital that in the next three months pseudopatients would present themselves to the hospital. The hospital staff were asked to identify which of their new patients were the pseudopatients. In fact, no pseudopatients were actually sent, yet one staff member was sure that 41 out of 193 patients were pseudopatients. Rosenhan concluded that a system of diagnosing and labelling mental disorders that allowed these kinds of errors to occur was not a very reliable one.

Not all psychologists agree with Rosenhan's conclusions. Many have also criticised his procedures. For example, prominent American psychiatrist Robert Spitzer, who led the development of the DSM, argued that being able to lie and get admitted to a hospital is no proof that the system used to diagnose a mental disorder does not work. He pointed out that hearing voices is a sign of serious psychological dysfunction and rightfully should not have been ignored just because the person then appeared 'normal'. He also stated that the diagnosis of 'in remission' is a rare one and shows that the staff did realise the pseudopatients were not behaving completely as expected of a person labelled 'schizophrenic'.

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Weblink
Video of Rosenhan outlining his research 2 m 21 s

Figure 6.14 A dormitory room in a psychiatric hospital like that visited by Rosenhan (1973). There has been a shift away from this type of accommodation. If a person needs hospital care for a mental disorder, accommodation is often in a separate room as part of a psychiatric unit in a public or private hospital.

BOX 6.2 Medical student syndrome

Have you ever read about a disease or disorder on the internet or heard about it on television and become convinced that you are suffering the same symptoms and therefore must have the disease or disorder? This is known as *medical student syndrome*, as it is most frequently observed in medical students.

It is thought that psychology students who study mental disorders may also suffer from the same syndrome. Although some students do suffer from a disorder, most are merely experiencing an exaggerated sense of their susceptibility to a disorder. It has been found that one in every five individuals responds 'yes' to the question 'Have you ever felt that you were going to have a nervous breakdown?' Of course, most of these people have never suffered an actual breakdown (Sue, Sue & Sue, 2006).

Research has shown that students who plan to complete a degree in psychology report more worry about their mental health than those planning to complete a degree in another discipline. However, the process of learning about mental disorders eventually decreases their anxiety about their own mental health (but increases it about the health of their family members).

It is also thought that anyone who reads a lot of medical information is susceptible to medical student syndrome. More recently, the term 'cyberchondria' has been coined to describe the condition suffered by people who use the wealth of medical information on the internet to diagnose themselves with a serious physical health disorder. What starts as a web search about headache leads to the conclusion that they must have a brain tumour!

As you learn more about mental health and mental disorders you may recognise symptoms in yourself — or in others. These 'symptoms' are more likely to be a normal reaction to life circumstances and not a sign of an actual mental disorder. For example, feeling down, anxious or overwhelmed may be an understandable response to a stressful situation such as studying many different subjects at school, all of which 'must be passed at a high standard'. However, if you are concerned, talk about your concerns with a friend, family member or teacher. If you then feel you may have a problem, consider seeking support from your school's student welfare service or other mental health professional.

Figure 6.15 As you learn more about mental health and mental disorders you may recognise 'symptoms' in yourself — or in others — that are often not a sign of an actual disorder. If you have a concern, consult a mental health professional.

LEARNING ACTIVITY 6.6

Review questions

1. What are two potential benefits of labelling and categorising mental disorders?
2. On what basis or criteria are mental disorders categorised?
3. (a) What does the abbreviation DSM stand for?
   (b) What is the DSM used for?
   (c) Give three examples of the type of information in the DSM about each mental disorder.
   (d) What type of information is not provided in the DSM?
4. (a) Suggest why it is important that only qualified mental health professionals use a DSM type manual to diagnose someone's mental disorder.
   (b) Suggest one or more ways in which this type of system could be misused by non-qualified individuals. Explain your answer.
5. (a) What is stigma? social stigma? self-stigma?
   (b) Describe the relationship between labelling and stigma.
   (c) Explain why individuals diagnosed with a mental disorder view the removal of social stigma as important.
   (d) Explain why mental health professionals view the removal of any type of stigma as important.
   (e) Suggest two ways in which self-stigma could be reduced or removed.

LEARNING ACTIVITY 6.7

Analysis of research by Rosenhan (1973) on labelling

Read the summary of the research on labelling and answer the following questions.

1. Identify the sample and the population.
2. Suggest a relevant research hypothesis.
3. What type of research method was used?
4. Which current ethical standards or guidelines may have been breached by Rosenhan? Give a reason for each suggestion.
5. What do the results suggest about the effects of labelling someone with a mental disorder?
6. Comment on whether Rosenhan's conclusions are valid and on the extent to which his findings can be generalised.
7. Do you think it is possible that similar results would be obtained if the study were conducted in more recent times? Explain you answer.

LEARNING ACTIVITY 6.8

Reflection

Which do you believe is the more appropriate term — mental disorder or mental illness? Explain your preference.

LEARNING ACTIVITY 6.9

Media analysis/response — StigmaWatch

SANE Australia is a not-for-profit organisation that aims to provide a better life for people affected by mental disorder. One of its activities is to fight stigma against mental disorder through a project called StigmaWatch, conducted through its website at www.sane.org/stigmawatch

1. Who are StigmaWatchers?
2. What do StigmaWatchers do?
3. What are the reporting criteria used by StigmaWatchers?
4. How are reports actioned?
5. Comment on the effectiveness of StigmaWatch in reducing stigma.

ADDICTION DISORDERS

The term 'addiction' is most commonly used to describe the uncontrollable use of drugs and other chemical substances on which people can become dependent. Dependence on these substances is primarily physiological — changes occur in bodily processes so that a certain amount of the substance is necessary for minimal daily functioning. This is called *physical dependence* and it becomes apparent when the substance is withheld or unavailable and the user undergoes painful withdrawal reactions such as physical pain and intense cravings. The cravings suggest a psychological component of addiction, so the term *psychological dependence* is used to refer to the mental desire to experience the effects produced by the substance.

More recently, the use of the term addiction has expanded to cover dependence on any type of substance, including alcohol, nicotine in cigarettes and caffeine in tea, coffee, Coca-Cola™ and various energy drinks. Common to these substances on which we can become dependent and take in excess is activation of the brain's 'reward system' which produces or heightens the experience of pleasure, making us 'feel good'.

There has also been increasing recognition among psychologists that a diverse range of behaviours may also be addictive. They can result in dependence, involve a psychological component and possibly also a physical component as with substance addiction. For example, everyday activities such as eating, shopping, physical exercise, work, watching TV, playing video games and using social media or the internet in general are believed to be potentially addictive (see Box 6.3).

Consequently, **addiction** is now used more broadly to refer to a condition in which someone feels a recurring urge to use a substance or engage in an activity despite potentially harmful consequences. The condition is associated with a low level of self-control and a mental preoccupation with the continued use of the substance or engagement in the activity. These are so strong that normal daily activities are ignored and override all potential detrimental effects, including those that can be devastating.

Common characteristics of all addictions, whether they involve substance abuse or addictive behaviour, are:

- *activation of the brain's reward system* resulting in a pleasurable feeling (e.g. a 'high' or 'buzz', pain reduction, loss of anxiety) that reinforces (rewards and strengthens) the addiction, thereby maintaining the addiction
- *persistent and repeated thoughts, feelings and behaviour* associated with the addictive substance or activity
- *reduced level of self-control* associated with the addictive substance or activity
- *tolerance* involving decreased sensitivity to the substance or activity over time, whereby increasing amounts of the substance or activity are required to achieve the original desired effects
- *withdrawal* involving unpleasant psychological and/or physical reactions that occur when the particular use or activity is suddenly reduced or discontinued (e.g. sadness, excitability and/or irritability, sweating, nausea, vomiting, headaches, sleep disturbances).

Figure 6.16 Addiction refers to a condition in which an individual feels a recurring urge to use a substance or engage in an activity despite potentially harmful consequences.

Types of addiction disorders

The DSM-5 has a category of mental disorders called *Substance-Related and Addictive Disorders*. The substance-related disorders encompass all types of legal and illegal drugs, such as alcohol, caffeine, tobacco, marijuana, sedatives and stimulants. The disorders include:

- *Alcohol-related disorders* such as *Alcohol use disorder* (mild, moderate or severe), *Alcohol withdrawal*
- *Caffeine-related disorders* such as *Caffeine intoxication*, *Caffeine withdrawal*
- *Cannabis-related disorders* such as *Cannabis use disorder* (mild, moderate or severe), *Cannabis intoxication* (with or without perceptual disturbances)
- *Hallucinogen-related disorders* involving use of drugs, such as PCP, LSD and 'angel dust'
- *Inhalant-related disorders* (mild, moderate or severe), such as *Cannabis intoxication* (with or without perceptual disturbances)
- *Opioid-related disorders* involving use of legal and illegal drugs such as morphine, heroin, methadone and codeine
- *Sedative-use disorders* involving use of substances that calm and relax the body, such as 'tranquilisers' and prescription sleeping medications
- *Stimulant-related disorders* involving use of substances that arouse the body, such as ecstasy, 'ice', cocaine and amphetamines (speed, 'uppers')
- *Tobacco-related disorders* such as *Tobacco use disorder*, *Tobacco withdrawal*.

Gambling disorder is the only addictive disorder in this DSM-5 category. It is expected other addictions that primarily involve behaviour will be added to the next DSM when more research evidence becomes available. For example, *Internet gaming disorder* has been shortlisted for inclusion, pending further research evidence.

In this section, we focus on gambling disorder and consider biological, psychological and social factors that influence its development and treatment.

BOX 6.3 Internet addiction

Some people are so preoccupied with the internet and unable to control their use of it that it jeopardises their wellbeing, relationships, education or employment. This has led some psychologists to propose a mental disorder called *internet addiction* to describe and explain the uncontrollable, maladaptive use of this technology.

Detecting and diagnosing internet addiction is often difficult because its legitimate use for personal and business reasons can mask addictive behaviour. It is estimated that over 70% of office staff misuse the internet during work hours, for example by using social media, reading personal email, shopping online, booking holiday accommodation, or even visiting pornography, gaming or gambling sites (Young, 2010).

The *Internet Addiction Diagnostic Questionnaire* (*IADQ*) was developed by American psychologist Kimberley Young as an initial screening instrument for diagnostic purposes. The following questions are linked to key symptoms associated with internet addiction according to her criteria.

1. Do you feel preoccupied with the Internet (think about previous online activity or anticipate next online session)?
2. Do you feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?
3. Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?
4. Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?
5. Do you stay online longer than originally intended?
6. Have you jeopardized or risked the loss of a significant relationship, job, educational or career opportunity because of the Internet?
7. Have you lied to family members, a therapist, or others to conceal the extent of involvement with the Internet?
8. Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g. feelings of helplessness, guilt, anxiety, depression)?

According to Young (2017), if a person answers 'yes' to five or more questions about a six-month period, they may be suffering from internet addiction. Other signs include neglecting friends and family, neglecting sleep to stay online, being dishonest with others, feeling guilty, ashamed, anxious, or depressed as a result of online behaviour, and withdrawing from other pleasurable activities.

The DSM-5 has identified a more specific type of internet addiction involving internet gaming. This is described as 'persistent and recurrent use of the internet to engage in games, often with other players, leading to clinically significant impairment or distress in a 12-month period' (p. 795). Internet gaming disorder, as it is currently called, will be included in the next edition of the DSM if further research evidence justifies it.

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Weblinks

- TED talk by Dr Kimberly Young on internet addiction 17 m 3 s
- ABC *Catalyst* story on computer game addiction 10 m 54 s

Gambling

Gambling is any activity in which something of value (e.g. money) is put at risk in the hope of obtaining something of higher value. The activity may be legal or illegal but the outcome is usually determined by chance and therefore unknown.

The most popular gambling activities in Australia are purchasing lotto and instant lottery ('scratchy') tickets. Wagering ('betting') on sports matches, horses or greyhounds, 'playing' electronic gaming machines ('pokies') and casino table games such as blackjack and roulette account for the overwhelming bulk of money gambled (Productivity Commission, 2010).

Sports betting has grown substantially in recent times. For example, it is the only gambling form for which participation rates have increased during the last decade or so. Studies have found that approximately 1 in 7 (13%) Australians gambles on sport, with expenditure doubling since 2005 and continuing growth predicted. Expansion of and extensive promotion have been influential in the growth of sports betting. Australians now have convenient, 24/7 and mobile access to websites, which means they can gamble on dozens of different sports from nearly any time and place (Australian Institute of Family Studies, 2017).

The various forms of gambling can be divided into two categories: continuous and non-continuous. *Continuous* forms are those in which the time between betting and knowing the outcome is short — which permits instant gratification. This includes 'pokies', bingo, horse racing, casino betting, 'scratchies' and sports betting. *Non-continuous* forms are those in which the time between betting and knowing the outcome is long — thereby delaying gratification. The most common or popular non-continuous activity is lottery gambling such as Tattslotto or Powerball.

Gambling as an addiction

For many Australians, most forms of gambling are a source of recreation and pleasurable social activity. Gambling can provide time away from the pressures of work, a temporary escape from boredom, fun, excitement, a chance to win money, the thrill of anticipation and an opportunity to get away from thoughts and feelings that may be 'depressing', to get out and meet people and socialise, and to 'dream' about winning a fortune. Gambling venues such as casinos and clubs can also provide an accessible, comfortable and safe social environment, which many people — particularly women, elderly people and 'ethnic communities' — have found appealing (Gordon & Chapman, 2014; Productivity Commission, 2010).

Figure 6.17 (a) The most popular gambling activities in Australia are purchasing lotto and instant lottery ('scratchy') tickets. (b) Australian sports betting has grown substantially during the last decade and its growth is closely tied to the expansion of Internet gambling and extensive promotion.

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Weblinks

- Australian Gambling Research Centre
- ABC News story on online gambling 5 m 11 s

For a number of people, however, gambling stops being pleasurable and becomes a serious problem that causes harm to themselves and/or to those around them such as their partner, family, friends or others in the community. When gambling begins to consume more money and time than a person can afford, it can affect many parts of the individual's life, including their psychological and physical health, relationships, finances, work and study.

The terms *problem gambling, gambling disorder* and *pathological gambling* are often used interchangeably to describe gambling behaviour that has become very 'problematic' or addictive. Legislative and regulatory authorities in Australia tend to use the term problem gambling. The DSM-5 uses the term gambling disorder.

Problem gambling

Problem gambling is characterised by difficulties in limiting money and/or time spent on gambling, which leads to negative consequences for the gambler, for others or for the community. This is the preferred definition in Australia as it includes the notion that problem gambling can be represented on a continuum as a behaviour that occurs in varying degrees. The description 'difficulties in limiting money and/or time spent on gambling' suggests a continuum of gambling behaviours from individuals who have *no difficulty* (including non-gamblers) to those who have *extreme difficulty* (see Figure 6.18 below).

Problem gambling can also be represented on a continuum as ranging from *occasional non-problematic use* (e.g. recreational gambling) when there are no adverse impacts through to *extreme over-involvement* (e.g. gambling accompanied by a sense of impaired self-control), with a range of more or less problematic behaviours in between. There is no clear point, however, at which a 'recreational gambler' becomes a 'problem gambler' (Productivity Commission, 2010).

Table 6.6 Prevalence of problem gamblers in Victorian adults (2014)

Risk for problem-gambling	Operational definition	% and number of Victorian adults
Non-problem gamblers	Gambles with no negative consequences	57.59% (2 500 000)
Low-risk gamblers	Experiences a low level of problems with few or no identified negative consequences	8.91% (391 200)
Moderate-risk gamblers	Experiences a moderate level of problems leading to some negative consequences	2.79% (122 500)
Problem gamblers	Gambles with negative consequences and a possible loss of control	0.81% (35 600)
Non-gamblers	Did not gamble in the past 12 months	29.90% (1 300 000)

Source: Victorian Responsible Gambling Foundation (2017). *Study of gambling and health in Victoria: Gambling Problems in Victoria* (Fact sheet 1). Retrieved from https://www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0005/25637/Vic-prevalence-study-Fact-sheet-1-Gambling-problems-in-Victoria.pdf

Gambling disorder

The DSM-5 describes **gambling disorder** as persistent and recurring maladaptive gambling behaviour that disrupts everyday personal, family and/or vocational activities. In order to be diagnosed with gambling disorder, a person must experience at least 4 of the following 9 symptoms (or 'criteria') in a 12-month period.

1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
2. Is restless or irritable when attempting to cut down or stop gambling.
3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
4. Is often preoccupied with gambling (e.g. having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
5. Often gambles when feeling distressed (e.g. helpless, guilty, anxious, depressed).
6. After losing money gambling, often returns another day to get even ('chasing' one's losses).
7. Lies to conceal the extent of involvement with gambling.
8. Has jeopardised or lost a significant relationship, job, or educational or career opportunity because of gambling.
9. Relies on others to provide money to relieve desperate financial situations caused by gambling.

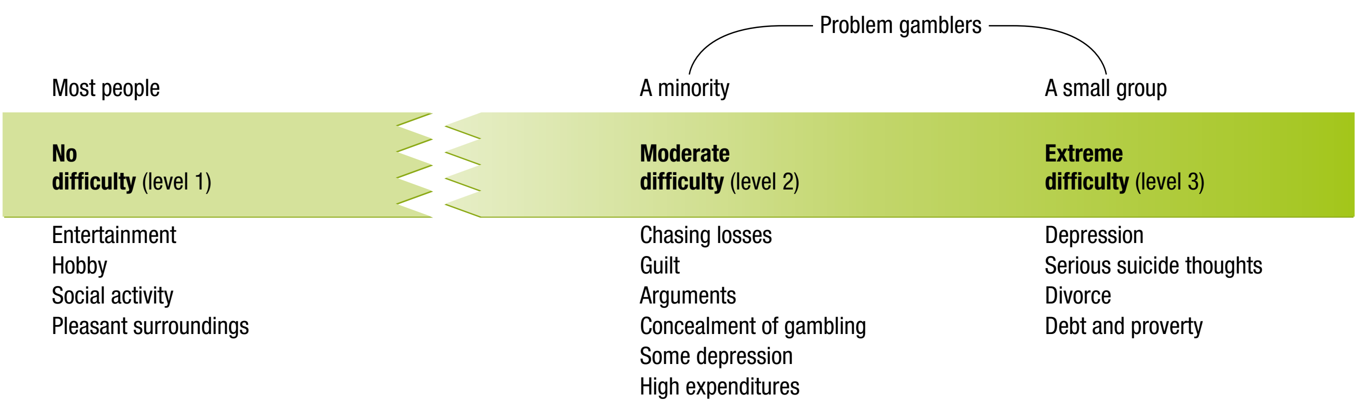

Figure 6.18 A gambling continuum

Source: Based on Australian Government Productivity Commission (2009). *Australia's gambling industries inquiry report volume 1: Report (Parts A–C), 10*. 19. Retrieved from http://www.pc.gov.au/inquiries/completed/gambling-2009/report/gambling-report-volume1.pdf

As with problem gambling, the DSM-5 represents gambling disorder on a continuum ranging in severity. The severity of the disorder is determined by the number of symptoms, as follows:

- *Mild*: 4–5 symptoms
- *Moderate*: 6–7 symptoms
- *Severe*: 8–9 symptoms.

Because of the increasing number of problem or addicted gamblers in the general population and the significant harmful effects of uncontrollable gambling on the individual, their family, friends, colleagues and the wider community, a growing number of psychologists are conducting research on causes and treatments of the behaviour. Most believe that it is caused by the interaction of a combination of biological, psychological and social factors, rather than any single factor. We consider some examples of contributing factors.

LEARNING ACTIVITY 6.10

Review questions

1. Explain the meaning of addiction, with reference to potentially addictive behaviours and substances.
2. Distinguish between:
   (a) psychological and physiological dependence
   (b) tolerance and withdrawal.
3. Explain why addiction is considered to be maladaptive.
4. Explain what gambling is with reference to an example.
5. Draw a continuum for problem gambling using the operational definitions in Table 6.6.
6. Under what circumstances would body building or exercising be considered an addiction disorder? Explain your answer.
7. Which DSM-5 symptoms of gambling disorder do each of the following people exhibit?
   (a) Leon has a very stressful life. He works 15 hours a day, six days a week. However, when he is sitting in front of a 'pokie', nothing else matters and he's able to forget about his stressful life for a while.
   (b) In order to continue gambling, Selina has stolen money from friends and borrowed money from family members under false pretences. She never tells anyone the truth about how much she has lost on gambling. She always tells everyone that she 'broke even'.
   (c) Samir has just lost $15 000 on gambling. He thinks, 'I've gotta get back my $15 000. If I win the money back everything will be alright', so he goes back to the roulette table. This time he tells himself that if he recovers the $15 000 he will stop for good. However, Samir loses another $1000.

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Digital documents

- Data analysis — gambling activities in Victoria
- Practical activity — problem gambling

Contributing factors

The onset of a gambling addiction can occur during adolescence, young adulthood or at any other time in the lifespan. Generally, it develops over a number of years during which there is a gradual increase in both the frequency and amount of gambling. There is no known single event that triggers the development of addictive gambling behaviour.

Many factors, however, have been proposed as contributing to its development. One approach to explaining gambling addiction is based on the biopsychosocial model. From this perspective, factors that interact in influencing its occurrence include biological factors (such as activation of a reward system in the brain that make gambling a pleasurable experience), psychological factors (such as distorted ways of thinking) and social factors (such as social acceptability of gambling).

Biological — dopamine reward system

The **dopamine reward system** is a group of neural pathways in the brain that, when stimulated, results in pleasurable effects. These positive feelings can reinforce and motivate a person to perform certain activities, including gambling and other addictive behaviours. As the name suggests, the dopamine reward system involves the neurotransmitter dopamine and is sometimes called the brain's 'pleasure centre'.

As shown in Figure 6.19 opposite, the dopamine reward system is located beneath the cerebral cortex in the midbrain area. It is more formally called the *mesolimbic system* and has connections that extend to the cerebral cortex and other brain structures and areas. Reward results from activation of dopamine producing neurons within the pathway. When dopamine is released, it is experienced as a feeling of pleasure and sometimes euphoria. Connection to the prefrontal cortex helps ensure we pay attention to and notice the pleasure. Studies have found that anticipation of receiving a reward is sufficient to activate the release of dopamine.

Another dopamine system in the midbrain area is active in maintaining normal motor behaviour. This is called the *nigrostriatal system* and reduced dopamine in its pathways is related to muscle rigidity and other motor symptoms of Parkinson's disease discussed in chapter 4.

Neuroimaging techniques have shown that gambling for a monetary reward, especially on pokie machines, activates the dopamine reward system. Because a win, and therefore the reward, is never predictable, every instance of a payoff results in a new burst of dopamine into the brain, no matter how many times the person plays (Gray, 2007).

Research evidence also shows that gambling addiction may be partially due to *excessive* dopamine activity. Some of this evidence comes from studies on

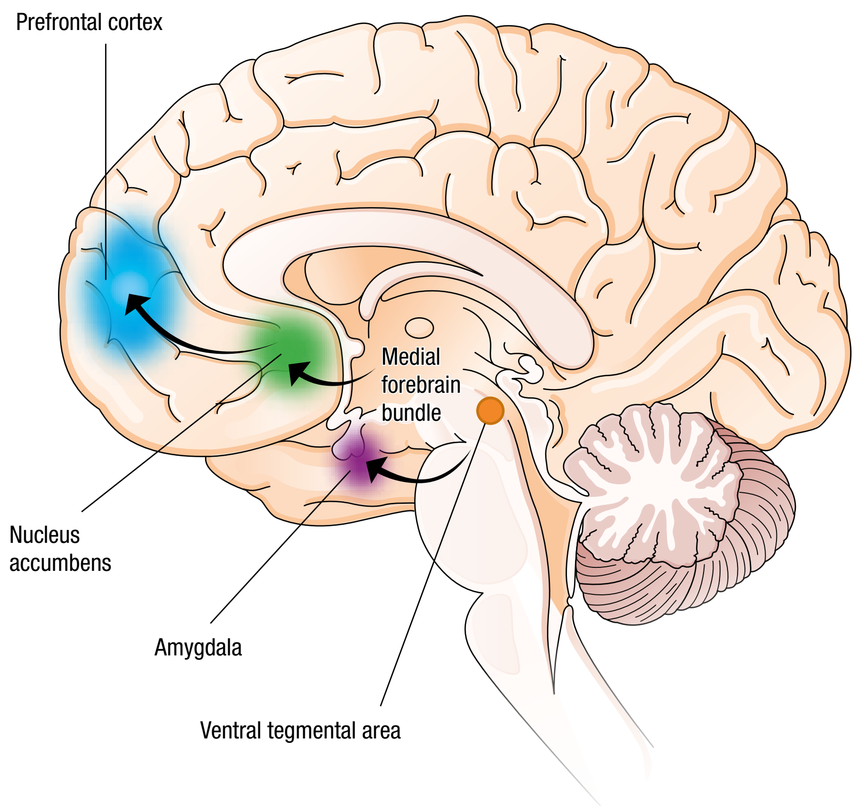

Figure 6.19 The dopamine reward system is a group of neural pathways located in the midbrain area. It is more formally called the 'mesolimbic' system and runs from the ventral tegmental area, through the medial forebrain bundle, to the nucleus accumbens. There are connections to other structures and areas, including the prefrontal cortex. Neurons within it are activated by dopamine. When stimulated, the dopamine reward system produces a pleasurable experience.

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The chemistry of addiction 11 m 49 s

Parkinson's disease, which is associated with a deficiency of dopamine in the brain. Treatment therefore involves *increasing* dopamine levels in the brain using medications such as levodopa.

Several studies have reported a relationship between the use of dopamine medications for Parkinson's disease and the development of a serious gambling problem, suggesting that an excess of dopamine could be responsible (at least in some of the cases). For example, in one study, 11 people with Parkinson's disease all became addicted to gambling after starting treatment with medications that promoted a high level of dopamine, seven within three months. The results also showed that gambling stopped in 8 out of the 11 participants when the dopamine medication was reduced or discontinued (Dodd et al., 2005). Precisely how medications that promote dopamine production or release lead some people with Parkinson's disease to develop a gambling addiction remains unclear.

Psychological — distorted ways of thinking

Cognitive distortions are inaccurate thoughts, beliefs and attitudes; for example, thoughts that are irrational ('illogical'), exaggerated, extreme and/or not consistent with what is actually going on in the real world. Many people with a gambling addiction have been identified as having one or more cognitive distortions. Most are unaware of these flawed ways of thinking that lead them to make errors of judgment and bad decisions.

Two of the most common cognitive distortions held by people with a gambling addiction are illusions of control and the gambler's fallacy. Both lead to flawed decision making and tend to maintain their gambling behaviour.

Illusion of control

An **illusion of control** refers to the mistaken belief ('illusion') that the outcomes of random, unpredictable events can be influenced or controlled by one's thoughts or actions. It is believed that there is a way to 'beat the odds' or 'beat the system', when in fact the outcome is completely unpredictable and whatever the individual does will not actually influence the outcome.

Figure 6.20 A 'pokie' machine player who has an illusion of control may talk to the machine in a certain way in the mistaken belief that this can increase the likelihood of success.

Examples that demonstrate an illusion of control include:

- 'willing' a winning result through mental effort
- talking to and touching a gaming machine in a certain way
- choosing specific Tattslotto numbers in preference to computer-generated 'quick pick' numbers
- revealing the cards slowly one at time after having been dealt a hand in poker
- blowing on dice before throwing them when playing the game of craps.

Although these types of 'strategies' are illogical, and the gambler may be aware of this, they persist with their use, usually attributing failure to 'bad luck'.

The gambler's fallacy

People with a gambling addiction also tend to incorrectly believe that outcomes are predictable, irrespective of the laws of probability that actually apply. This belief involves what is commonly called the gambler's fallacy. The **gambler's fallacy** refers to the mistaken belief that in a series of independent chance events, future events can be predicted from past ones.

The gambler's fallacy is often illustrated with coin tosses. For example, if a coin is tossed in the air and comes down heads ten times in succession, it is believed that there is an increased chance of the coin coming down tails on the next toss. This, however, is incorrect (assuming the toss of the coin is fair). If two events are independent of one another, then one event does not affect the occurrence of the other. Each toss of the coin is entirely independent of the previous toss (or tosses). Even though the gambler may have a memory of the previous coin toss, the coin does not. The chance of getting heads (or tails) on any given toss is the same (1:2 or 50%) regardless of what happened in a previous toss, including situations in which heads may have come up ten times in a row.

Gamblers who believe in the gambler's fallacy also believe, for example, that in roulette certain numbers are 'due' because they haven't come up for a while, and that the chance of winning on a particular poker machine depends on how recently someone else won on that machine. These gamblers therefore bet on roulette numbers that are 'due' in the mistaken belief that those numbers must eventually come up or they play a particular poker machine 'because it hasn't paid all day' and must therefore be due to pay out.

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Animation explaining the gambler's fallacy 2 m 57 s

Figure 6.21 A cognitive distortion such as 'Odd numbers are due to come up' can maintain gambling behaviour.

Social — social acceptability of gambling

Although some people do not gamble at all, gambling as a recreational activity is well entrenched in Australian society and an enjoyable recreational activity for many. Around three in four Australians gamble at some time in the year. From the 'traditional' gambling game of 'two-up', which is often described as part of the ANZAC spirit, to the Melbourne Cup, the horse race that 'stops the nation' in November, gambling is regarded by many Australians as part of their cultural heritage (Dickins & Thomas, 2016a; Productivity Commission, 2010).

In Australia, there is also a lot of infrastructure in place to support gambling. Many different forms of gambling are legal and there are numerous points of access and ample opportunities to gamble at any time of the day on any day of the year. The media promote it through coverage of 'social' events involving gambling, and advertising provides and reinforces a positive image of gambling in the community.

Despite a growing level of government and public awareness that a gambling addiction can have devastating consequences, gambling continues to be a regular recreational activity for many Australians of different socio-cultural backgrounds.

The perception that gambling is socially acceptable has an influential effect in determining the rate and frequency of gambling among different sectors of the population. Research evidence suggests that the number of people in any given community who actively participate in a gambling activity is related to the promotion, accessibility and availability of gambling outlets. This is one of the main reasons internet gaming sites and opportunities for online gambling are causing significant concern among psychologists (Gainsbury, 2014; Hing, 2014; Rickwood, et al., 2010).

Table 6.7 Different attitudes to gambling activities across cultures

Gambling is . . .		
Not accepted	**Somewhat accepted**	**Accepted**
• Russian — 'reprehensible pastime' • Tamil — not part of the culture, a sin	• Arabic — a source of entertainment and refuge but also of shame, a source of quick money • Caribbean — not universally accepted but seen as part of one's status, considered manly • Italian — an individual pastime (apart from cards, which is seen as a social activity) and not generally shared with the family • Latin American — not universally accepted but seen as part of one's status, considered manly • Macedonian — an enjoyable activity, which sometimes results in feelings of shame	• Aboriginal (Australia) — a source of pleasure and fun, a way to make money • Chinese — positive, part of the culture, a way to 'test one's luck', and a source of quick money • Croatian — traditional pastime, a source of personal entertainment • Greek — traditional pastime, an enjoyable form of social contact and entertainment shared with family and friends, a source of quick money • Hispanic — a pleasurable hobby or social activity, part of one's status, considered manly • Korean — a way to escape, a pleasurable and social activity • Maori — not historically part of the culture but a common pastime currently • Pacific/Samoan—an enjoyable, sociable activity • Vietnamese — an enjoyable activity, a source of quick money, a game of luck and skill

Source: Dickins, M., & Thomas, A. (2016a). *Gambling in culturally and linguistically diverse communities in Australia* (AGRC Discussion Paper No. 7). Melbourne: Australian Gambling Research Centre, Australian Institute of Family Studies.

Research evidence also shows that younger Australians are more likely to perceive gambling as socially acceptable. The perception of social acceptability encourages young people to try gambling at some stage and is a significant predictor of youth gambling frequency in Australia. Social acceptability also decreases the likelihood of negative consequences being associated with regular gambling. For example, a young person is more likely to engage in regular gambling if their family and friends actively gamble and promote positive values and attitudes about gambling (Dickins & Thomas, 2016b; Hare, 2015; Ohtsuka & Maddern, 1999; Productivity Commission, 2010).

Figure 6.22 Simulated gambling games mimic the characteristics of gambling games but do not provide an opportunity to bet, win or lose real-world money. However, research studies have found that people who play simulated gambling games are more likely to gamble commercially and report gambling problems (Dickins & Thomas, 2016b).

Treatment

The most effective treatment for a gambling addiction adopts a biopsychosocial approach so that the full range of contributing factors can be addressed. This helps ensure that other possible physical and mental health problems are also considered. For example, addictive gambling is more common among people with poor physical health and/or who have another mental disorder such as one involving substance use, depression, anxiety or a personality disorder.

Only a small proportion of people with a gambling addiction seek professional help. Many refuse to recognise or accept the seriousness of their problem or that there are negative consequences of their addiction. Other reasons include embarrassment and the belief that they can resolve their gambling problems without professional help (Hare, 2015; Productivity Commission, 2010).

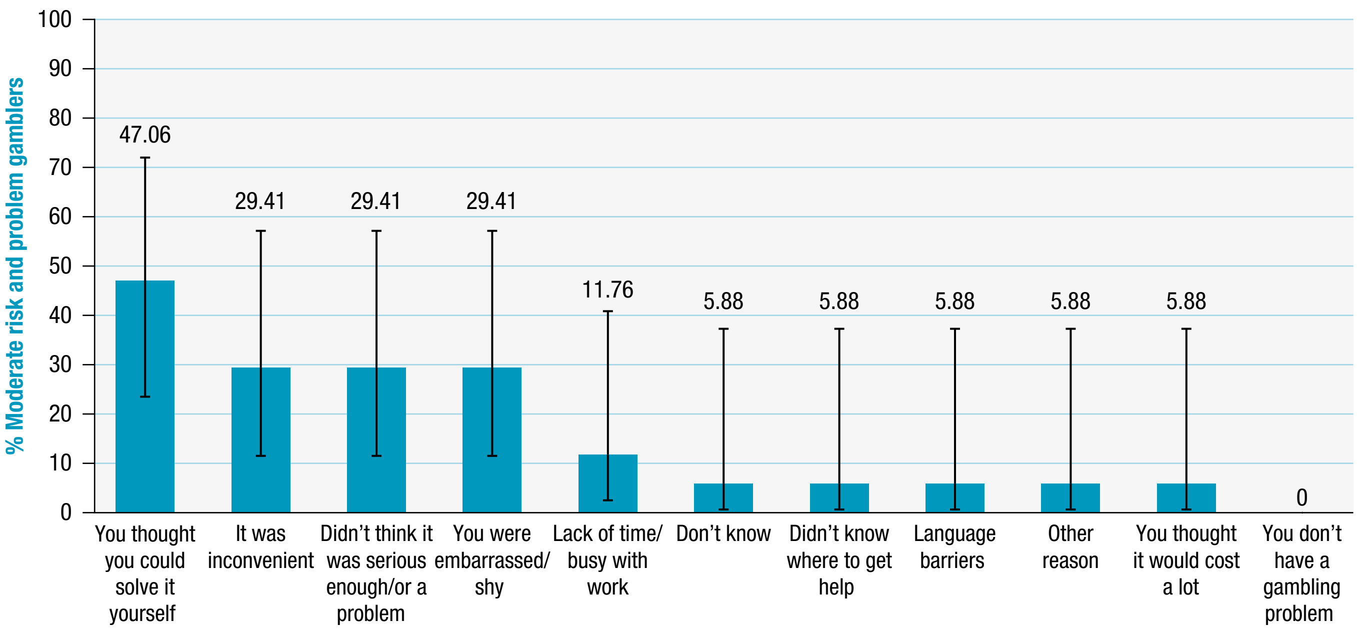
Most of those who do seek treatment have either 'hit rock bottom' or are coming close. For example, a person may not seek help until they are facing financial ruin, a relationship breakdown, serious work-related issues, deterioration of physical health, deterioration of psychological health (e.g. attempted suicide) or legal charges linked to their gambling activities.

The main forms of treatment for a gambling addiction involve psychotherapy and social support. Medication that targets the dopamine reward system can in some cases decrease the frequency of gambling behaviour but as yet there is no 'magic pill'. There are also concerns about the side effects of existing medications. Consequently, medication tends to not be a preferred option in the treatment of a gambling addiction.

Cognitive behavioural therapy is the most commonly used type of therapy. As the name suggests, it combines cognitive and behavioural therapies. A core assumption of **cognitive behavioural therapy (CBT)** is that the way people feel and behave is largely a product of the way they think. Therefore, CBT is used to help the person become aware of their faulty thinking when gambling, and then to develop more accurate thoughts, beliefs and attitudes about playing and winning games of chance.

It is common for someone with a gambling addiction to report that the urge to gamble is overwhelming and beyond their control, once it has been triggered. Therefore, the person will also be assisted to learn and use techniques to manage the tension, anxiety or arousal that may be associated with their desire to gamble. In addition, improved problem-solving skills can help individuals use strategies to refuse gambling opportunities and to deal with gambling urges, decide limits on the time and money spent gambling, resolve difficulties with family members and find suitable solutions to gambling debts (Earle, 2013; Rickwood et al. 2010).

Support is also available through support groups that may be accessed in the local and wider community, through attendance or online. A **support group** is a group of people who interact on the basis of common interests or experiences to provide mutual support. They are mostly organised and/or 'run' by



Question – May I ask why did you not seek help? Was it because (responses prompted)? (Base: Moderate risk and problem gamblers who wanted help for a gambling problem in the past 12 months, but did not seek help)

Figure 6.23 Why non-help seekers did not seek help for a gambling problem, but wanted help

Source: Hare, S. (2015). *Study of Gambling and Health in Victoria*. Victoria, Australia: Victorian Responsible Gambling Foundation and Victorian Department of Justice and Regulation.

a person who has experienced or recovered from the mental disorder that is the focus of the group, or by someone affected by it, such as a close relative. Online support groups enable access to others and information through services such as live chat Facebook pages, conference calls, forums and blogs. These are often established and conducted by not-for-profit organisations.

A key assumption of support groups run for people with a gambling addiction is that recovery is possible. The goal of recovery usually involves drawing on each other's experiences to develop problem-solving skills for self-management of the addiction in a gradual step-by-step recovery (O'Brien, Kennedy & Ballard, 2007).

Figure 6.24 An individual with a gambling addiction often refuses to recognise or accept that they have a problem. When challenged, they can come up with an endless variety of reasons to justify their gambling.

BOX 6.4 Gamblers Anonymous

One of the best-known support groups for people with a gambling addiction is Gamblers Anonymous. Gamblers Anonymous was founded in Los Angeles, California in 1957 and has established itself worldwide as a resource for people struggling with gambling problems.

Gamblers Anonymous offers a self-help program for anyone with a gambling problem. The only requirement for Gamblers Anonymous membership is a desire to stop gambling. The program involves confidential group meetings, which are held in local community centres and church halls and go for 90 minutes. There are no compulsory fees or charges.

Gamblers Anonymous follows a 12-step recovery program based on the following principles.

1. We admitted we were powerless over gambling — that our lives had become unmanageable.
2. We came to believe that a Power greater than ourselves could restore us to a normal way of thinking and living.
3. We made a decision to turn our will and our lives over to the care of this Power of our own understanding.
4. We made a searching and fearless moral and financial inventory of ourselves.
5. We admitted to ourselves and to another human being the exact nature of our wrongs.
6. We were entirely ready to have these defects of character removed.
7. We humbly asked God (of our understanding) to remove our shortcomings.
8. We made a list of all persons we had harmed and became willing to make amends to them all.
9. We made direct amends to such people wherever possible, except when to do so would injure them or others.
10. We continued to take personal inventory and when we were wrong, promptly admitted it.
11. We sought through prayer and meditation to improve our conscious contact with God as we understood Him, praying only for knowledge of His will for us and the power to carry that out.
12. Having made an effort to practise these principles in all our affairs, we tried to carry this message to other compulsive gamblers.

The initial steps in recovery from a gambling addiction include admitting to powerlessness over the urge to gamble and surrendering to a 'higher power', which members can interpret according to their own beliefs. This is why members of Gamblers Anonymous often introduce themselves to other members at meetings with an admission of their problem; for example, 'Hi, I'm Vinnie and I'm a problem gambler'.

Another key feature of Gamblers Anonymous is having a 'sponsor'. A sponsor is a former problem gambler who has abstained from all gambling whatsoever and can provide guidance and assistance to the member throughout their recovery process.

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Gamblers Anonymous Australia

LEARNING ACTIVITY 6.11

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Word copy of table

Review questions

1. Complete the following table to summarise factors contributing to gambling addiction.

Contributing factor	Description	How it influences
Biological Dopamine reward system		
Psychological Cognitive distortions - Illusion of control - Gambler's fallacy		
Social Social acceptability of gambling		

2. (a) Studies have shown that lottery gamblers with an illusion of control pick their own numbers rather than have the numbers randomly selected for them. Why might this be the case?
   (b) Some people with a gambling addiction engage in superstitious behaviour such as never betting on a 'bad' number. Is superstitious behaviour an illusion of control? Explain your answer.
3. Tatts annually issues a media release notifying the 'top 10 Lotto hot spots' for each state or territory. It names areas and agencies where most division 1 prizes and the largest amounts of money were won in the previous 12 months.
   (a) In what way might this type of information contribute to or reinforce a gambler's cognitive distortions about winning a Lotto prize?
   (b) Which type of cognitive distortion is relevant?
4. How may a gambling addiction be treated?
5. List three potential benefits of participation in a support group for people with a gambling addiction.
6. Explain how the social network of someone with a gambling addiction could:
   (a) provide support
   (b) maintain a person's gambling behaviour.

ANXIETY DISORDERS

We all experience anxiety from time to time and in moderate degrees. In everyday life, anxiety is an adaptive response. Mild to moderate levels of anxiety improve our ability to cope, our reactions can become faster, our understanding better and our responses more appropriate. It is anxiety that can prompt us to do our homework, study for an exam, seek medical advice when an unusual skin blemish appears, be wary when too high up a ladder, and to avoid other dangerous situations.

In psychology, **anxiety** is defined more specifically as a state of arousal involving unpleasant feelings of apprehension or uneasiness that something is wrong or something bad is about to happen. The focus of anticipation may be internal or external. It may be accompanied by psychological, behavioural and physiological responses such as 'nervousness', worry, uncertainty, change in mood, negative thinking involving loss of control and ability to cope, difficulty concentrating and paying attention, excessive fear, upset stomach or nausea, racing heart, rapid breathing, muscle tension, inability to relax, and poor sleep.

The term 'anxiety' also describes the feeling people experience when faced with threat or danger or under stress. Although fear can be experienced with anxiety, and both fear and anxiety can trigger the same responses, psychologists distinguish between them.

Figure 6.25 Anxiety involves a feeling of apprehension that something is wrong or something bad is about to happen, often without apparent reason.

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TedX presentation on living with anxiety 7 m 27 s

Fear is an emotional reaction to something real which is present or anticipated and is perceived to threaten our wellbeing. For example, you are likely to experience fear when confronted by a snarling, vicious looking big dog. By contrast, anxiety is a reaction to the anticipation of a future threat. The threat is often vague or unknown and the reaction tends to be longer-lasting than fear (American Psychiatric Association [APA], 2013; Öhman, 2010).

It is normal to be anxious before important events, but the anxiety should not become so severe that it impairs performance. High levels of anxiety can reduce our capacity to plan, to make accurate judgments, to carry out skilled tasks, or even to understand information. While most people feel anxious sometimes, some people feel anxious most of the time. For these people, anxiety is not an adaptive response. It is a source of extreme distress and can indicate an anxiety disorder.

Anxiety disorders are the most frequently experienced and diagnosed of all the mental disorders, commonly occurring with other mental disorders. **Anxiety disorders** are characterised by persistent feelings of tension, distress, nervousness and apprehension or fear about the future, with a negative effect. A person with an anxiety disorder will feel uneasy and distressed a lot of the time for no apparent reason.

Individuals with an anxiety disorder do not lose touch with reality or behave in socially unacceptable ways. However, the anxiety is severe enough to interfere with their functioning, making it difficult for them to cope waith the normal demands of everyday life. In some cases, an episode of high anxiety can be so severe it is immobilising.

Types of anxiety disorders

The DSM-5 describes different types of anxiety disorders in this category. All have several common symptoms. Anxiety disorders include:

- *Generalised anxiety disorder* — persistent, excessive or unrealistic anxiety and worry. Adults often worry about everyday life circumstances such as health and finances, job responsibilities and their children's safety, or minor matters such as household chores or being late for an appointment. Children tend to worry about their abilities and how well they can do things. Individuals typically find it difficult to prevent worrisome thoughts from coming to mind, distracting them and interfering with tasks that need to be done.
- *Panic disorder* — recurring, unexpected panic attacks involving a surge of intense fear or anxiety. A panic attack tends to occur suddenly ('out of the blue') for no apparent reason in situations when most people would not be afraid, such as when relaxing, awakening, gardening or shopping. Panic attacks often last only a few minutes, but repeated episodes may continue to occur.

Figure 6.26 Some people have an anxiety disorder associated with performance situations.

According to the DSM-5, a panic attack is diagnosed when at least four of the following symptoms occur abruptly and reach a peak within minutes: palpitations, pounding heart, or accelerated heart rate; sweating; trembling or shaking; sensations of shortness of breath or smothering; feelings of choking; chest pain or discomfort; nausea or abdominal distress; feeling dizzy, unsteady, lightheaded, or faint; chills or hot flushes; numbness or tingling sensations; derealisation (feelings of unreality) or depersonalisation (being detached from oneself); fear of losing control or going crazy; fear of dying.

- *Specific phobia* — excessive, persistent and unreasonable fear of a specific object or situation, such as flying, heights, spiders, dentists, receiving an injection, and seeing blood. The phobic object or situation almost always triggers fear or anxiety and is intentionally avoided or endured with intense anxiety if avoidance isn't possible. The level of fear or anxiety is out of proportion to the actual danger posed and causes significant distress.
- *Social anxiety disorder (Social phobia)* — excessive, persistent and unreasonable fear of social and performance situations, primarily due to concern about being negatively judged by others (e.g. anxious, weak, stupid, boring, unlikeable), and fear of behaving in a way that offends others or is embarrassing or humiliating (e.g. sweating, trembling).
- *Agoraphobia* — excessive, persistent and unreasonable fear of a situation in which it is believed something terrible may happen and that escape might be difficult or help might not be available if needed. Agoraphobic situations may include using public transport, being in an open space area (e.g. in a car park, on a bridge), being in an enclosed space (e.g. shop, movie theatre, lift), standing in a line, being in a crowd and being outside of the home alone (e.g. in the back yard). These situations are avoided, require the presence of a companion or are endured with intense fear or anxiety.

In this section, we focus on biological, psychological and social factors that influence development and treatment of many anxiety disorders, with particular reference to phobias.

Contributing factors

Some anxiety disorders appear to be linked to a single event. For example, a specific phobia involving bees could be traced back to a distressing experience with a bee at some previous time. However, many people can have a distressing experience involving a bee and not develop a phobia. This suggests that the development of an anxiety disorder is unlikely to be due to one event or factor alone.

As with other mental disorders, anxiety disorders are best understood from a biopsychosocial perspective. Many factors have been proposed as risk factors, therefore contributing to the development of anxiety disorders. For a phobia, these include biological factors (such as an over-reactive nervous system response and imbalances in brain chemistry), psychological factors (such as faulty thinking) and social factors (such as transmission of threat information and parental modelling).

Biological — stress response and brain chemistry

There is research evidence that some people with an anxiety disorder experience an over-reactive autonomic nervous system response when they perceived a threat. This is a *physiological stress response* that is automatically initiated by the sympathetic nervous system. Sometimes called the *fight–flight response*, it can be activated by the sight or thought of an anxiety-provoking object or situation, even when there is no actual danger.

Bodily changes that occur with this stress response account for many of the physiological symptoms associated with many anxiety disorders, such as palpitations resulting from a pounding heart or an accelerated heart rate, and sweating due to increased perspiration. Feeling dizzy or even fainting are believed to be the result of an initial increase in autonomic nervous system arousal followed by a sudden drop in blood pressure and heart rate.

There is also evidence that an imbalance in brain chemistry involving the neurotransmitter GABA may contribute to anxiety disorders, particularly phobias. GABA helps regulate nervous system arousal and physical reactions that occur when the body is aroused. A low level can result in heightened activity of the nervous system and contribute to an over-reactive stress response and exaggerated anxiety symptoms.

Psychological — learning processes and faulty thinking

Learning through experience can significantly influence the development and onset of a phobia. One learning process that has been widely studied is called conditioning. In particular, the type of conditioning called classical conditioning can contribute to the development of a phobia. During *classical conditioning,* an object that is originally neutral in that it causes no fear or anxiety symptoms (e.g. a butterfly) becomes unintentionally paired with a frightening event (e.g. a sudden panic attack that occurs spontaneously) so that it becomes a conditioned ('learnt') stimulus that triggers anxiety. Anxiety then becomes an automatically occurring conditioned response whenever a butterfly is encountered (or even when an encounter is anticipated) because the butterfly is associated with a panic attack. The person then begins to avoid butterflies in order to reduce the possibility of experiencing anxiety. The person has learned to be anxious through classical conditioning — a form of associative learning.

Another type of conditioning called *operant conditioning* helps maintain the avoidance behaviour and other symptoms associated with a phobia. For example, the strategy of avoiding butterflies is successful in that it temporarily reduces or takes away the unpleasant experiences of anxiety. The removal of an unpleasant consequence (i.e. anxiety symptoms) by avoidance is a 'reward' for avoidance behaviour that maintains the occurrence of this type of behaviour for butterflies.

Both classical and operant conditioning are discussed in more detail in relation to the topic of attitude formation in chapter 9.

People with anxiety disorders, particularly phobias, tend to develop *faulty thinking* habits that can make them more prone or vulnerable to experiencing fear and anxiety. For example, their fear and anxiety are usually based on negative thoughts about the anxiety-provoking object or situation. These negative thoughts are typically unreasonable and unjustifiable. The individual is often aware of this but it makes no difference to how they react.

They also tend to engage in catastrophic thinking, a type of negative thinking in which an object or situation is perceived as being far more threatening, dangerous or insufferable than it really is and will result in the worst possible outcome. For example, a person with agoraphobia or a concern about being late for an appointment may think that if they go outside to the letterbox to get the mail, the front door may close and lock them out of the house and they will be exposed to all types of danger with no one around to help.

When catastrophic thinking occurs, individuals experience heightened feelings of helplessness and grossly underestimate their ability to cope with the situation. For example, a person with a phobia of dogs may think 'if this dog turns towards me, there is nothing I can do to stop it from attacking me'. Equally, they may believe that they will be completely unable to cope with the symptoms of anxiety they may experience; for example, 'if I faint, I may never regain consciousness'.

Figure 6.27 A specific phobia of butterflies can be acquired through classical conditioning then maintained through operant conditioning.

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Tutorial on classical conditioning of phobias 10 m 21 s

Social — transmission of threat information and parental modelling

Many and varied social factors have been proposed as contributing to the development of anxiety disorders. For example, phobias can result from transmission of threat information within the individual's social environment and/or modelling ('imitating') of reactions by one or both parents to an object or event that triggered a fear reaction.

Transmission of threat information refers to the delivery of information from parents, other family members, peers, teachers, the media and other secondary sources about the potential threat or actual danger of a specific object or situation. Children are most vulnerable to the transmission of threat information, particularly from parents. For example, parents may communicate their fear and anxiety directly to the child (e.g. 'Don't touch the broken glass because it's dangerous'). The child may also hear their parents communicate their fear and anxiety to another individual (e.g. their partner) or aloud to themselves (e.g. 'That was so frightening I can't stop shaking').

Children also commonly reproduce or imitate a parent's behaviour. For example, a child with no fear of a ladybird may learn that this tiny bug should be feared after observing a parent's extreme fearful reaction when a ladybird landed on their hand when outside in the garden. Fears developed through parental modelling can be just as strong as fears developed through direct, personal experience.

Figure 6.28 A parent can transmit threat information and model fear and anxiety responses.

Treatment

There are many mental health professionals and services available to help with anxiety disorder information, treatment and support. Effective treatment helps people with recurring anxiety to learn how to control their condition so it doesn't control them. The type of treatment will depend on the anxiety disorder being experienced and its severity. In most cases, psychological and/or medical treatments are likely to be required (beyondblue, 2016a).

Cognitive behaviour therapy (CBT) is often used for anxiety disorders. This approach targets the faulty thinking underlying the disorder and assists people to change their negative, maladaptive thoughts into more realistic ones. When someone with an anxiety disorder develops a more appropriate way of thinking about events in their life, it enables them to take greater control over their feelings and behaviour, and feel less anxious. For example, CBT can help people with a phobia understand that a feared object or event is not actually dangerous, so their avoidance behaviour is unnecessary.

When being treated for a phobia through CBT, the behaviour therapy component is also commonly used. For example, the individual may be gradually exposed to the feared object or situation, starting with low to moderately stressful stimuli. Relaxation and controlled breathing skills are also often taught to people with an anxiety disorder as a way of keeping their anxiety under control.

Anti-anxiety medications may also be used to help treat symptoms. They can be effective in providing relief from symptoms and can do so quickly; however, they can have side effects including impaired cognitive functioning, drowsiness and lethargy. With prolonged use, some of these medications can cause physical and/or psychological dependence, as well as withdrawal symptoms when they're stopped. When medication is stopped, the original symptoms often return. Therefore mental health professionals often combine medication with psychotherapy in the treatment of anxiety disorders (beyondblue, 2016d).

LEARNING ACTIVITY 6.12

Review questions

1. Explain the meaning of the term anxiety.
2. Give an example of when anxiety is useful.
3. Give an example of when anxiety is not useful.
4. Distinguish between fear and anxiety.
5. Explain the meaning of the term anxiety disorder with reference to two brief descriptions of examples of this type of disorder.
6. In what way is the anxiety experienced as a 'normal' part of everyday life different from the experience of anxiety that characterises an anxiety disorder?
7. Give an example of each of the three different types of factors that may contribute to the development of an anxiety disorder such as a phobia and explain their potential effect on development and/or perpetuation.
8. (a) Visit the beyondblue website and outline three sources of support for an anxiety disorder that are not discussed in this chapter. Include an example of an online support centre.
   (b) Identify another reputable support service for anxiety disorders and how their services are accessed.
9. Using the text and other sources, complete the following table an anxiety disorder of particular interest to you.

4P Factor model	Biopsychosocial approach		
	Biological factors	Psychological factors	Social factors
Predisposing risk factors			
Precipitating risk factors			
Perpetuating risk factors			
Protective factors			

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beyondblue resources about anxiety

LEARNING ACTIVITY 6.13

Reflection

Some people believe that individuals with a mental disorder should 'just get on with life'. Comment on the accuracy of this belief in relation to anxiety disorders.

MOOD DISORDERS

Everyone experiences fluctuations in their mood, such as feeling 'high' when things are going well and we get a good result for a test, or feeling 'low' when events take a negative turn and we get involved in conflict with friends or at home. Experiencing 'highs' and 'lows' is quite normal when the intensity and duration of these feelings is in proportion to the events that produce them. However, experiencing fluctuations in mood that are severe, happen for no apparent reason, are long-lasting and impair the ability to do what we usually do each day, can indicate the presence of a mood disorder.

The term **mood disorder** is used to describe a mental disorder involving a disabling disturbance in emotional state, from the extreme sadness of depression to the extreme elation of mania. As an emotional state, **mood** is an overall feeling that colours our perception of the world and influences how we approach and go about daily life. Common examples of mood that are much like everyday emotions include happiness, sadness and anger.

Mood, however, can also involve feelings that we may not be able to easily label or we experience for no apparent reason, such as uneasiness, tension or anxiety. Consequently, mood is sometimes referred to as a *non-specific* emotional state, meaning that we may have no idea what has caused a mood (Schacter, Gilbert & Wegner, 2009).

The DSM-5 describes three broad types of mood disorder — those that involve only symptoms of depression, those that involve symptoms of mania and those that involve alternating episodes of depression and mania.

Depression is a lasting and continuous, deeply sad mood or loss of pleasure. It is characterised by symptoms such as feelings of worthlessness, failure and guilt, no confidence, withdrawal from close family and friends, fatigue and changes in sleep habits and appetite. In contrast, mania can be considered to be the opposite of depression.

Mania is an elevated mood involving intense elation or irritability. It is characterised by symptoms such as being overly excited, extremely active, talking excessively and being easily distracted. A person experiencing mania also tends to have an unrealistically high opinion of themself and their abilities, an inflated sense of importance and insensitivity to the negative consequences of their actions. There is a decreased need for sleep, and, in some cases, an individual may have very little sleep for days at a time, yet does not become fatigued. Thinking is speeded up and can switch abruptly between topics, making it hard to follow their train of thought. Speech also tends to be rapid and it can often be difficult for others to get a word in.

Hypomania is an extremely happy or irritable mood like mania, but its experience is not as intense as mania and often there are not as many symptoms.

When mood fluctuates, or 'swings', between depression and mania, this is called *bipolar disorder* (once called *manic-depressive disorder*). Mood changes between the two extremes of bipolar disorder are often unrelated to the individual's current situation and whatever they are thinking, feeling or doing at the time.

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Videos on personal stories of mood disorders

Figure 6.29 Bipolar disorder is characterised by fluctuations between episodes of extreme moods.

Types of mood disorders

Mood disorders described in this DSM-5 category include:

- *Major depressive disorder* A depressed mood for at least two weeks during which the individual feels sad or miserable most of the time *or* has lost interest or pleasure in most of their usual activities most of the day nearly every day *and* four or more symptoms that occur nearly every day, such as feeling tired and run down all the time, feeling irritable, sleep problems, loss or change of appetite, significant weight loss or gain, feeling worthless or excessively guilty, difficulties concentrating, thinking and making decisions. There may also be recurrent thoughts of death or suicide. The disorder is more commonly called *major depression* or simply *depression*.
- *Dysthymia* The symptoms are similar to those of major depression but less severe. However, the depressive symptoms last longer. A person has to have this milder depression for more than two years to be diagnosed with the disorder. Because it is longer lasting, it is also called *persistent depressive disorder*.
- *Premenstrual Dysphoric Disorder* Depressive and other mood or physical symptoms in the week before the onset of the menstrual cycle; for example, mood swings, feeling suddenly sad or tearful, feeling overwhelmed or loss of control, increased sensitivity to rejection, irritability or anger, feelings of hopelessness, sleep problems and decreased interest in usual activities. Symptoms improve when menstruation starts and gradually decrease.
- *Bipolar I disorder* Characterised by fluctuations between episodes of major depression and mania.
- *Bipolar II disorder* Characterised by fluctuations between episodes of major depression and hypomania.
- *Cyclothymia* Experience periods of manic symptoms and depressive symptoms over at least two years. Involves recurring mood changes without actually experiencing a manic or depressive episode. The duration of the symptoms are shorter, less severe and not as regular as those of major depressive or bipolar disorder. It is also called *cyclothymic disorder* and often described as a milder form of bipolar disorder.

In this section, we focus on major depression and consider biological, psychological and social factors that influence its development and treatment. On average, 1 in 5 women and 1 in 8 men will experience some level of depression. It is a serious condition that causes many people to be disabled, experience other complications and even to suffer premature death through accident or suicide (beyondblue, 2016b; RANZCP, 2017b).

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Movie preview: *Of Two Minds* (2012) — living with bipolar disorder 2 m 31 s

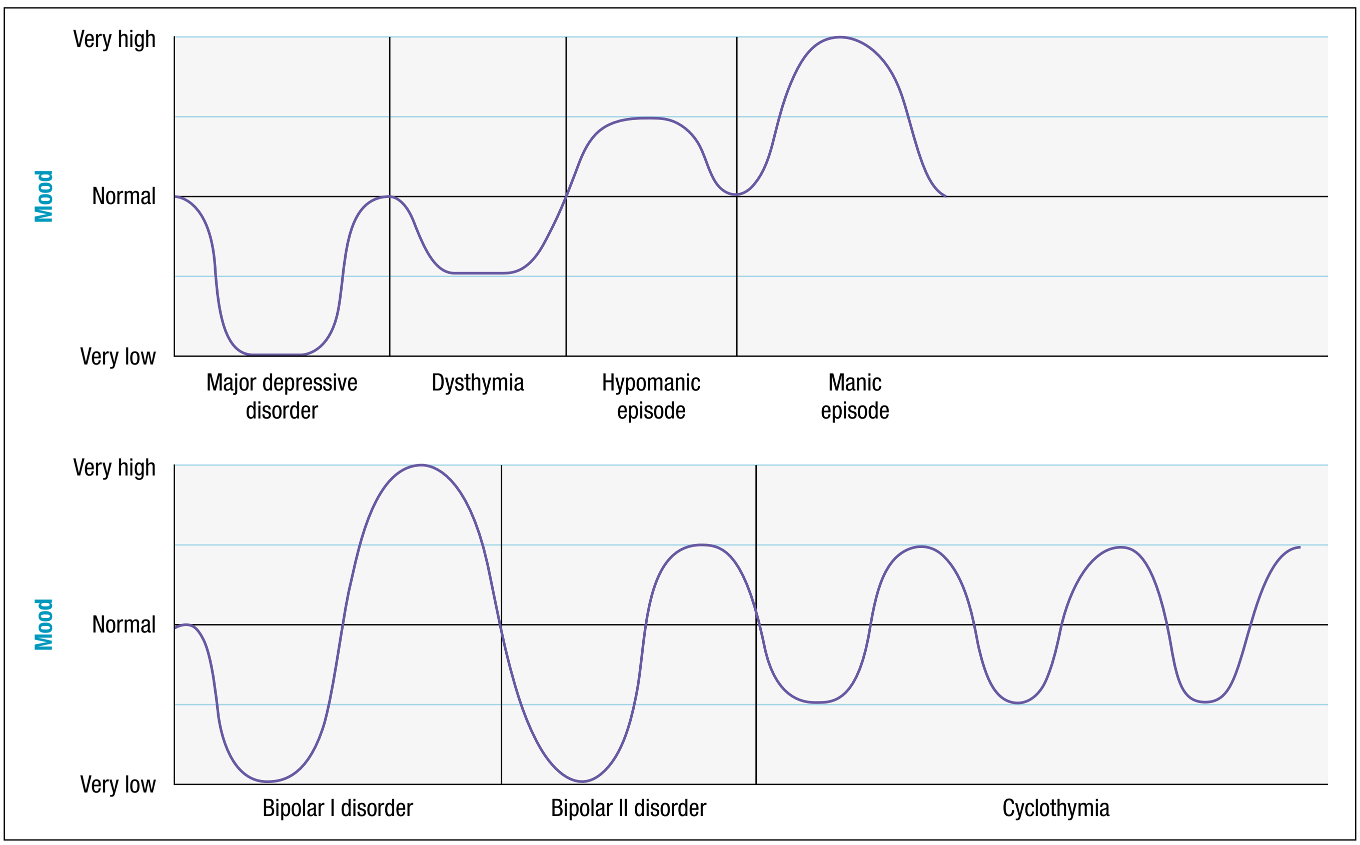


Figure 6.30 Visual representation of various types of moods and mood disorders described in the DSM-5

BOX 6.5 Signs and symptoms of depression

A person may be depressed if, for more than two weeks, he or she has felt sad, down or miserable most of the time or has lost interest or pleasure in usual activities, and has also experienced several of the signs and symptoms across at least three of the categories below.

It's important to note that everyone experiences some of these symptoms from time to time and it may not necessarily mean a person is depressed. Equally, not every person who is experiencing depression will have all of these symptoms.

Behaviour
- not going out any more
- not getting things done at work/school
- withdrawing from close family and friends
- relying on alcohol and sedatives
- not doing usual enjoyable activities
- unable to concentrate

Feelings
- overwhelmed
- guilty
- irritable
- frustrated
- lacking in confidence
- unhappy
- indecisive
- disappointed
- miserable
- sad

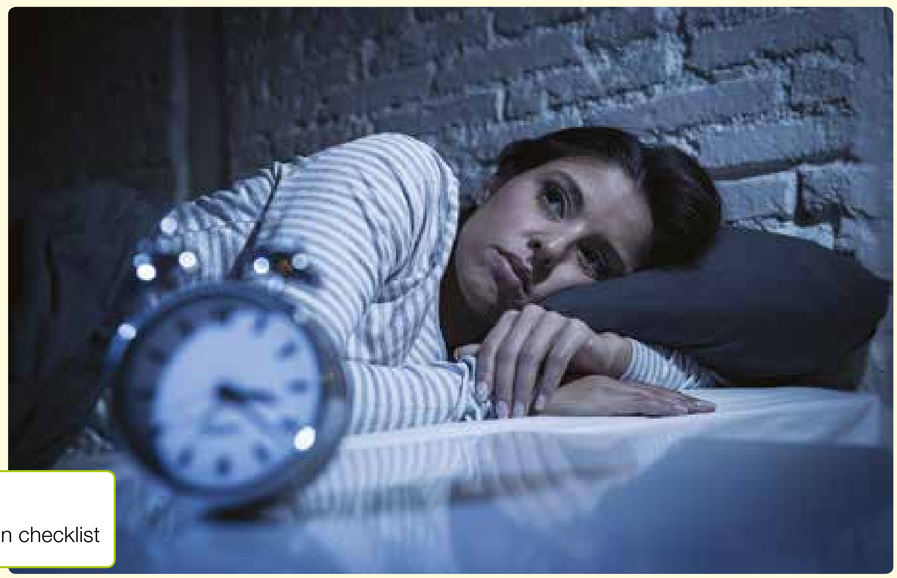
Thoughts
- 'I'm a failure.'
- 'It's my fault.'
- 'Nothing good ever happens to me.'
- 'I'm worthless.'
- 'Life's not worth living.'
- 'People would be better off without me.'

Physical
- tired all the time
- sick and run down
- headaches and muscle pains
- churning gut
- sleep problems
- loss or change of appetite
- significant weight loss or gain

If you think that you, or someone you know, may have depression, there is a quick, easy and confidential checklist you can complete at the beyondblue website to give you more insight. The checklist will not provide a diagnosis; for that you need to see a health professional.

Source: beyondblue (2016d). The facts: Depression — Treatments for depression. Retrieved from https://www.beyondblue.org.au/the-facts/depression/treatments-for-depression

beyondblue



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beyondblue online anxiety and depression checklist

LEARNING ACTIVITY 6.14

Review questions

1. Explain the meaning of the term mood.
2. (a) What is a mood disorder?
   (b) List three examples of mood disorder types in the DSM-5.
3. When is change in mood considered to suggest the presence of a mood disorder?
4. Distinguish between depression and mania.
5. List the criteria for a diagnosis of major depressive disorder with reference to examples of a range of different types of symptoms.
6. Consider the descriptions of major depressive disorder, dysthymia and cyclothymia. Should these be viewed as points along a depression continuum rather than distinct disorders? Explain your answer.

Contributing factors

There is no known single cause of mood disorders. Research investigating possible causes of the different types of mood disorders has primarily focused on major depression as this is the most common type of mood disorder and its symptoms are common among the various mood disorders.

Many different factors have been proposed as risk factors or contributing to the development or onset of depression. These include biological factors (such as genetic influence and imbalances in brain chemistry), psychological factors (such as the psychological response to stress and dysfunctional ways of thinking) and social factors (such as the poverty and social stress). As proposed by the biopsychosocial model, major depression (or any other mood disorder) cannot be explained by a single factor or event. It is best understood in terms of the interaction of different internal and external influences.

Biological — genes and brain chemistry

Research studies of families, twins and adopted children living with non-biological parents show that depression has a genetic component. These studies have found variable results but it is evident that depression has some tendency to run in families, which puts some people at an increased risk. For instance, depression is about one-and-a-half to three times more common among biologically related people than among non-biologically related people in the general population (APA, 2000, 2013; Levinson & Nichols, 2017). If one parent has depression, the risk to one of their offspring of developing depression at some time in their life has been found to be about a 25–30% chance. Overall, however, depression is considered 'moderately heritable'. Results from twin studies are shown in Table 6.8 below.

The existence of a genetic component does not mean that an individual will automatically become depressed if a biological parent or close relative has had the disorder (beyondblue, 2016b). Other biological

Table 6.8 Sample size and correlation of lifetime major depression

Zygosity and sex	Number of twin pairs	Correlation between twins for liability to lifetime major depression
Monozygotic, female–female	2317	0.44
Dizygotic, female–female	3185	0.16
Monozygotic, male–male	1774	0.31
Dizygotic, male–male	2584	0.11
Dizygotic, male–female	5633	0.11

Source: Kendler, et al., (2006). A Swedish national twin study of lifetime major depression. *American Journal of Psychiatry, 163*(1), p.110.

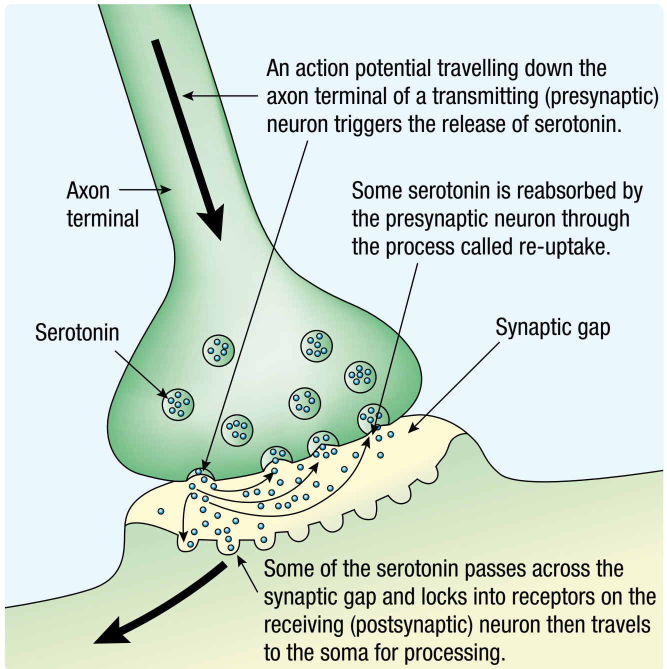

Figure 6.31 Many researchers have found that a depleted amount of the neurotransmitter serotonin in the brain due to the re-uptake process shown above may influence mood in a way that results in depression. Some researchers, however, suggest it is possible that depression may contribute to a decrease in serotonin levels.

factors, as well as psychological and social factors, still have an important influence on its development or onset. In addition, these factors may also influence gene activity or expression.

Another biological factor that can contribute to depression is depleted amounts of certain neurotransmitters. In particular, the neurotransmitters serotonin and noradrenaline have been found to be involved in mood disorders and therefore depression. By contrast, mania is assumed to be caused by an oversupply of these brain chemicals. However, the precise role that a deficiency in serotonin and/or noradrenaline may play in depression is still not fully understood.

Psychological — psychological responses to stress and dysfunctional ways of thinking

Many research studies have found that major depression may develop as a consequence of exposure to stressful life experiences. The experiences that appear to be most often associated with depression are those that involve a loss that can significantly disrupt everyday life in an ongoing way; for example, those related to marriage and romantic relationships (e.g. breaking up), work (e.g. losing a job) and personal trauma (e.g. being diagnosed with a life-threatening illness). Such experiences severely interrupt our everyday life and impact on our well-established 'routine' ways of satisfying our needs and desires.

People with major depression also think differently to people who do not have depression. In particular, they habitually think in negative ways. These negative thoughts tend to automatically 'pop up' in response to a specific event and can influence both mood and behaviour. For example, straight after finishing an exam, an individual with major depression might think 'I bet I've failed that', 'I'm no good at exams' or 'I really am stupid'. These negative automatic thoughts will lower the individual's mood, which, in turn, increases the probability of more thoughts of this type, thereby producing a vicious cycle that tends to maintain their depression. The behaviour resulting from these negative automatic thoughts might include going home rather than going out to celebrate with school friends after the exam. By contrast, other students who do not have major depression may have thought they did well (a positive automatic thought) and others might not have been thinking about the possible outcome and are just happy to have the exam over with (neutral automatic thought), both of which would not lower their respective moods.

Research studies have found a direct relationship between the amount and severity of someone's habitual negative thoughts and the severity of their depressive symptoms. This means that the more negative thoughts a person has, and the more the person believes them, the more depressed they will become.

Figure 6.32 Some people can simply 'shrug off' daily hassles as they arise. For others, however, their effects can accumulate and contribute to the development or onset of major depression.

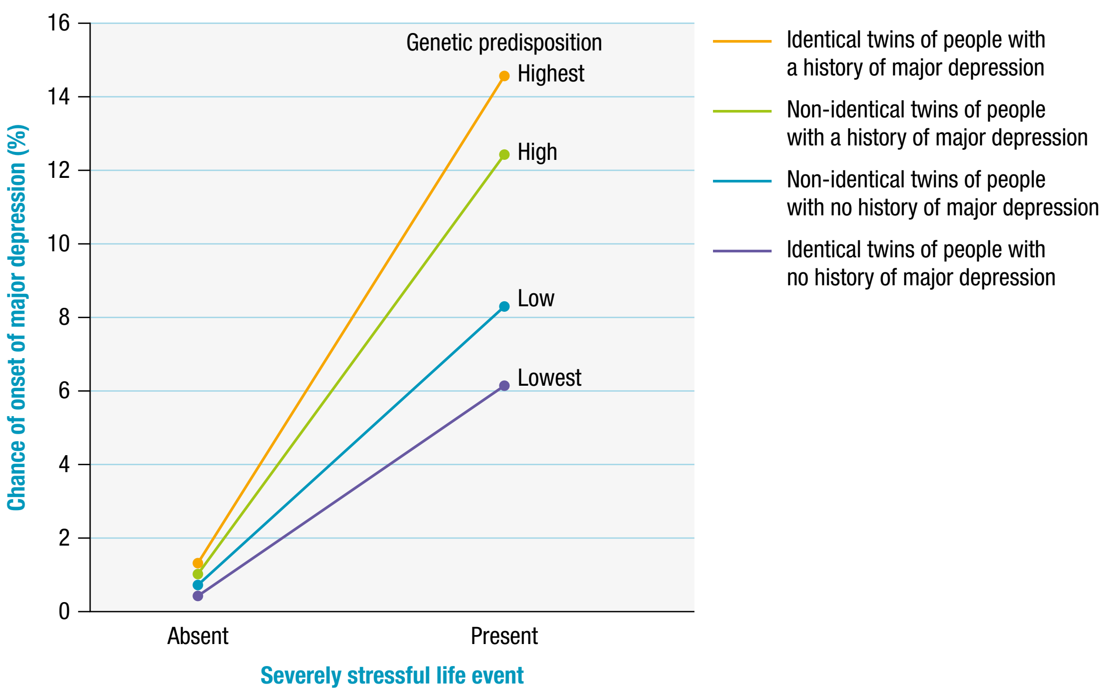

Figure 6.33 Results of twin studies on the roles of genetic factors and stressful life events in the development of major depression

Source: Kendler et al., (1995). Stressful life events, genetic liability, and the onset of an episode of major depression in women. *American Journal of Psychiatry, 152*, p. 837.

LEARNING ACTIVITY 6.15

Analysis of twin study data on major depression

Consider the data in Figure 6.33 on the previous page and answer the following questions.

1. Write a suitable title for the graph.
2. Briefly describe the sample used and its composition.
3. How were major depression and stress operationalised?
4. On the basis of the results shown, write a conclusion on the role of both the following factors in major depression, ensuring that you refer to relevant data:
   - genes (nature)
   - stressful life events (nurture).

Social — poverty and social stress

Poverty describes the situation for people who lack the basic necessities of life to the extent that they are unable to meet minimum standards of wellbeing. For example, they do not have adequate resources to guarantee or maintain access to basic necessities such as food, water, shelter and clothing, acceptable levels of health and education, and freedom from excessive vulnerability to situations that create stress or intensify the stress already being experienced.

Research evidence shows that poverty is strongly associated with major depression. People in poverty are more likely to be depressed than those who are not in poverty. However, some psychologists continue to debate whether being in poverty can result in the development of depression or whether having depression can result in poverty due to an inability to fully participate in society.

Research evidence also shows a relationship between social stress and major depression. *Social stress* is produced by our relationships with others and from our wider social environment. For example, the stress may occur through

- problems with friends, family, work colleagues or a partner
- not 'getting on' with someone during groupwork at school because they aren't contributing
- being harassed or bullied by someone.

Difficulties in interpersonal relationships, particularly those that are ongoing problems, can lead to a sense of helplessness or hopelessness about one's ability to negotiate and resolve difficult interpersonal situations. This seems to be particularly the case for women, as interpersonal relationships tend to be both more central to and more valued by women than men (Kendler, Myers & Prescott, 2005).

The absence of social contact, interactions and relationships with others may also result in major depression. Research evidence shows a relationship between social isolation and depression. This has been obtained through studies with both animals and humans. For example, Australian psychologist Graeme Hawthorne (2008) conducted research on the prevalence of perceived social isolation among a sample of 3015 adult Australians. A key finding of his study was that people who reported feeling socially isolated were highly likely to be experiencing depression. In addition, people who were living alone were twice as likely to have major depression when compared to people living with others.

Figure 6.34 Poverty is an enforced lack of basic necessities of life. In Australian society, poverty is usually measured in terms of economic resources, particularly level of income, because income can determine access to the basic necessities, such as a daily, nutritious meal.

BOX 6.6 A cross-cultural comparison of public beliefs about causes and risk factors for major depression

Mental health professionals and researchers view major depression as having complex causes involving an interplay of biological, psychological and social factors. However, the public's beliefs about causes are generally less sophisticated. Studies from Australia, Ireland, Germany, Switzerland, the UK and the USA have all found that social factors were most often seen as the causes of major depression, whereas genetic factors were much less frequently identified. Social factors covered in these studies included stressful life events, traumatic experiences, family problems and social disadvantage.

In one cross-cultural study, people in Australia and Japan were surveyed on the possible causes and risk factors in relation to two scenarios. One scenario described a person with major depression and the other scenario described a person with major depression *and* suicidal thoughts. In Japan, the survey involved 2000 adults aged between 20 and 69 from 25 regional areas. In Australia, the survey involved a national sample of 3998 adults aged 18 years or over.

Table 6.9 Percentage of Japanese and Australian populations to endorse proposed explanations as 'likely' or 'very likely'

Cause	Major depression	Major depression with suicidal thoughts
Virus or infection		
• Japan	6.2	6.6
• Australia	50.5	41.4
Allergy		
• Japan	10.2	11.4
• Australia	44.9	37.6
Day-to-day problem		
• Japan	93.6	91.8
• Australia	96.8	95.7
Death of someone close		
• Japan	79.8	81.4
• Australia	96.3	94.8
Traumatic events		
• Japan	82.6	79.6
• Australia	93.9	92.7
Problems from childhood		
• Japan	81.0	82.0
• Australia	91.3	95.0
Inherited or genetic		
• Japan	34.6	34.0
• Australia	68.0	68.4
Nervous person		
• Japan	81.4	77.4
• Australia	67.9	65.6
Weakness of character		
• Japan	73.6	69.2
• Australia	43.0	46.1

Source: Nakane, Y. et al., (2005). Public beliefs about causes and risk factors for mental disorders: a comparison of Japan and Australia. *BMC Psychiatry, 5*(33), 2–5.

LEARNING ACTIVITY 6.16

Analysis of data from a cross-cultural study on beliefs about major depression

Consider the data in Table 6.9 above and answer the following questions.

1. Which of the two depression scenarios is likely to be perceived by participants as the most severe case?
2. To what extent do differing perceptions appear to have influenced participant responses? Explain with reference to the data.
3. What cultural differences were there, if any, in relation to question 2? Explain with reference to the data.
4. Classify the causal factors into psychological, biological and social domains.
5. What cultural differences in beliefs about contributory factors do the data suggest? Explain with reference to the data.
6. Which of the causal factor(s) do you believe are inaccurate? Explain your answer(s).
7. On the basis of the data, write a conclusion about similarities and differences of Japanese and Australian opinions about causes of major depression (with or without suicidal thoughts).
8. (a) How might the beliefs individuals hold about the cause(s) of a mental disorder influence the type of assistance they seek to cope with it? Explain your answer.
(b) Assuming perceived cause influences choice of treatment, what type of treatment might Japanese people prefer? Australians? Explain with reference to the data.

Treatment

There is a range of effective treatments to help people with major depression and other mood disorders. There are also many things that people with a mood disorder can do for themselves to help recovery and stay well. The important thing is finding the right treatment and the right mental health professional for the individual's needs. The type of treatment will depend on the mood disorder being experienced and its severity. In most cases, psychological and/or medical treatments are likely to be required (beyondblue, 2016d; RANZCP, 2017d).

People diagnosed with depression habitually think in negative ways and many of their thoughts are often distorted and unjustifiable. These cognitive distortions and biases maintain their depression, so a commonly used psychological treatment involves assisting them to identify and change thoughts and behaviours responsible for maintaining their symptoms. This can be achieved through psychotherapy such as CBT.

Antidepressant medications may also be prescribed to relieve some of the symptoms. Many of these medications target seratonin (to block re-uptake) and are commonly prescribed alongside the use of psychotherapy. They are also prescribed when other treatment strategies have not been helpful or psychotherapy is not possible due to the severity of the disorder or the lack of access to therapy.

Antidepressants can relieve symptoms and make people feel better, but taking them does not change a person's personality or make them feel endlessly or artificially happy. As with any other medication, some people who take antidepressants also experience side effects. Many of these side effects are short-term and well tolerated (Cowen & Browning, 2015).

Common side effects can include nausea, headaches, anxiety, sweating, dizziness, agitation, weight gain, difficulties sleeping and loss of appetite. The actual side effects that are experienced vary according to such factors as the specific type of antidepressant, the dosage, the individual's condition and their age. Antidepressants are considered to not be addictive but suddenly stopping their use can result in the experience of withdrawal symptoms, such as anxiety, headaches and a 'flu-like' feeling (beyondblue, 2016d).

In addition to psychotherapy and antidepressants to assist management of depression, strategies such as diet, relaxation training, exercise and alternative medicines may be used (RANZCP, 2017b). Support may also be provided through an individual's family or wider social network, as well as through support groups that may be accessed in the local and wider community (including the internet).

Family members and friends play an important role in a person's recovery. They can offer support, understanding and help. People with depression often don't feel like socialising, but spending time alone can make a person feel cut off from the world, which makes it harder to recover. That's why it's important for them to take part in activities with family members and close friends, and to accept social invitations, even though it's the last thing they may want to do. Staying connected with people helps increase levels of wellbeing, confidence and the chance to participate in physical activities.

There are also support groups for people with depression that are conducted by people who have experienced similar problems. These groups can provide an opportunity to connect with others, share experiences and find new ways to deal with difficulties. In addition, there are online forums for sharing personal stories and other information, or to seek and access support (beyondblue, 2016d).

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Animation on how antidepressants work

Figure 6.35 Many types of antidepressant medications can be used in the treatment of depression. The most commonly used block the re-uptake of serotonin shown in Figure 6.31. Although there is evidence contrary to the widely held theories about serotonin, the serotonin medications alleviate symptoms in many cases.

Table 6.10 Classes of antidepressants

Serotonin and noradrenaline	Serotonin only	Noradrenaline only
Serotonin and noradrenaline re-uptake inhibitors (SNRIs) • venlafaxine (e.g. Efexor, Efexor-XR)	Selective serotonin re-uptake inhibitors (SSRIs) • sertraline (e.g. Zoloft) • citalopram (e.g. Cipramil, Ciazil, Talohexal) • paroxetine (e.g. Aropax, Paxtine) • fluoxetine (e.g. Prozac, Erocap, Lovan, Zactin, Auscap) • fluvoxamine (e.g. Luvox, Faverin)	Tricyclic antidepressants (TCAs) • nortriptyline (e.g. Allegron) • clomipramine (e.g. Anatranil) • dothiepin (e.g. Prothiaden, Dothep) • imipramine (e.g. Tofranil) • amitriptyline (e.g. Tryptanol, Endep)
Reversible inhibitors of monoamine oxidase A (RIMAs) • moclobemide		
Monoamine oxidase inhibitors (MAO-Is) • tranylcipramine • phenlzine (special diet required — rarely prescribed in Australia)		Noradrenaline re-uptake inhibitors (NARIs) • reboxetine (e.g. Edronax)
Noradrenaline — serotonin specific antidepressants (NaSSAs) • mirtazapine (e.g. Avanza, Remeron)		

BOX 6.7 Electroconvulsive therapy (ECT)

Hundreds of thousands of prescriptions are written for antidepressant medications in Australia every year. By contrast, a small number of individuals with severe depression receive electroconvulsive therapy as a medical treatment. *Electroconvulsive therapy* (*ECT*), also called shock therapy, involves administering one or more brief bursts of a moderate electric current to induce a seizure in the brain. It is not a surgical experience.

First used with people in 1938, ECT is a relatively simple and quick medical procedure. As shown in Figure 6.36, the patient lies on a padded bed and electrodes are placed on one or both of their temples, depending on whether the left, right or both hemispheres are to be shocked. The patient is then given a short-term anaesthetic and injected with a muscle relaxant to minimise the chance of self-injury during a seizure. A soft object is placed between the teeth to prevent swallowing of the tongue.

When unconscious, a burst of electricity, for 0.1–0.5 seconds, is administered to induce a seizure. The seizure lasts for about 30 to 40 seconds. On regaining consciousness, the patient often reports a headache and is usually confused and disoriented for up to a few hours. In most cases, the patient experiences a permanent memory loss for events immediately before and after the ECT. Some patients, however, experience substantial memory loss that can be permanent.

The use of ECT for severe depression is rarely a once-only treatment. A patient is often required to undergo a series of 8–12 ECT treatments over a period of several weeks.

About 80% of patients with severe depression usually show at least a temporary improvement after about four ECT treatments. After a few more treatments, improvement is longer lasting. Overall, however, there tends to be a high relapse rate, regardless of the number of treatments. About half the patients treated for severe depression experience a relapse within six months, unless they are also treated with antidepressants.

Figure 6.36 During ECT, electrodes on the forehead apply an electric current to the brain, creating a brief seizure in the cerebral cortex. Although ECT is controversial, for some severely depressed people it can be effective in alleviating their symptoms.

(continued)

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The major advantage of ECT is that it relieves the symptoms of depression relatively quickly, typically within days, whereas antidepressant medication can take weeks to provide relief. Because of its rapid therapeutic effects, ECT can be a lifesaving procedure for a severely depressed individual who is suicidal. In this case, waiting several weeks for relief can actually be deadly. ECT may also be an effective 'last resort' treatment for individuals who would otherwise continue to be debilitated by the symptoms of depression; for example, for people who are not helped by antidepressant medications or psychotherapy or cannot tolerate the side effects of antidepressants.

Although ECT can be effective in treating depression, how this occurs remains unknown. ECT's biggest drawback is that its antidepressive effects can be short-lived. About half the patients experience a relapse within six months. Today, patients are often prescribed long-term antidepressant medication following ECT, which reduces the relapse rate. In cases of severe, recurrent depression, ECT may also be periodically readministered to prevent the return of depressive symptoms (RANZCP, 2017b).

In the last decade there has been research on other brain stimulation techniques for treating severe cases of depression; for example, using deep brain stimulation (DBS) and transcranial magnetic stimulation (TMS) technologies.

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- Video on ECT for treating depression 9 m 52 s
- *Today Tonight* story on DBS for treating depression 4 m 29 s
- ABC *Lateline* story on TMS for treating depression 6 m 43 s

LEARNING ACTIVITY 6.17

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Review questions

1. Complete the following table to summarise factors contributing to a mood disorder, such as major depression.

Contributing factor	Description	How it influences
Biological Genes Brain chemistry		
Psychological Stress response Dysfunctional thinking		
Social Poverty Social stress		

2. (a) Why do researchers use twin studies to investigate the possible role of genes in depression?
(b) How do the results of twin studies also provide evidence for environmental factors influencing the development of depression?
(c) Does the existence of a genetic component mean that a person will develop depression if a biological parent or relative has or has had the disorder? Explain your answer.

3. (a) Give two examples of social or cultural groups in Australian society you believe may be vulnerable to social isolation and therefore depression. Give a reason for each answer.
(b) Describe the circumstances under which someone with lots of pets would be considered socially isolated.
(c) Are socially isolated people more or less likely to experience social stressors? Explain your answer.

4. (a) Suggest a suitable aim of cognitive behavioural therapy (CBT) in the treatment of an individual with major depression.
(b) What key assumption would underlie this aim?

5. Find an example of a reputable provider of online support services for depression or another mood disorder.
(a) Name the organisation.
(b) What is the URL (website address)?
(c) Can support be accessed from the service 'offline'? If so, explain how.
(d) Give three examples of services offered at the site and how these are accessed.

PERSONALITY DISORDERS

Of all the factors that make us different from one another, personality is, for many people, the most intriguing. We frequently comment on the personality of others with statements such as, 'She has a great personality', or 'All my friends think Sam is great, but they don't know what he's really like'. Or we describe someone as being 'selfish', 'friendly' or 'shy'. You may have even heard someone talk about another person as having 'no personality'! But everyone has a personality and it cannot be defined or described simply in one or two words.

Personality is a complex combination of characteristics. Psychologists have defined it in many ways over time. Most current definitions refer to **personality** as an individual's unique pattern of thoughts, feelings and behaviour that are relatively stable over time and across situations.

This means that the combination of personal characteristics that make up your personality is the only combination of its kind and that your personality is your typical way of thinking, feeling and behaving in a wide variety of situations. Furthermore, the definition incorporates your individual attitudes, values, morals, motivations, wishes, loves, fears and so on which make up 'you' — not only right now, but when you were younger and when you are older. This doesn't mean that your personality is 'fixed' and unchanging. Instead, it is 'relatively stable' and tends to be the same over time and in different situations.

Some people have personality characteristics that are so inappropriate that they cause problems in many areas of their lives. In addition, these characteristics may cause distress to themselves and others. This is what usually happens with personality disorders.

Personality disorders are a group of mental disorders involving inflexible and maladaptive personality characteristics that interfere with functioning or cause significant personal distress. People with a personality disorder think, feel and/or behave in ways that differ markedly from what is acceptable in their culture. This has occurred for a very long time, usually for years. In addition to personal and social difficulties, they also tend to form inaccurate perceptions of themselves and others and to unrealistically interpret many social situations. In some cases, the individual with a personality disorder may not see it as a disorder at all, but just 'who they are'.

Most personality disorders have their origins in childhood or adolescence and persist into adulthood. Despite their specific problems, people with a personality disorder often function well enough to get by without professional assistance. But this does not mean that they actually have good mental health.

Types of personality disorders

There are three sub-categories of personality disorders in the DSM-5 — disorders characterised by dramatic or erratic behaviour and disregard for others (e.g. *antisocial* and *narcissistic* disorders), disorders characterised by anxious and fearful behaviours (e.g. *obsessive-compulsive* and *dependent* disorders), and disorders characterised by odd behaviours (e.g. *schizoid* and *paranoid* disorders).

All of these disorders involve a 'pervasive' pattern of characteristics. This means the thoughts, feelings and behaviours associated with each disorder are evident in almost all aspects of a person's life. Examples of personality disorders from each sub-category are:

- *Antisocial personality disorder:* Disregard for and violation of the rights of others. Shows disrespect for the law and no concern about disobeying laws (e.g. repeatedly does things for which they can be arrested). Is consistently irresponsible (e.g. often skips work and debts) and likely to show a lack of empathy or guilt for wrongdoing. Will often blame their victims (e.g. 'they deserved it for being stupid', 'he had it coming anyway'). Likely to act impulsively and is willing to be very aggressive with others. May be deceitful and manipulative (e.g. repeated lying, use of aliases, conning others) and show a reckless disregard for themself and others (e.g. no concern about drinking excessively and speeding). Many have shallow emotions and their relationships with others are superficial and involve little commitment or loyalty (e.g. comfortable using and abusing others). Some people with antisocial personality disorder are referred to outside psychology as a *sociopath* or *psychopath*, especially when they commit callous crimes.

Figure 6.37 A significant number of hardened criminals who are repeat offenders have antisocial personality disorder.

- *Narcissistic personality disorder:* Characterised by an exaggerated sense of self-importance, an overwhelming need for admiration by others but with a lack of empathy for others. Require a lot of attention, are extremely sensitive to criticism and may get angry at or reject anyone who criticises or doesn't admire them. Many believe they are 'special' and also have a sense of entitlement (e.g. expecting others to do special favours for them and to automatically accept whatever they say or do). Many are preoccupied with fantasies about power or success and constantly overestimate their personal qualities and achievements regardless of their actual performance. In conversations, they will almost always talk about themselves and show a lack of interest in whoever they are with. Their interpersonal relationships are disturbed by their self-interest, lack of empathy, 'high maintenance', arrogant behaviour or attitudes, and their habit of manipulating or taking advantage of others.
- *Borderline personality disorder:* Characterised by ongoing impulsivity and intense fluctuations in mood, self-image and relationships with others. Usually experience extreme difficulties in their relationships. May be quite friendly one day and hostile the next, erupting in anger at the slightest sign of disapproval. May constantly seek reassurance and likely to be prone to feelings of depression, emptiness and fear of abandonment. Impulsivity can result in self-damaging behaviour such us binge drinking, spending sprees, reckless driving or sexual promiscuity. A significant number with the disorder have a history of broken friendships, divorce and lost jobs. It is among the most commonly diagnosed personality disorders.
- *Histrionic personality disorder:* Continual attention-seeking behaviour and exaggerated expression of emotions. People from different cultures vary in the extent to which they show their emotions, but someone with this disorder goes well beyond cultural standards.
- *Dependent personality disorder:* Excessive psychological need to be cared for by other people. Very reliant on others and unwilling to take responsibility for themselves.
- *Obsessive-compulsive personality disorder:* Preoccupation with orderliness, perfectionism and control. Not the same as and quite different from *obsessive-compulsive disorder* in which there are specific recurring thoughts or behaviours (see page 295).
- *Paranoid personality disorder:* Distrust and suspiciousness of others, resulting in their motives being interpreted as wanting to harm, deceive or exploit, even when there is no evidence to support this.

Figure 6.38 Some media outlets have reported that psychologists have diagnosed US President Donald Trump as having narcissistic personality disorder. However, a psychologist would be reluctant to make a diagnosis without a consultation.

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Weblinks
- Trump has narcissistic personality disorder
- Trump does not have narcissistic personality disorder

Contributing factors

The signs of a personality disorder usually appear during adolescence. In some cases, someone with a personality disorder may have had a similar disorder in childhood or some of the symptoms may have shown up at that time. However, according to the DSM-5, a person cannot be diagnosed with antisocial personality disorder before age 18.

There are many different types of personality disorders and none can be attributed to a single cause. Nor has any specific factor been identified as having the most significant influence.

A considerable amount of research has focused on antisocial personality disorder as people with this disorder are the most likely to cause harm and suffering to others. As with other mental disorders, many factors have been studied to understand how this type of disorder develops. From a biopsychosocial perspective, these factors include biological factors (such as genetic influence and nervous system functioning), psychological factors (such as fearlessness) and social factors (such as family environment).

In this section, we focus on antisocial personality disorder and consider biological, psychological and social factors that influence its development and treatment.

Biological — genetic influence and nervous system functioning

The results of twin and adoption studies suggest a possible genetic influence on antisocial personality disorder. For example, identical twins tend to be more likely to both have antisocial tendencies and engage in illegal behaviour when compared with fraternal twins. Specific personal characteristics associated with the disorder tend to show an even stronger relationship. For example, aggressive forms of antisocial behaviour are higher among identical twins than fraternal twins when compared to antisocial behaviour that involves only rule breaking.

Adoption studies show that adopted children whose biological parents engaged in antisocial behaviours have a higher rate of antisocial characteristics than that found among adopted children whose biological parents did not engage in such behaviour. Despite such findings, it can still be difficult to disentangle the influence of environmental factors such as the impact of family upbringing and role modelling by a parent who may have the disorder (APA, 2013; Huffman, 2012).

It has also been proposed that people with antisocial personality disorder may have lower levels of 'autonomic nervous system reactivity' and are therefore constantly under-aroused and less likely to experience anxiety. For example, it is believed that their low reactivity requires them to need more stimulation to reach their ideal level of arousal when compared to people without the disorder. Furthermore, their lower level of arousal may lead them to thrill-seeking or sensation-seeking behaviour, such as irresponsible or illegal activities, in order to trigger a reaction and reach or maintain their ideal level of arousal. Their impulsivity will prevent them from weighing up the potential consequences before they engage in such behaviours (Hyde, et al., 2014).

Psychological — fearlessness and social learning

Some people with antisocial personality disorder continue to break the law despite their experiences with jail sentences. They have difficulty controlling their impulses and do not seem to experience the guilt or other feelings that stop most others from committing offences, lying or harming others. This has led psychologists to propose that people with antisocial personality disorder may not learn to avoid certain behaviours because they are unresponsive to punishment for their antisocial behaviour. As a consequence, they develop *fearlessness* or at least have a higher fear threshold. Things most people find frightening have little effect, if any, on people with antisocial personality disorder (Lykken, 1982).

Researchers who have tested the fearlessness hypothesis have found that people with antisocial personality disorder are slow at anticipating punishment, slow at learning how to stop responding when punishment becomes inevitable, and are more likely to be unresponsive to fear and threats when they are chasing monetary rewards. In addition, men with severe antisocial personality disorder tend to have a limited range or depth of feelings (called 'emotional poverty'). For example, one study found that men with a severe antisocial personality disorder scored very poorly in recognising fear in other people when asked to name the emotions shown on faces in photos. However, they recognised other emotions quite well (Getzfield, 2006; Kring & Johnson, 2012).

Social — family environment

Antisocial behaviour violates social norms — acceptable standards of behaviour. Since the family is a very influential source of learning social norms, researchers have investigated the possible contribution of the family environment to the development of antisocial learning processes and antisocial personality disorder. In addition, cases of antisocial personality disorder have origins in childhood or early adolescence and continue into adulthood (APA, 2013).

Generally, studies that target family environments have found that people with antisocial personality disorder often come from homes characterised by inadequate supervision, neglect, harsh and inconsistent disciplinary practices, emotional deprivation, and antisocial tendencies or behaviour by one or both parents. Antisocial personality disorder is also more likely to develop when an individual is raised in a family environment where parents consistently use verbal, physical or emotional abuse and where there is inappropriate role modelling by parents, particularly the father. Growing up in a single parent home is in itself not related to antisocial personality disorder (APA, 2013; Cohen, Brown & Smailes, 2001; Huffman, 2012; Miller & Lisak,1999).

Social learning processes also contribute to the development of antisocial personality disorder. For example, research evidence shows that children can learn then copy the attitudes and behaviours of a parent who has antisocial tendencies. One study compared a group of 90 adults who had a record of antisocial behaviour with a group of 100 adults who lived and grew up in the same area but had no record of antisocial behaviour. The researchers found that among these participants, having a father (but not a mother) who was antisocial was related to antisocial behaviour as an adult. It was concluded that the presence of an antisocial father may serve as a role model for such behaviour (Black, 2015; Sue, Sue & Sue, 2006).

Figure 6.39 Antisocial personality disorder involves a pervasive pattern of disregard for, and violation of, the rights of others that tends to begin in childhood or early adolescence and continues into adulthood.

Treatment

The most effective treatment for a personality disorder usually involves a combination of psychotherapy, social support and possibly medication. As with other mental disorders, treatment will depend on the type of disorder, its symptoms, their severity and how they interfere with functioning in various areas of life. For example, treatment for 'paranoid personality disorder' may require use of antipsychotic medications, whereas treatment for 'dependent personality disorder' may not.

Research studies have found that many people with a personality disorder have another, co-morbid ('co-occurring') mental disorder (as well as their personality disorder). For example, in one study, 113 participants with antisocial personality disorder who were in jail for a criminal offence were nearly all found to have a substance-related addictive disorder (Black, 2015; Black, et al., 2010).

Similarly, mental health professionals find that many people with a personality disorder initially consult them on a condition other than their personality disorder. For example, a person with antisocial personality disorder may seek treatment for a gambling addiction, or someone with borderline personality disorder might seek treatment for a mood disorder. Therefore, effective treatment for a personality disorder can involve treatment of a co-morbid mental disorder.

Treatment of a personality disorder is also challenging because of the very nature of the disorder. In most cases, this type of disorder has been present for many years before the person seeks treatment and its symptoms are often so ingrained that it is difficult to bring about change thoroughly or quickly. It tends to begin early in life, usually by age 8 years, but is diagnosed as *conduct disorder* in childhood, converting to antisocial personality disorder at age 18 if antisocial behaviours have persisted (Black, 2015).

Often with personality disorders, there is a need for a longer term treatment plan. However, this also means that the dropout rate from treatment programs tends to be higher than for other disorders. In particular, people with antisocial personality disorder are unlikely to see their behaviours as problematic and therefore tend to be poorly motivated to change themselves. Nonetheless, treatment can and does help people manage, reduce or even eliminate symptoms of their personality disorder.

Treatment for most personality disorders usually has psychotherapy at its core. *Psychodynamic therapy* can help the person understand that their thoughts, feelings and behaviour are related to negative early childhood experiences. The therapy explores these experiences, how they influence functioning and how they can be overcome through changes in thinking and behaviour. *Cognitive behavioural therapy* can help the person recognise and change their irrational thoughts about themselves, other people and the world around them. Similarly, the 'behavioural' component of the therapy will target behaviour change.

There is no medication specifically designed for the treatment of any personality disorder. However, medication may be prescribed to treat a co-morbid disorder and associated problems that may be disrupting everyday functioning, such as depression, anxiety or psychotic symptoms. Medications can, for example, help reduce symptoms such as irritability, mood swings and impulsive behaviour.

Social support also has an important role in the treatment of personality disorders. Often, the very nature of an individual's disorder has caused them to alienate friends, relatives and work colleagues. In many cases, family and friends of people with a personality disorder feel confused and angry. Consequently, people with a personality disorder have very limited social networks. This makes access to support groups in the community even more important.

Support groups run by and for people who interact on the basis of having the same type of personality disorder provide an opportunity to support each other; for example, by devising strategies for problems they share and coping strategies for specific challenges in everyday life. Support programs may include help with finding suitable work, accommodation, training and education so that they can lead full and productive lives.

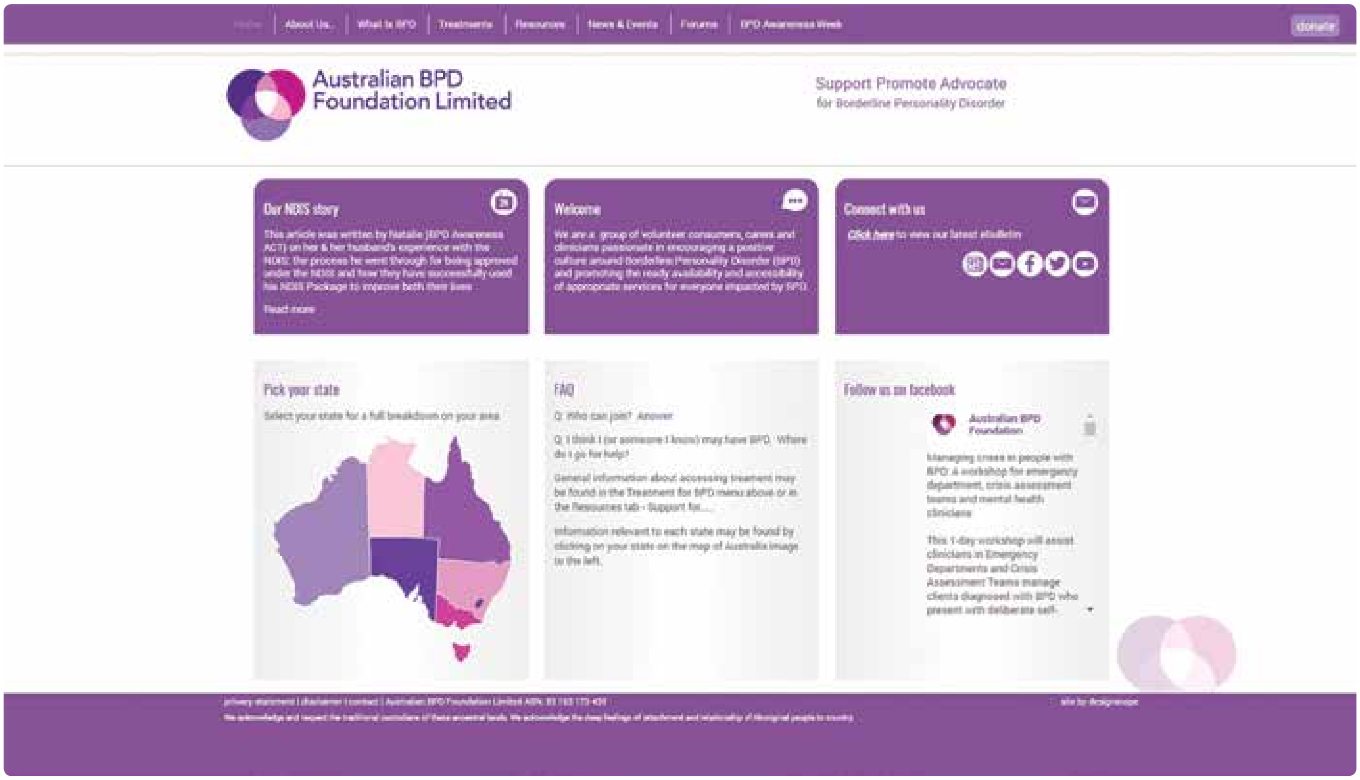

Figure 6.40 The Australian BPD Foundation is a support and advocacy group for borderline personality disorder.

LEARNING ACTIVITY 6.18

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Review questions

1. Explain the meaning of personality disorder with reference to two examples of different disorders.
2. List three characteristics that all personality disorders have in common.
3. Suggest a reason to explain why the DSM-5 proposes that a personality disorder such as antisocial personality disorder cannot be diagnosed in someone before they are aged 18.
4. (a) Explain why convenience sampling is more likely to be used in studies of antipersonality disorder.
   (b) What is a limitation of studies that rely on a convenience sample?
5. (a) Give two reasons to explain why treatment of personality disorders can be 'challenging'.
   (b) What is a key difference between psychodynamic therapy and cognitive behaviour therapy?
   (c) How might medication be used to treat a personality disorder?
   (d) Explain the role of social support in the treatment of a personality disorder.
6. Complete the following table in relation to antisocial personality disorder.

Contributing factor	Description	How it influences
Biological Genes Nervous system functioning		
Psychological Fearlessness Social learning		
Social Family environment		

PSYCHOTIC DISORDERS

The term **psychotic disorder** is used to describe a group of disorders characterised by psychosis. **Psychosis** is a condition in which an individual experiences loss of contact with reality. Typically, the individual's thinking will be disorganised and they will have difficulty in distinguishing between what is real and self-generated perceptions. This means that the person has difficulty making sense of their thoughts, feelings or what is actually happening around them. The best known psychotic disorder is schizophrenia. All the other psychotic disorders in the DSM-5 have one or more symptoms like those of schizophrenia.

The term **psychotic** is used in relation to someone who is experiencing many symptoms of a psychotic disorder. If someone is described by a mental health professional as experiencing psychosis or having a psychotic disorder it means they are experiencing psychotic symptoms, but not that they are 'violent', 'dangerous', 'psychopaths' or 'serial killers', as some people believe. People with a psychotic disorder are not inherently violent or dangerous. When in a treatment or management program, they act like other people in the general population.

In most cases, psychotic disorders may develop gradually over an extended period. Some people experience an isolated episode of psychosis which lasts only a few days or weeks, others a few episodes of psychosis only, whereas others experience psychosis as part of an ongoing diagnosed disorder such as schizophrenia, bipolar disorder or a personality disorder.

Figure 6.41 A person diagnosed with a psychotic disorder experiences loss of contact with reality. Their thinking is disorganised and they have difficulty making sense of their thoughts, feelings or what is actually happening around them.

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TED talk on the experience of schizophrenia 14 m 13 s

Key symptoms

The DSM-5 defines psychotic disorders in terms of key symptoms. These symptoms are generally described as either positive or negative.

Positive symptoms are experiences and behaviours that have been added to the person's normal way of functioning. These include hallucinations, delusions and disorganised thinking, speech and behaviour. They are 'in addition to' to how the individual usually thinks, feels and behaves.

Negative symptoms take away something from a person's normal way of functioning. They include loss of interest or pleasure in normal activities, loss of motivation and a decrease in the intensity of emotional expression.

In order to be diagnosed as having a psychotic disorder, a person must experience at least one of the following five symptoms: delusions, hallucinations, disorganised thinking and speech, grossly disorganised or abnormal motor behaviour, negative symptoms. In addition, symptoms must have been experienced for variable amounts of time, depending on the specific disorder and they must also have a significant impact on the person's ability to study, work and undertake other daily activities.

Delusions

A **delusion** is a fixed false belief that is held with absolute certainty, even when there is strong factual evidence that does not support it. Delusions usually involve a misinterpretation of actual information or experience. The content of a delusion may be based on a variety of themes, such as the following.

- *Persecution*: a belief that one is going to be harmed, harassed, tormented, tricked, spied upon and so on. For example, a person might believe that scientists are trying to poison them with radioactive particles delivered through their tap water, or that a tracking device has been implanted in their brain, or that they are under constant surveillance because ASIO agents are trying to assassinate them. Persecution is the most common type of delusion.
- *Reference*: a belief that comments, actions, objects in the environment and so on are being directed at and have a special relevance ('reference') to oneself. For example, a person might believe that songs being played on the radio are about them or the newsreader on television is sending messages meant specifically for them.
- *Control*: a belief that thoughts, feelings or behaviour are being controlled by an external force. For example, a person might believe that aliens are controlling what they think and say.
- *Grandeur*: a belief that one has exceptional abilities, fame or importance. For example, a person might believe that they are Jesus Christ, that they have the power to cure cancer, that they dictated the Harry Potter stories to J.K. Rowling, or that they are going to be awarded an Order of Australia medal.

Figure 6.42 A delusion of reference might involve a belief that the person on TV is talking about or directly to the viewer.

Hallucinations

A **hallucination** is a perceptual experience during which the individual sees, hears, feels, tastes or smells something that is not actually present in reality. Although hallucinations can occur in any of the senses, the most common are auditory hallucinations, which involve 'hearing voices'.

Auditory hallucinations may be experienced as being 'heard' through the ears, in the brain or mind, from the body (e.g. the stomach), or anywhere in external space. Loudness may vary from a whisper through to shouting.

People experiencing auditory hallucinations usually appear preoccupied to someone else because they are paying attention to what the voices are saying. They may also be seen or heard talking to themselves because they are responding aloud to the voices inside their head. Having hallucinations can therefore make it difficult to focus attention on external activities or events, such as reading, watching television or having conversations with others (see Box 6.8 on page 345).

Disorganised speech (thinking)

Disorganised speech reflects disorganised thinking. What is said is often not organised in a particularly meaningful way. Speech can be disconnected, jumbled and can sometimes seem as if it is 'all over the place'. For example, the person may suddenly switch from one topic to another completely different topic (called *derailment*). In addition, answers to questions may be vaguely related or completely unrelated to what was asked (called *tangentiality*). In either case, the person is usually unaware of what they are doing and that others may be having difficulty following or understanding what is being said.

Grossly disorganised or abnormal motor behaviour

Behaviour often appears to be fragmented, inappropriate, unusual, unpredictable, purposeless and erratic. This severely affects the ability to perform the usual activities of daily living. For example, the individual may not be able to attend to their personal hygiene or prepare meals for themselves. They may also dress in an unusual manner. For example, they may wear many layers of clothing, such as several different dresses over each other, or wear a hat, coat and gloves on a very hot day.

A person with a psychotic disorder may also behave in socially inappropriate or unacceptable ways, such as talking loudly to themself on a train, or display unpredictable agitation, such as shouting and swearing for no apparent reason.

Catatonia is used to refer to the marked decrease in responsiveness to external events that is associated with psychotic and other mental disorders. Catatonic behaviour ranges from resistance to instructions (*catatonic negativism*) to maintaining a rigid, inappropriate or bizarre posture to a complete lack of verbal responses (*catatonic mutism*) or motor responses (*catatonic stupor*). It can also include purposeless and excessive motor activity for which there is no apparent cause (*catatonic excitement*). For example, the person may appear agitated and wave and flap their arms around whilst quickly pacing back and forth.

Negative symptoms

Negative symptoms are particularly common in schizophrenia, often emerge gradually and may include affective flattening, avolition, alogia and anhedonia.

- *Affective flattening* is a reduction in the intensity of emotional expression, including the body language associated with emotions such as facial expressions, eye contact, arm movement and speech tones. For example, the person seems to stare, has a blank look on their face, speaks in a flat ('monotonous') voice, doesn't maintain eye contact, and uses hardly any other expression when communicating.

Figure 6.43 Catatonic behaviour may involve maintaining a particular posture for a prolonged time.

- *Avolition* is a decrease in self-initiated, purposeful activities. It is similar to apathy, when a person experiences a lack of energy or enthusiasm for doing anything. It is apparent when the person has difficulty with or is unable to initiate or follow through on a course of action. For example, the person feels drained of energy and is no longer interested in going out and meeting friends or participating in activities about which they were once enthusiastic. Instead, they may sit or lie around at home for hours on end doing nothing.
- *Alogia* is sometimes called *poverty of speech* and involves a reduction in speech output, such as its content and fluency. The person may say very little and give very short, simple or empty replies to questions.
- *Anhedonia* is the decreased ability to experience pleasure from normally enjoyable activities. This may include recalling previously pleasurable experiences as not very enjoyable.

Types of psychotic disorders

The DSM-5 has a category called *Schizophrenia spectrum and other psychotic disorders*. All are characterised by the presence of one or more psychotic symptoms. However, the disorders vary in severity, depending on the type of symptoms, how many there are, how often they occur and how often they last. Psychotic symptoms can occur in an isolated episode or as part of an ongoing diagnosed disorder such as schizophrenia, bipolar disorder, depression or schizoaffective disorder.

- *Schizophrenia* — a mental disorder characterised by persistent symptoms of psychosis involving disturbances and disorganisation of thoughts, perceptions, feelings and behaviour. Many people with schizophrenia have an altered perception of reality, often a significant loss of contact with reality. They may see or hear things that don't exist, hold beliefs that are odd or not true, speak in strange or confusing ways, believe that others are trying to harm them, feel like they're being constantly watched and behave in disorganised ways. The collective influence of its symptoms severely impacts on the individual's ability to function in everyday life.

  To be diagnosed with schizophrenia, an individual must have experienced symptoms for a significant amount of time during a one-month period with some symptoms persisting for at least six months. At least one of these must be hallucinations, delusions or disorganised speech (thinking).
- *Delusional disorder* — troubled by one or more persistent delusions, such as persecution (e.g. being conspired against, cheated, spied on, poisoned, blocked from achieving goals), having made an important discovery, believing that a partner is unfaithful or that one is loved by another person, having a serious medical condition such as cancer
- *Brief psychotic disorder* — experience one or more psychotic symptoms for at least one day and less than one month, then the symptoms disappear
- *Schizoaffective disorder* — a mixture of symptoms of schizophrenia and mood disorders
- *Substance/medication-induced psychotic disorder* — persistent delusions and/or hallucinations due to the direct physiological effects of excessive substance use or withdrawal from use; for example, drug abuse (including alcohol and medications), petrol sniffing, glue sniffing. In some individuals, these symptoms are temporary and disappear once the effect of the substance wears off. For others, however, the symptoms do not go away. The psychotic symptoms may persist and the drug use triggers the onset of a recurrent lifelong more serious psychotic disorder such as schizophrenia.

Figure 6.44 Various legal and illegal substances can induce psychotic episodes or disorders.

LEARNING ACTIVITY 6.19

Review questions

1. Explain the meaning of psychotic disorder with reference to schizophrenia and an example of another psychotic disorder.
2. Distinguish between positive and negative symptoms of psychosis with reference to examples of each type of symptom.
3. (a) What is a delusion?
   (b) Name and describe two types of delusions that a person with a psychotic disorder may experience.
4. Explain what a hallucination is with reference to an example.
5. Explain the difference between a delusion and a hallucination.
6. Describe the relationship between disorganised speech and disorganised thinking.
7. Explain the meaning of disorganised behaviour.

Contributing factors

What can explain the disconnected thoughts, bewildering hallucinations, odd delusions, lack of emotional expression and unusual behaviours associated with psychotic disorder? Most research has been conducted on schizophrenia as it includes symptoms of all other psychotic disorders, it is the most prevalent of this type of disorder and tends to be the most disabling. In this section, we therefore focus on schizophrenia.

Schizophrenia is an extremely complex disorder. It may develop very gradually or present abruptly. There is a great deal of variability among individuals with schizophrenia in the onset, type and duration of symptoms, as well as the length of the recovery phase. It should therefore not be surprising that many factors play a contributory role in varying degrees. These include biological factors (such as genetic influence and changes in brain structure and function), psychological factors (such as psychological responses to stress and cognitive impairments) and social factors (such as family environment) (RANZCP, 2017d).

As proposed by the biopsychosocial model, schizophrenia (or any other psychotic disorder) cannot be explained by a single factor or event. We consider examples of different influences, then an explanation of schizophrenia called the 'two-hit hypothesis'. As suggested by the term, this proposes that schizophrenia can be explained by two particular kinds of events.

Biological — genetic influence and changes in brain structure and function

There is considerable research evidence that individuals can inherit a genetic predisposition to developing schizophrenia. Numerous studies of family histories of people with schizophrenia have found that the disorder tends to run in families, more so than other mental disorders.

As shown in Figure 6.45 on the next page, it is evident that the more closely individuals are biologically related to someone with schizophrenia, the greater the likelihood of developing the disorder. For example, identical twins have a risk of about 50%. This means that if one twin has schizophrenia, the other one will too in about 50 out of every 100 pairs of identical twins. In contrast, a non-twin brother or sister of a person with schizophrenia has about a 10% chance of also having schizophrenia (Gottesman, 1991; Joseph & Leo, 2006).

Although the risk for schizophrenia increases with genetic similarity, not even sharing 100% of genes means that the disorder will definitely develop. No single gene has been identified as being exclusively responsible for schizophrenia. A number of different genes are likely to contribute to its development. It seems that the genes we inherit can make us more vulnerable to the disorder, depending on other factors. Genes do their work in an environment so environmental factors will influence their expression and activity.

Other research shows that schizophrenia is associated with changes in brain structure and function, to the extent that it is now commonly described as a brain disorder. For example, some studies have found that the brains of some people with schizophrenia have a reduced level of activity in the prefrontal cortex and lower amounts of grey matter in both the frontal and temporal lobes — areas that are involved in speech, thinking, memory, emotions and behaviours which are disrupted in schizophrenia (Ingvar & Franzén, 1974; Kring & Johnson, 2012).

Some people with schizophrenia may also have enlarged ventricles in the cerebral cortex, so this has been linked to the disorder. These are the fluid filled space in the brain, and their enlargement results from the death

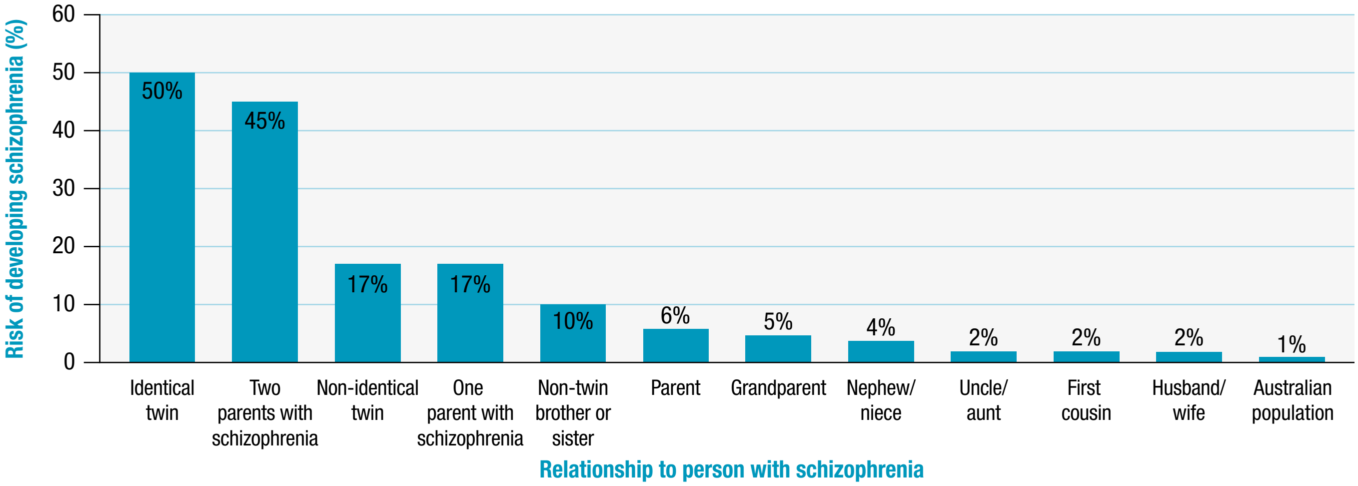

Figure 6.45 Although having a genetic predisposition increases the likelihood of developing schizophrenia, the risk depends on the degree of biological relationship. Genetic predisposition alone does not 'cause' schizophrenia.

Source: Adapted from Gottesman, I.I. (1991). *Schizophrenia genesis: The origins of madness.* New York: Freeman. p. 96.

of nearby neurons. It is believed that the ventricles get bigger to take up the space left by the dead neurons. This suggests that schizophrenia may be accompanied by neural degeneration. Still other researchers have found a smaller hippocampus or amygdala. But how these abnormalities impact on the disorder remains unclear (Kempton et al., 2010; Palha et al., 2012).

Studies have also linked symptoms of schizophrenia to higher or lower than normal levels or activity of various neurotransmitters in specific brain areas. For example, overactivity of dopamine in the prefrontal cortex and the basal ganglia (in the midbrain) has been linked to various positive and negative symptoms. Consequently, dopamine has been the target of some of the medications designed for the treatment of schizophrenia. But many patients treated with dopamine blocking or activating drugs do not improve so dopamine does not fully explain schizophrenia. Pinpointing the impact of specific neurotransmitters on schizophrenia is as problematic as isolating the effects of individual genes. It is likely various neurotransmitters are collectively involved in influencing the disorder (Lodge & Grace, 2011; Seeman, 2011).

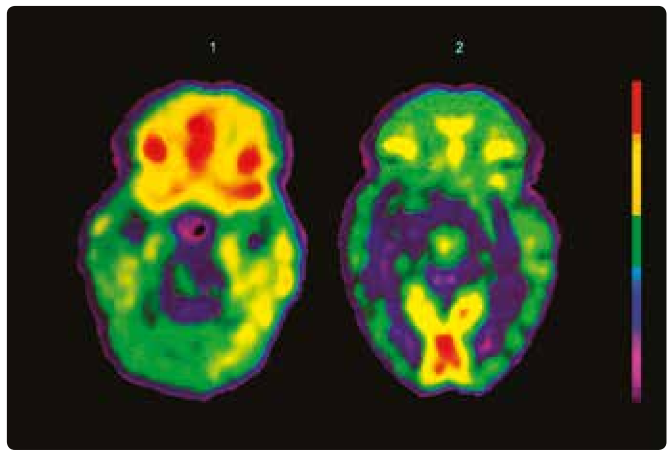

Figure 6.46 These PET scans show differences in brain activity of two individuals, one without schizophrenia (left) and one with the disorder (right). The colours show different levels of activity within each brain during an attention test. Red indicates high activity, through yellow, green and blue (very low activity). The brain of the person with schizophrenia (right) shows much lower activity in the frontal lobes (at the top).

LEARNING ACTIVITY 6.20

Analysis of data on schizophrenia and biological relationship

Refer to Figure 6.45 and answer the following questions.

1. Explain the meaning of the term genetic predisposition in relation to schizophrenia.
2. What is the risk of a person developing schizophrenia if one of their biological parents has or has had the disorder?
3. What is the risk of a person developing schizophrenia if both of their biological parents have or have had the disorder?
4. In what way do studies of people with varying genetic similarity provide evidence of a genetic basis for schizophrenia? Explain with reference to data in Figure 6.45.
5. Explain, with reference to Figure 6.45, why the term causation should not be used with the term genetic predisposition.

BOX 6.8 Brain activation during auditory hallucinations

Studies using neuroimaging techniques show that the primary auditory cortex is activated during auditory hallucinations.

Researchers at the Mental Health Research Institute of Victoria in Melbourne used PET scanning technology to analyse the brain activity of three groups of people. Group 1 had eight males with schizophrenia who were actively experiencing auditory hallucinations. Group 2 had seven males with schizophrenia who had never experienced auditory hallucinations. Group 3 had eight male control group participants who did not have schizophrenia.

During the PET scanning, the researchers instructed Group 1 to indicate the onset and duration of their auditory hallucinations by pressing a button with their right index finger. Groups 2 and 3 were randomly exposed to various auditory stimuli via headphones as well as periods of no sound. Sounds consisted of speech that simulated auditory hallucinations such as a group of people all talking at the same time or crowd noise in which many human voices could be heard talking about different topics but with no single voice dominating. Like Group 1, Groups 2 and 3 were instructed to indicate their perception of the auditory stimulus by pressing a button with their right index finger.

The results of the study revealed that all three groups of participants demonstrated significant and extensive activation of the primary auditory cortex in both hemispheres. For Group 1, the activation was in response to their auditory hallucinations and, for Groups 2 and 3, the activation was in response to the random bursts of human speech generated by the researchers. It was also found that the primary auditory cortex of Group 1 participants was activated in the absence of external auditory stimuli.

This study shows that the brain activity of people hearing 'imaginary' voices (as occurs when someone with schizophrenia has auditory hallucinations) is similar to the brain activity that occurs in any person's brain when they hear 'real' voices talking to them. Essentially, the brains of people with schizophrenia respond to their auditory hallucinations the same way as a regular brain responds to hearing someone speak. According to the researchers, when a person with schizophrenia reports that they are 'hearing voices', they are simply reporting what their brain is telling them (Copolov et al., 2003).

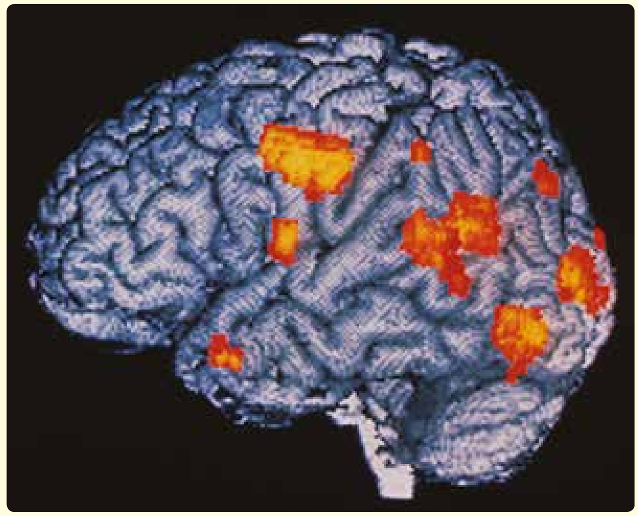

Figure 6.47 This image shows the left side of the brain of a young adult with schizophrenia during auditory and visual hallucinations. It shows increased activity (yellow-orange) in the visual cortex (at right) and the auditory cortex (upper centre), indicating that relevant sensory areas of the brain may be activated when hallucinations are experienced.

Psychological — stress and cognitive impairments

Schizophrenia is not a stress disorder and stress in itself does not cause schizophrenia. There is considerable research evidence, however, that stress can trigger its onset in people who are more vulnerable to developing the disorder, or worsen the symptoms for those who already have it.

Although people with schizophrenia do not appear to experience more stress in daily life than people without it, they tend to be more reactive and psychologically affected under stress. With such a blurred line between the real and the imaginary, and taking account of disturbances in thinking, schizophrenia can make it stressful — sometimes even frightening — to meet the challenges of daily life, especially when one does not cope as well with stress as do people without the disorder. Coping is particularly difficult when lacking social support, which is quite common among people with schizophrenia.

Cognitive impairments are a major part of schizophrenia. It is estimated that as many as 85% of people diagnosed with the disorder experience significant problems with thinking and other mental abilities. Studies have found that these problems may be present before the onset of obvious psychotic symptoms (Brewer et al., 2006). Problems with reasoning and memory underlie a number of cognitive impairments.

For example, people with schizophrenia tend to jump to conclusions — they make hasty judgments or decisions on the basis of inadequate or ambiguous information, typically resulting in unjustifiable or incorrect conclusions. Delusional beliefs are based on unjustifiable conclusions.

They tend to be reached very quickly on the basis of limited data-gathering and there is also a tendency to stick to the first explanation for an event that comes to mind (Broome et al., 2007; Garety, Hemsley & Wessely, 1991).

Studies also show that people with schizophrenia tend to perform poorly on a wide range of memory tasks, particularly short-term 'working' memory which involves the processing of information for just about everything we consciously do on a daily basis. People with schizophrenia tend to retain less information in this memory system and also process information more slowly. In addition, they also tend to have specific impairments in 'episodic' memory, which is involved in the long-term storage and recall of personal experiences. For example, they may not be able to remember what they did yesterday and where they left their house keys earlier in the day. People with an episodic memory impairment may also lose the ability to associate themselves with personally significant past events or plan for the future on the basis of past experiences. These difficulties underlie disorganised behaviour and thinking (Aleman, et al., 1999; Danion et al., 2007; Harvey & Sharma, 2002).

Figure 6.48 People with schizophrenia have cognitive impairments which affect daily functioning in ways that can be unique to the individual with the disorder.

Social–family environment

Most research on social factors has focused on how different family environments may contribute to the development or experience of schizophrenia. For example, researchers have investigated such factors as dysfunctional parenting, disturbed family communication styles, and parental styles that are constantly critical or induce guilt, as possible contributors to schizophrenia.

One of the best known studies on the potential effects of family environments was conducted by Finnish psychiatrist Pekka Tienari and his colleagues (2004). In this 40-year longitudinal study, the researchers tracked a sample of 145 adopted individuals whose biological mothers had schizophrenia (the 'high genetic risk' group). As part of their study, the researchers assessed the degree of psychological adjustment of the family in which each adopted individual was raised, including the mental health of the adoptive parents. The families were then classified as either 'psychologically healthy' or 'psychologically dysfunctional'.

Tienari and his colleagues found that adopted children with a biological mother who had schizophrenia had a much higher rate of schizophrenia than did the control group. However, this was true only when the children were raised in a psychologically dysfunctional family environment. As shown in Figure 6.49 opposite, when children with a genetic background of schizophrenia were raised in a psychologically healthy adoptive family environment, they were about as likely as the control group children to develop schizophrenia.

However, living in a psychologically healthy family environment did not make children with a genetic history of schizophrenia immune to the development of schizophrenia. Figure 6.49 also shows that 5.8% of the 'high genetic risk' children developed schizophrenia, even though their family environment was psychologically healthy.

The results of Tienari's study demonstrate the complex interaction of genetic and environmental factors in schizophrenia. Clearly, children who were genetically at risk to develop schizophrenia benefited from being raised in a psychologically healthy family environment. This means that a healthy psychological environment might counteract an individual's genetic predisposition and therefore vulnerability for schizophrenia. Conversely, a psychologically dysfunctional family environment can act as a catalyst for the onset of schizophrenia, especially for those individuals with a genetic predisposition for schizophrenia.

Other research on family environments has focused on a specific communication pattern called expressed emotion. *Expressed emotion (EE)* is a negative communication pattern that is observed among some relatives of individuals with schizophrenia.

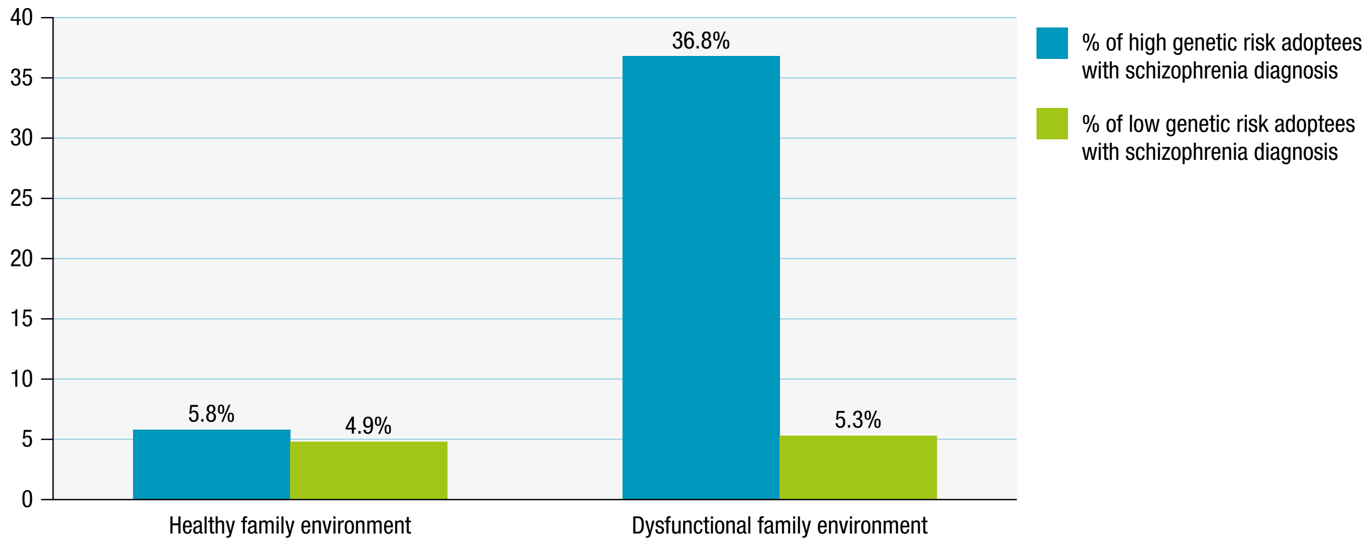

Figure 6.49 Results of the Finnish study conducted by Tienari and colleagues (2004) on the potential effects of family environments on schizophrenia

A *high-EE* family environment tends to be stressful as it involves a lot of negative criticism of the person with schizophrenia, and expressions of disapproval and hostility. For example, high-EE relatives tend to believe that psychotic symptoms are under the personal control of the family member with schizophrenia and make such statements as 'you are a lazy person' or 'you've caused the family a lot of trouble'. In contrast, the *low-EE* environment tends not to be stressful as it tends to be characterised by warmth, affection, positive comments and interactions.

Figure 6.50 People with schizophrenia living in a high-EE environment are significantly more likely to experience a relapse than those living in a low-EE environment.

Some psychologists argue that high-EE relatives promote the onset of schizophrenia because of their stress-producing behaviour. However, it is still unclear as to whether expressed emotion can actually trigger the onset of schizophrenia or whether the dysfunctional and bizarre behaviour of a family member with schizophrenia may in itself promote dysfunctional communication and interactions among family members (Kavanagh, 1992).

THE 'TWO-HIT' HYPOTHESIS AS AN EXPLANATION FOR THE DEVELOPMENT OF SCHIZOPHRENIA

Research evidence makes it clear that there is no single cause of schizophrenia. Although researchers target possible causes, there is widespread agreement that the development of schizophrenia (and other mental disorders) is best accounted for in terms of the biopsychosocial model. Possible risk factors are as varied as its symptoms and how they interact is at least as complex as the disorder.

Before the biopsychosocial model became prominent in the last decade or so, psychologists preferred to explain schizophrenia in terms of heredity and environment; that is, people with the disorder have a genetic predisposition that interacts with a variety of environmental factors to promote its development. There was little explanation of *how* heredity and environment interacted until the 'two-hit' hypothesis was proposed. It is a relatively simple model because it explains schizophrenia in terms of the smallest possible number of events required to trigger its onset — two.

The **'two-hit' hypothesis**, sometimes called the *'two-hit' theory* or *model*, proposes that two events — genetic vulnerability and environmental stress — cause the development of schizophrenia. Both events are necessary and must occur in that order.

The first event, or 'hit', involves having a genetically determined vulnerability, or 'weakness'. This may be, but is not limited to, having a biological relative with the disorder. For example, it may also be an infection that develops while in the uterus or disruption to fetal brain development resulting in a brain abnormality of some kind. This initial event is biological in nature and interferes with the normal course of development in some way. It also sets the stage for impact of the second event.

The second 'hit' is a major stressful life event that is environmental in nature; for example, ongoing exposure to a dysfunctional family environment, loss of a loved one through break-up or death, experiencing abuse, being the victim of bullying, being involved in a traumatic incident or any other stress-producing event. A stressful life experience increases the likelihood of the disorder when the first hit has occurred.

In sum, according to the 'two-hit' hypothesis, the origin of schizophrenia (or any other mental disorder) is a genetically determined vulnerability. This does not in itself cause the disorder but it sets the stage for developing the disorder. A second event involving a major life event or episode of stress which interacts with genetic vulnerability is necessary for development to occur. In addition, a stressful life event is unlikely to trigger the development of schizophrenia unless the individual has a genetic vulnerability for the disorder. But it is only when the first *and* second hits occur that the risk for schizophrenia increases. Nor does genetic vulnerability cease to exist if there is no second hit (Maynard et al., 2001; Mednick et al., 1998).

Treatment

Approximately 3% of the population will experience a psychotic disorder at some time in their life. In Australia, it is estimated that about five people in every thousand living in a large town or city are in contact with a mental health service each month because of psychotic symptoms.

Treatment can do much to help individuals manage their disorder and control symptoms. Studies show that the earlier a person is treated, the better their outcome is likely to be. Treatment generally includes a combination of psychotherapy, social support and medical treatment, depending on the type of disorder and its severity. All are usually essential for the best outcome in treating schizophrenia (SANE Australia, 2017b; Schizophrenia Fellowship, 2017).

Medication is currently the main treatment for schizophrenia. This can also be helpful for schizoaffective disorder. Called *anti-psychotics*, these help control symptoms by returning the chemical imbalance in their brain to a relatively normal level. For example, medications can relieve symptoms such as disorganised thinking, delusions and hallucinations. However, current medications don't offer a total solution, or 'cure'. Anti-psychotics tend to have side effects such as nausea, muscular spasms, agitation, weight gain and involuntary movements of the head and tongue that can affect speech. Sometimes, additional medication is prescribed to manage the side effects of the anti-psychotic medication.

Psychotherapy is commonly used to complement medications. For example, cognitive behaviour therapy can assist the individual to identify and change irrational or undesirable thoughts and ways of thinking that maintain many symptoms. The therapist may also teach specific strategies that target impaired reasoning and memory to assist the individual to cope more effectively in everyday life. Access to crisis support is also considered important, so part of a regular plan is for the individual to know how to contact an after-hours service when they feel at risk.

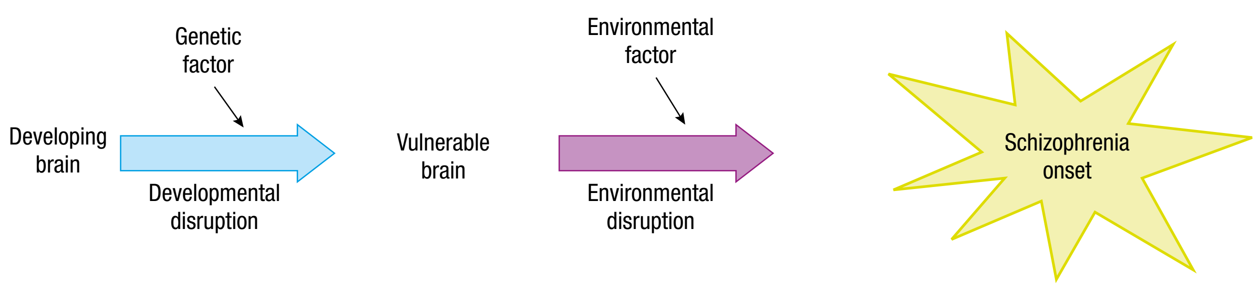

Figure 6.51 According to the two-hit model for schizophrenia, a disruption in the development of the brain can produce a vulnerability to schizophrenia, but onset of symptoms must be triggered by environmental factors.

Source: Adapted from Maynard, T.M., Sikich, L., Lieberman, J.A., & LaMantia, A. (2001). Neural development, cell-cell signaling, and the 'Two-Hit' hypothesis of schizophrenia. *Schizophrenia Bulletin, 27*(3), 457–476.

As with other mental disorders, social support is also very important, both within the family and the community. Support groups run by and for people who interact on the basis of having the same type of psychotic disorder can provide mutual support to one another; for example, by devising strategies for problems they share and coping strategies for specific challenges in everyday life. Support programs may include vocational training, help with finding suitable work, accommodation, training and education so that they can lead full and productive lives. Understanding and acceptance by the community is also very important, particularly sensitivity to social stigma which is common among people with a psychotic disorder (RANZCP, 2017e).

Figure 6.52 (a) Many years ago, people who developed schizophrenia were hospitalised and often restrained. The contemporary emphasis in the treatment of people with schizophrenia is to avoid long-term institutional care and provide support in the community to enable them to live as 'normal' a life as possible. Hospitalisation is sometimes necessary, primarily to stabilise symptoms with the view to the person returning home as quickly as possible. (b) Antipsychotic medication is currently the main treatment for schizophrenia.

BOX 6.9 Schizophrenia in the movies

Many movies featuring someone with schizophrenia have been made, some of which present more accurate portrayals of the disorder than others. While films such as those listed below raise the awareness of schizophrenia in society, they need to be considered alongside reputable sources of information about the disorder.

- *The Soloist* (2009)
- *15 Park Avenue* (2005)
- *Spider* (2002)
- *A Beautiful Mind* (2001)
- *Donnie Darko* (2001)
- *Spinning Out* (1991)
- *Blade Runner* (1982)
- *Lost Highway* (1977)

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Weblink
A Beautiful Mind trailer 2 m 20 s

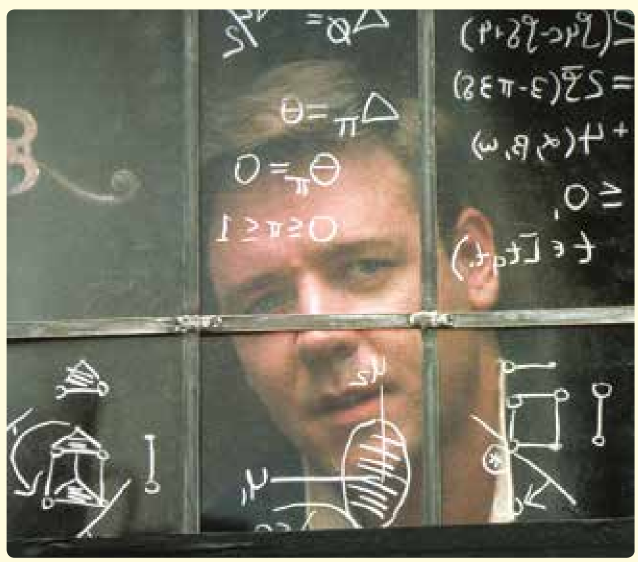

Figure 6.53 Russell Crowe in the film *A Beautiful Mind*, in which he plays John Nash, a brilliant mathematician who suffers from schizophrenia

BOX 6.10 Maintaining good mental health

If you asked, most people would be able to tell you how they could look after their physical health. For example, they are likely to make such statements as: 'Make sure I get enough rest', 'Eat healthy foods and exercise regularly' and 'Take any medication prescribed by a doctor'. But fewer people are likely to be able to tell you how they could look after their mental health.

Good mental health helps us to more fully enjoy life and appreciate the people and environment around us. We respond better to the stressors and challenges of daily life, use our abilities to the fullest and make the most of opportunities when our mental health is strong.

Mental Health Australia advises that there are three categories of activities we can do to build and maintain good mental health. These involve practising 'ABCs'.

- **A**ct by keeping yourself as active as possible, physically, socially and mentally. For example:
  - *exercise:* regular physical activity improves psychological wellbeing and can reduce depression and anxiety
  - *enjoy hobbies:* taking up a hobby brings balance to your life by allowing you do something you enjoy, and it also keeps your brain active
  - *treat yourself well:* cook yourself a good meal, have a bubble bath, see a movie, call a friend or relative you haven't called for ages, sit on a park bench and take in your surroundings.
- **B**elong by connecting to your community. For example:
  - *invite:* join a group, chat to a neighbour, meet a friend
  - *share a laugh:* life often gets too serious, so when you hear or see something that makes you smile or laugh share it with someone you know
  - *do one thing at a time:* for example, when you are out for a walk or spending time with friends, turn off your mobile phone and stop making that mental 'to do' list.
- **C**ommit to looking for challenges, having a go and getting involved. For example:
  - *'collect' positive emotional moments:* recall times when you have experienced pleasure, comfort, tenderness, confidence or other positive emotions
  - *learn ways to cope with negative thoughts:* don't block negative thoughts but learn how to interrupt them and not let them take over
  - *set personal goals:* for example, finish that book you started three years ago, walk around the block every day, learn a new skill, call your friends instead of waiting for the phone to ring
  - *keep a journal (or even talk to the wall!):* expressing yourself after a stressful day can help you gain perspective, release tension and even boost your body's resistance to illness
  - *volunteer:* volunteering helps others, makes us feel good about ourselves, widens social networks, provides new learning experiences, and can bring balance to people's lives.

Figure 6.54 Exercising regularly is good for both your mental and physical health.

Source: Adapted from Mental Health Council of Australia (2012). *Be active for your mental health* (Fact sheet). Retrieved from http://mhaustralia.org/fact-sheets/be-active-your-mental-health-fact-sheet

LEARNING ACTIVITY 6.21

Reflection

It is a widespread myth that schizophrenia involves a 'split' personality or multiple personalities. This may be linked to schizophrenia literally meaning 'split mind', which refers to the positive symptoms that indicate an apparent split from or loss of contact with reality. The disorder involving multiple personalities is called dissociative identity disorder.

Comment on whether or not it really matters that the technically correct terms (or labels) are used when referring to mental disorders.

LEARNING ACTIVITY 6.22

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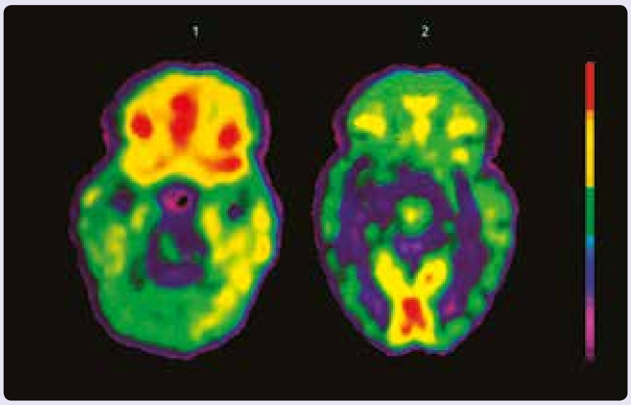
Word copy of table

Review questions

1. Complete the following table in relation to schizophrenia.

Contributing factor	Description	How it influences
Biological Genes Brain structure and functioning		
Psychological Stress response Cognitive impairments		
Social Family environment		

2. Examine the two PET scans shown below.



Is the prefrontal cortex shown at the top or bottom in each scan? Explain your answer.

3. Give an example of how 'the dysfunctional and bizarre behaviour of a family member with schizophrenia' may in itself promote a high-EE family environment.

4. (a) Suggest a relevant aim for the study conducted by Tienari and colleagues (2004).
(b) Suggest a label for the *y* (vertical) axis in Figure 6.49.
(c) Briefly state the main results.
(d) What do the results suggest about genes and family environment as contributory factors to schizophrenia?
(e) What potential implications do the results of this study have with regard to preventive measures that could be taken by parents to reduce the likelihood that their child will develop schizophrenia? Explain your answer.

5. (a) How does the 'two-hit' hypothesis explain the development of schizophrenia?
(b) To what extent does the 'two-hit' approach to explaining schizophrenia differ from the biopsychosocial approach?
(c) Use the 'two-hit' hypothesis to explain the development of another type of mental disorder described elsewhere in this chapter.

6. Identify key elements of a possible treatment plan for schizophrenia based on the biopsychosocial model.

LEARNING ACTIVITY 6.23

Media analysis/response

Conduct a search of the Australian media or the internet and select an item on schizophrenia that you believe is inaccurate and/or inappropriate and may therefore contribute to stigma.

Write a report that includes answers to the following, using one or more examples from your chosen media item.

- Name of item and source details
- A summary of what the item is about
- A description of how schizophrenia is represented, with reference to examples
- Other comments that you believe are relevant
- An explanation of how this item may contribute to the development or maintenance of stigma, with references to information in this text.

Ensure you include a copy of the item or source where appropriate (e.g. a weblink).

LEARNING ACTIVITY 6.24

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Word copy of checklist

Media analysis/response — movies about schizophrenia

Box 6.9 lists several movies about schizophrenia. Watch one of these movies, or another in which schizophrenia is featured, and record your observations of how schizophrenia is portrayed. An observation checklist based on the one opposite should be used. You can modify this checklist by accessing it through your eBook. As you record your observations, include specific examples of behaviours in each category.

After watching the movie:

1. develop a profile of one (or more) of the characters depicted with schizophrenia, based on the data in your observation checklist
2. comment on how accurately schizophrenia is portrayed in the movie, with reference to the information in the text
3. describe any treatment used to manage schizophrenia in the movie
4. state whether the treatment used in the movie accurately reflects the way(s) in which schizophrenia is treated by the mental health profession.

Observation checklist

Behaviour	Name of character	Name of character	Name of character
Positive symptoms: Hallucinations Delusions Disorganised speech (thinking) Disorganised behaviour			
Negative symptoms: Low interest/pleasure Low energy/motivation Flat emotional expression **Everyday life coping**			

LEARNING ACTIVITY 6.25

Mental disorder brochure

Select one of the mental disorders you have studied in Unit 1. Develop a fact sheet in the form of a brochure that could be displayed in a doctor's surgery or community outlet. The brochure should include the following information:

- name of the disorder
- different types of the disorder (if relevant)
- brief description of the disorder(s)
- typical symptoms
- who it can affect (e.g. age, sex)
- types of treatment
- offline and online support.

LEARNING ACTIVITY 6.26

Visual presentation on causes and management of schizophrenia

Prepare a visual presentation in which you use a biopsychosocial approach to explain the causes and management of schizophrenia.

You may select from a range of formats to present your information; for example, PowerPoint, a poster, a concept map, a flow chart, or a combination of formats. You may use photographs and other visual or art media.

In your presentation, ensure that you:

- explain what schizophrenia is with reference to key symptoms
- outline a range of relevant biological, psychological and social factors
- indicate how these factors may contribute to the development and treatment or management of schizophrenia, including possible relationships between different factors.

Written information may be in a dot-point format, but ensure that all relevant information is accurately and adequately explained, using appropriate examples to clarify your understanding of key concepts.

CHAPTER SUMMARY

- **ATYPICAL PSYCHOLOGICAL DEVELOPMENT**
  - Approaches to describing normality
  - Conceptualisation of normality
    - Typical and atypical behaviours
    - Adaptive and maladaptive behaviours
  - Mental health and mental disorder
    - Mentally healthy
    - Mental health problem
    - Mental disorder
  - Mental health as a product of internal and external factors
    - Biopsychosocial model
      - Biological factors
      - Psychological factors
      - Social factors
    - 4P Factor model
      - Predisposing risk factor
      - Precipitating risk factor
      - Perpetuating risk factor
      - Protective factor
  - DSM-5 and categories of mental disorders
    - Incidence of mental disorder in Australia
  - Labelling someone with a mental disorder
    - Pros and cons of labelling
      - Benefits of labelling
      - Stigma
      - Rosenhan's research
  - Addiction disorders
    - Types of addiction disorders
      - Gambling as an addiction
    - Contributing factors
      - Biological — dopamine reward system
      - Psychological — distorted ways of thinking
      - Social — social acceptability of gambling
    - Treatment
  - Anxiety disorders
    - Types of anxiety disorders
      - Phobias
    - Contributing factors
      - Biological — stress response and brain chemistry
      - Psychological — learning processes and faulty thinking
      - Social — transmission of threat information and parental modelling
    - Treatment
  - Mood disorders
    - Types of mood disorders
      - Major depression
    - Contributing factors
      - Biological — genes and brain chemistry
      - Psychological — psychological responses to stress and dysfunctional ways of thinking
      - Social — poverty and social stress
    - Treatment
  - Personality disorders
    - Types of personality disorders
      - Antisocial personality disorder
    - Contributing factors
      - Biological — genetic influence and nervous system functioning
      - Psychological — fearlessness and social learning
      - Social — family environment
    - Treatment
  - Psychotic disorders
    - Types of psychotic disorders
      - Schizophrenia
    - Two-hit hypothesis
    - Contributing factors
      - Biological — genetic influence and changes in brain structure and function
      - Psychological responses to stress and cognitive impairments
      - Family environment

KEY TERMS

4P Factor model p. 301
adaptive behaviour p. 294
addiction p. 310
antisocial personality disorder p. 335
anxiety p. 320
anxiety disorder p. 321
atypical behaviour p. 294
atypical development p. 292
biological factor p. 300
biopsychosocial model p. 300
catastrophic thinking p. 322
cognitive behavioural therapy (CBT) p. 318
cognitive distortion p. 315
conditioning p. 322
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protective factor p. 301
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psychosis p. 340
psychotic p. 340
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situational approach p. 293
social acceptability p. 317
social factor p. 300
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social stigma p. 307
socio-cultural approach p. 293
statistical approach p. 293
stigma p. 307
stress p. 296
support group p. 318
transmission of threat information p. 323
'two-hit' hypothesis p. 348
typical behaviour p. 294

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 357–60. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about atypical psychological development	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Approaches to describing normality			
Conceptualisation of normality			
• Typical and atypical behaviours			
• Adaptive and maladaptive behaviours			
Mental health and mental disorder			
• mentally healthy			
• mental health problem			
• mental disorder			
• mental health continuum			

Key knowledge I need to know about atypical psychological development	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Mental health as a product of internal and external factors			
• Biopsychosocial model			
• 4P Factor model			
Categories of mental disorders			
Incidence of mental disorder in Australia			
Labelling someone with a mental disorder			
• Benefits			
• Stigma			
– Social stigma			
– Self-stigma			
• Labelling			
Addiction disorders			
• Addiction			
• Types of addiction disorders			
– Gambling as an addiction			
• Contributing factors			
– Biological — dopamine reward system			
– Psychological — distorted ways of thinking			
– Social — social acceptability of gambling			
• Treatment			
Anxiety disorders			
• Anxiety			
• Types of anxiety disorders			
– Phobias			
• Contributing factors			
– Biological — stress response and brain chemistry			
– Psychological — learning processes and faulty thinking			
– Social — transmission of threat information and parental modelling			
• Treatment			
Mood disorders			
• Types of mood disorders			
– Major depression			

(continued)

Key knowledge I need to know about atypical psychological development	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
• Contributing factors			
– Biological — genes and brain chemistry			
– Psychological — psychological responses to stress and dysfunctional ways of thinking			
– Social — poverty and social stress			
• Treatment			
Personality disorders			
• Types of personality disorders			
– Antisocial personality disorder			
• Contributing factors			
– Biological — genetic influence and nervous system functioning			
– Psychological — fearlessness and social learning			
– Social — family environment			
• Treatment			
Psychotic disorders			
• Psychosis			
• Key symptoms			
– Positive symptoms			
– Negative symptoms			
• Types of psychotic disorders			
– Schizophrenia			
• Contributing factors			
– Biological — genetic influence and changes in brain structure and function			
– Psychological — stress and cognitive impairments			
– Social–family environment			
• The 'two-hit' hypothesis as an explanation for the development of schizophrenia			
• Treatment			

CHAPTER 6 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

Which of the following is a psychological factor that could contribute to the development of a mental disorder?

A. poverty
B. being bullied by someone at school
C. how we perceive our internal and external environments
D. inheritance of particular genes

Question 2

In relation to mental disorders, atypical behaviour means that an individual

A. is distressed and extremely upset.
B. behaves in a way that is different from how they usually do.
C. is unable to do the kinds of things they normally do on a daily basis.
D. behaves in a way that is consistent with how they usually do.

Question 3

A mental disorder is best described as

A. maladaptive behaviour.
B. absence of mental health.
C. a mental condition that will usually resolve itself without treatment.
D. a diagnosable psychological condition that significantly disrupts how a person usually thinks, feels and behaves.

Question 4

A disadvantage of labelling a person with a specific mental disorder is that

A. there are not enough labels to cover all the different mental disorders.
B. the label may be misunderstood by admission staff if the individual needs to be hospitalised.
C. a label can influence the thoughts, feelings or behaviour of the person with the disorder in unwanted ways.
D. the process of labelling is often inaccurate and usually unreliable.

Question 5

Which of the following is not a biological factor that could contribute to the development of a mental disorder?

A. social stress
B. genetic inheritance
C. dopamine activity
D. enlarged brain ventricles

Question 6

Cognitive behaviour therapy primarily aims to

A. change the way a person feels or behaves by changing their thinking.
B. treat mental disorders using relaxation techniques.
C. change the way a person thinks by changing their feelings or behaviour.
D. treat mental disorders using social support.

Question 7

Schizophrenia

A. can usually be cured by medication.
B. is a type of split personality.
C. is a psychotic disorder.
D. cannot be diagnosed before someone reaches 18 years of age.

Question 8

If a person develops a phobia by watching someone else's fearful response to a particular object or situation, they are said to have developed their phobia through

A. classical conditioning.
B. operant conditioning.
C. observational learning.
D. transmission of threat information.

Question 9

Judging normality or abnormality on the basis of what most people do or do not do reflects the _____ approach.

A. historical
B. statistical
C. functional
D. situational

Question 10

Which of the following is the best example of a support group for someone with a gambling addiction?

A. members of a 'well-functioning' family who interact with someone recovering from a gambling addiction
B. a group of people with a gambling addiction who meet to support each other
C. a group of people who meet and devise recovery strategies for someone with a gambling addiction
D. a group of mental health professionals who monitor the recovery of someone with a gambling addiction

Question 11

The biopsychosocial model explains the development of a personality disorder by emphasising

A. how biological factors influence psychological factors, which in turn influence social factors.
B. the relative contribution of biological, psychological and social factors.
C. the interaction of biological, psychological and social factors.
D. the impact of underlying biological factors on psychological and social factors.

Question 12

In relation to gambling addiction, tolerance refers to

A. decreased sensitivity to the thrill of gambling over time, whereby increased amounts of money or risk-taking are required to achieve the former effects.
B. needing to spend increasing amounts of money or take bigger risks to chase losses accumulated through gambling.
C. the process of increasingly permitting or supporting engagement in gambling.
D. the unpleasant reactions that occur when gambling is discontinued or suddenly reduced.

Question 13

An individual with a psychotic disorder strongly believes that they are a participant in a 'top-secret' experiment run by 'the government', despite the fact that there is strong evidence that does not support this belief. This suggests that the person is experiencing

A. a delusion.
B. an hallucination.
C. fearlessness.
D. a negative symptom.

Question 14

Mood is best described as

A. irritability.
B. depression.
C. mania.
D. an emotional state.

Question 15

In order to be diagnosed with major depression, it is essential that an individual experiences

A. a depressed mood for a period of at least two weeks.
B. one or more mood swings from 'high' (mania) to 'low' (sadness).
C. intense sadness.
D. one or more thoughts of death or suicide.

Question 16

All personality disorders are characterised by

A. distress.
B. inflexible behaviour.
C. adaptive behaviour.
D. erratic behaviour and disregard for others.

Question 17

Diagnosis of a personality disorder requires evidence of a/an _____ pattern of behaviour.

A. odd
B. pervasive
C. anxious and fearful
D. culturally acceptable

Question 18

Jack's wife has told him she wants a divorce. 'I don't know how she can be so selfish,' he thinks. 'Sure, I spend a lot of time at the casino, but I am doing it for our family. She doesn't understand that there are ups and downs in poker. So finances have been a little tight. I just need a little time to get the money back. I know how to work the table. I've got the skills needed to beat the system.'

What type of cognitive distortion is Jack exhibiting?

A. overactivity of the dopamine reward system
B. the notion of being due for a win
C. gambler's fallacy
D. illusion of control

Question 19

If someone has a genetic predisposition for schizophrenia, it is most likely that they

A. have the single gene responsible for schizophrenia.
B. do not have a close biological relative with schizophrenia.
C. have been adopted by someone with schizophrenia who may also be a biological relative.
D. have a close biological relative with schizophrenia.

Question 20

An individual with a psychotic disorder may hear voices that are not real. This is an example of

A. grandeur.
B. a delusion.
C. a hallucination.
D. disorganised thinking.

SECTION B

Answer all questions in the spaces provided. Write using black or blue pen.

Question 1 (1 mark)

What is the full name of the reference commonly called 'the DSM' and what is it used for?

Question 2 (4 marks)

Explain the difference between:

(a) mentally healthy and mental disorder 2 marks

(b) atypical and maladaptive behaviour 2 marks

Question 3 (2 marks)

How does the 'two-hit' hypothesis account for the development of schizophrenia?

Question 4 (3 marks)

Give an example of a biopsychosocial approach to the treatment or management of a mental disorder. Ensure you name the disorder.

Question 5 (2 marks)

Explain what addiction is with reference to two characteristics.

Question 6 (1 mark)

Explain the meaning of anxiety disorder.

Question 7 (2 marks)

(a) When would a change in mood suggest the presence of a mood disorder? 1 mark

(b) Give an example of a mood disorder. 1 mark

Question 8 (10 marks)

(a) What is the 4P Factor model? 1 mark

(b) Distinguish between risk and protective factors in relation to mental health. 2 marks

(c) i Name the three types of risk factors in the 4P Factor model. 1 mark

ii Explain the difference between each of these risk factors with reference to a specific example and mental disorder. 6 marks

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS. The answers to the Section B questions are in eBookPLUS.

Unit 2

How do external factors influence behaviour and mental processes?

AREA OF STUDY 1

What influences a person's perception of the world?

AREA OF STUDY 2

How are people influenced to behave in particular ways?

On completion of this unit, the student should be able to:

OUTCOME 1

- compare the sensations and perceptions of vision and taste, and analyse factors that may lead to the occurrence of perceptual disorders.

OUTCOME 2

- identify factors that influence individuals to behave in specific ways, and analyse ways in which others can influence individuals to behave differently.

UNIT 2 KEY KNOWLEDGE

CHAPTER 7 **Sensation and perception**	• sensation and perception as two complementary but distinct roles in the reception, processing and interpretation of sensory information • taste and vision as two examples of human sensory systems, including the roles of sensory receptors and receptive fields, transmission of sensory information to the brain, and representation of sensory information in the cerebral cortex • the influence of biological, psychological and social factors on visual perception, including depth cues, visual perception principles and perceptual set • the influence of biological, psychological and social factors on gustatory perception, including age, genetics, perceptual set (including food packaging and appearance) and culture.
CHAPTER 8 **Distortions of perception**	• the fallibility of visual and gustatory perception systems, demonstrated by visual illusions and the judgment of flavours (influence of perceptual set, colour intensity and texture) • distortions of perception of taste and vision in healthy, intact brains as providing insight into brain function related to perception, illustrated by synaesthesia.
CHAPTER 9 **Social cognition**	• the role of person perception, attributions, attitudes and stereotypes in interpreting, analysing, remembering and using information about the social world • the applications and limitations of the tri-component model of attitudes • attitudes and stereotypes that may lead to prejudice and discrimination.
CHAPTER 10 **Social influences on behaviour**	• the influence of status and social power within groups, and obedience and conformity on individual behaviour, with reference to theorists including Asch, Milgram and Zimbardo • the influences on helping behaviour (or reluctance to help) including personal, situational and social factors • factors that influence bullying (including cyberbullying) behaviour and the effects of bullying behaviour on an individual's psychological functioning • positive and negative influences of media on individual and group behaviour, illustrated by advertising, television, video games and social media.

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7 SENSATION AND PERCEPTION

KEY KNOWLEDGE

- sensation and perception as two complementary but distinct roles in the reception, processing and interpretation of sensory information
- taste and vision as two examples of human sensory systems, including the roles of sensory receptors and receptive fields, transmission of sensory information to the brain, and representation of sensory information in the cerebral cortex
- the influence of biological, psychological and social factors on visual perception, including depth cues, visual perception principles and perceptual set
- the influence of biological, psychological and social factors on gustatory perception, including age, genetics, perceptual set (including food packaging and appearance) and culture

CHAPTER CONTENT

Imagine what it would be like to have no senses or sensory capabilities. Your life would be in complete darkness and silence. You would not be able to taste fruit or smell the fragrance of a flower. You would not be able to feel the warmth of heat or the coolness of ice. Never feeling pain means that you would always be vulnerable to physical harm. Standing or moving around would be a problem as you would never know whether you were upright, laying down, moving a leg or the direction in which you were facing. And you would never be aware of conditions inside your body.

We have a number of different senses, including vision, hearing, taste, smell, touch, pain and kinaesthesia (body position and movements). Each of these senses provides information in the form of a different kind of energy. When we 'sense' something, we are actually detecting and responding to physical stimuli — information which is in the form of a specific kind of energy and has stimulated receptor cells. It is not until we 'perceive' the information that we have interpreted and assigned meaning to the information.

Most of the sensory information ('stimuli') comes from our external environment; for example, light (for vision), air vibrations (for hearing) and chemical molecules (for taste and smell). Other sensory information comes from sensory receptor sites within our body, such as from muscle tendons and joints (for kinaesthesia).

All human *sensory systems*, also called *perceptual systems*, have many characteristics in common. This includes a similar sequence of information processing for detecting and responding to stimuli through sensation and perception. In this chapter we examine the two distinctive processes of sensation and perception using vision and taste (gustation) as examples of human sensory systems.

Vision is the sense on which most people are most reliant and taste is the least crucial but the most multisensory of our perceptual experiences. We will consider how biological, psychological and social factors can influence our perception of visual and taste stimuli originating in our external environment. In the next chapter, we explore circumstances where perceptual distortions, or 'mistakes', of vision and taste may occur.

DISTINCTION BETWEEN SENSATION AND PERCEPTION

Sensation is the process by which our sensory receptors and sense organs detect and respond to sensory information that stimulates them. The information at this stage is simply raw sensory data. It is meaningless until it is sent to the relevant sensory area in the brain for processing.

Perception refers to the process by which we give meaning to sensory information. This processing results in the conscious experience of our external (and internal) environments. The essence of perception is interpreting sensations. Our sensory systems 'translate' the sensations into information that is meaningful and useful.

Most of the time we process sensory information automatically, without realising that we are doing it. However, perception is not a passive process. It does not work like a camera or recorder, digitally capturing information. Perception is an active process. What we see, taste, hear, smell and so on is the result of brain activity that constructs our personal understanding of reality from raw sensory information. This allows us to adapt to our environment and function in everyday life as we do.

Psychologists often distinguish between sensation and perception. This is mainly done for the purposes of study. There is actually no clear boundary that identifies where sensation ends and where perception begins. Perception includes sensory processes and involves the entire sequence of events that begins with the detection of a stimulus (sensation) through to interpretation of the stimulus.

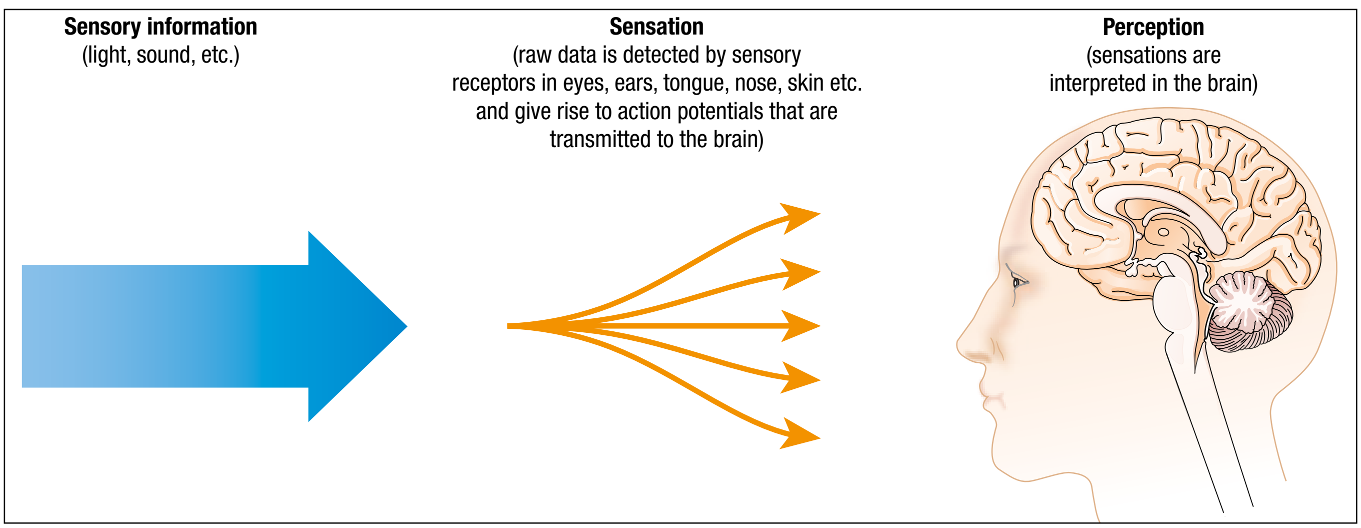

Figure 7.1 Sensation and perception are interrelated but commonly described as distinctive processes.

RECEPTION, PROCESSING AND INTERPRETATION OF SENSORY INFORMATION

All human sensory systems are information processing systems in which raw sensory information is detected and converted into a form that can be sent to the brain where it can be given meaning. The specific processes that enable sensation and perception of stimuli in our external environment are commonly called reception (or detection), transduction, transmission and interpretation. The details are slightly different for each sense but there is more in common than not.

Reception and receptive fields

Our eyes, tongue and other sense organs contain cells called *sensory receptors* (or simply *receptors*) that receive and process sensory information. For each sense, these are specialised to detect and respond to a specific type of sensory information, such as light or chemical molecules. **Reception** is the process of detecting and responding to incoming sensory information. Every receptor organ and cell within a sensory system has an area of sensitivity. This is the specific part of the world to which it can respond and is called its receptive field.

A **receptive field** is the area of space in which a receptor can respond to a stimulus. For example, when you look directly in front of you, everything you see is the receptive field of your eyes. If you close one eye, this reduces the area of the receptive field to what your open eye can see. At night time when you look into a starry sky, the receptive field for vision is extensive in distance. For the sense of hearing, a stimulus can be a moderate distance away. For some senses, such as taste and touch, the stimulus must come in direct contact with the sense organ and therefore a part of the body.

Not every receptor cell for each sense has the same receptive field. For example, within the eye, each receptor cell points in a slightly different direction and so has a unique receptive field. This means that the brain receives slightly different information from each receptor cell. This information is used to not only identify incoming sensory information, but also to compare and contrast the information that each receptor cell is providing. In addition, receptor cells can specialise in their responses to stimulation within their receptive fields. For example, some receptors involved in the sense of touch are fully activated by light touch but not heavy touch or a painful stimulus (Breedlove, Watson, Rosenzweig, 2010; Kolb & Whishaw, 2014).

The different types of sensory organs and receptors are also considered to have receptive fields. The receptive field of a sensory organ or an individual receptor cell is the specific area or part where a stimulus will affect its activity. For example, the retina at the back of the eye is the receptive field for sight and the receptive field of an individual visual receptor within the retina will become active only when light falls on it.

Clusters of receptor cells form more complex receptive fields. For example, the retina has distinctive areas where light activates receptor cells and there are distinctive areas on the tongue that are receptive fields. The information from each receptive field may be processed separately in different areas of the relevant sensory cortex. The brain then combines all these bits of information in a meaningful way, like assembling the bits of a jigsaw to form a complete image or a taste experience, but in an effortless and highly efficient way.

When sensory information reaches sensory receptors, it arrives in a form of energy which cannot be sent to or processed by the brain. It must therefore be converted into a form that can be sent along neural pathways to the brain. For vision, the energy is visible light in the form of electromagnetic energy. For taste, it is in the form of chemical molecules in foods and fluids.

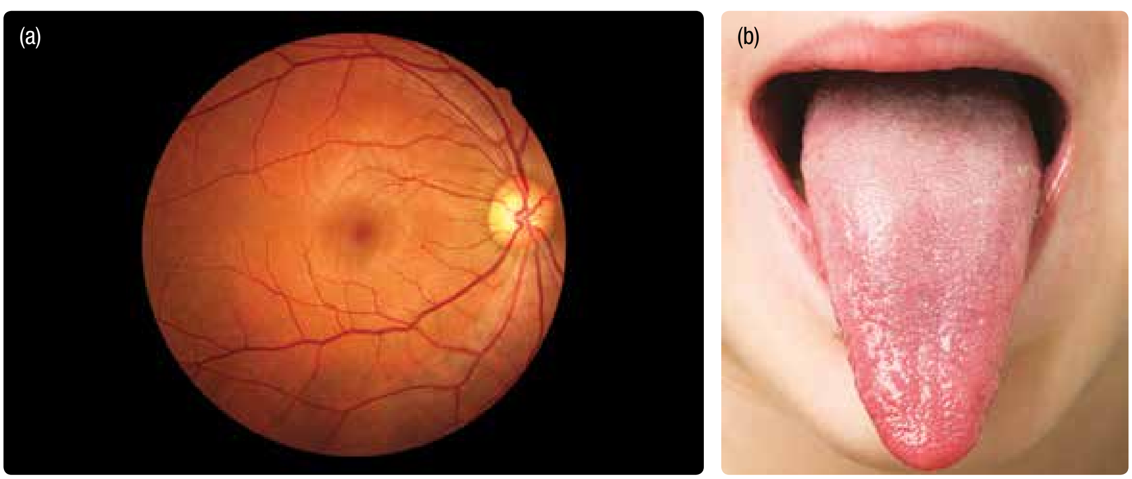

Figure 7.2 (a) The retina at the back of the eye contains all the sensory receptors that enable visual perception, whereas (b) the sensory receptors enabling taste perception are mostly located on the tongue.

Transduction

Transduction is the process by which the receptors change the energy of the detected sensory information into a form which can travel along neural pathways to the brain as *action potentials* (which are also called *neural impulses*). If transduction did not occur, sensory information would travel no further than the receptors and perception would not be possible.

Transmission

Transmission is the process of sending the sensory information (as action potentials) to relevant areas of the brain via the thalamus (except information for smell which bypasses the thalamus). As shown in figure 7.3, the area for vision is the primary visual cortex in the occipital lobe and the area for taste is the primary gustatory cortex in the rear part of the underside of the frontal lobe. When the sensory information reaches the relevant brain areas, interpretation can occur.

Like the primary visual cortex, the primary gustatory cortex has receptive fields. Different areas are arranged in such a way that different sets of neurons are selectively responsive to each of the five basic tastes.

Interpretation

Interpretation is the process in which incoming sensory information is given meaning so that it can be understood. For example, interpretation enables us to understand what we are looking at or what we have tasted or heard. Interpretation does not entirely occur in the cortical areas where it is received. The visual, gustatory and other sensory cortices are connected to other parts of the brain where information is sent for additional processing that enables perception. For example, the primary gustatory cortex sends information to several other areas of the cerebral cortex, including an area called orbitofrontal cortex, where neural connections for taste and smell are combined.

Interpretation involves bringing together incoming sensory information and using existing knowledge to make sense of sensory input. This may include information we have learned then stored in memory, as well as such information as our current motivational and emotional states and the situation in which the perceptual experience is taking place. Multiple areas of the brain are involved. However, the processing of information from different brain areas is so rapid that we are rarely conscious of it occurring at all.

It is usually only when a stimulus is vague, confusing or ambiguous that we become aware of the interpretative process. For example, our experience with many visual illusions often requires us to test a number of possible interpretations to make a meaningful perception. In some cases, as with the objects in Figure 7.4, we may struggle to make a meaningful interpretation, regardless of how often or long we consider it.

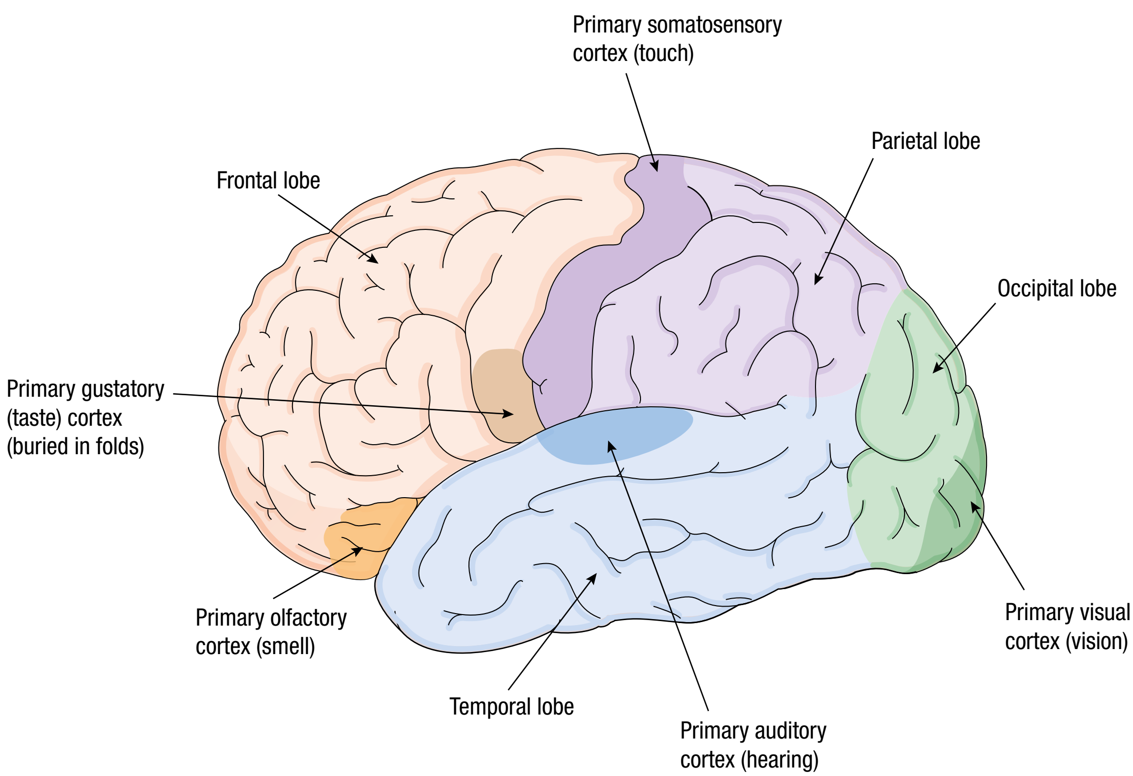

Figure 7.3 The primary areas in the cerebral cortex for receiving and processing different sensory information

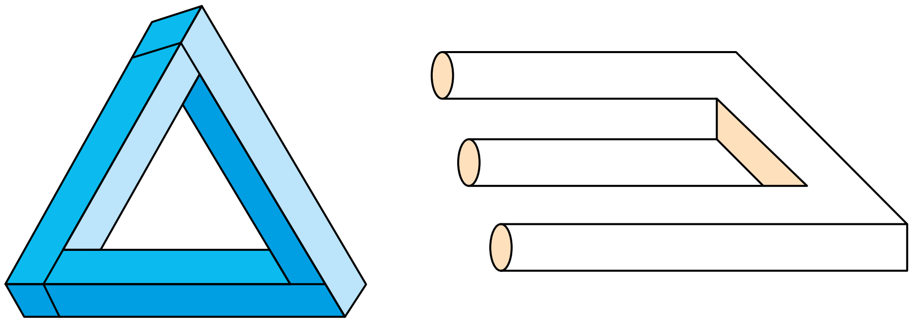

Figure 7.4 Visual illusions such as the 'impossible triangle' and 'three-pronged widget' illustrate that we can sometimes become confused by a stimulus and struggle to make a meaningful interpretation, regardless of how often or long we consider it.

BOX 7.1 Thresholds: absolute and differential

How dim can a light be and still be visible? Is there a specific light intensity that represents the limit at which a person is able or unable to perceive a visual stimulus? Is there a specific amount of sugar required before we can detect and then taste sweetness?

In order for sensation and perception to occur, the relevant receptors must be able to detect a stimulus. When examining sensory and perceptual processes, psychologists use the term *threshold* to refer to our ability to detect a stimulus or changes in a stimulus. Two types of thresholds are commonly described — absolute and differential.

Absolute threshold

The *absolute threshold* is the minimum amount of energy that is necessary in order for a stimulus to be perceived. For vision, this would involve the minimum amount of light energy required to stimulate the light receptor cells in the retina and trigger action potentials. The weakest visual stimulus that can be perceived has the light energy equivalent to a candle flame seen at about 50 kilometres when viewed under ideal conditions (e.g. a clear, pitch-black night). Examples for other senses are shown in Table 7.1 opposite.

The term 'absolute' can be a little misleading. Researchers have found, for example, that there is no specific level or intensity of light at which our eyes 'switch' from seeing no light to seeing light. Rather, as the light stimulus gradually increases in intensity, the likelihood of our responding to it tends to increase.

Consequently, researchers often define the absolute threshold in statistical terms to be the lowest or weakest level of a particular stimulus that can be detected, on average, 50% of the time. This means that if you were tested with a light stimulus, the absolute threshold would be the measure of light intensity where half the time you detected the presence of light and half the time you did not.

Differential threshold

Researchers have also examined our sensitivity to small differences (or changes) in the intensity of a given stimulus. This is referred to as the differential threshold.

The *differential threshold* (also called the *just noticeable difference*) for vision is the smallest perceptible difference (or perceptible change) that can be detected between two visual stimuli by the eye. For example, in an experiment on differential thresholds for visual perception, a researcher might investigate when a difference in the brightness of a light undergoing slight increases or decreases in its intensity can just be perceived by a participant; that is, when a change in brightness is 'just noticeable'. As with absolute thresholds, the researcher would define the differential threshold in statistical terms to be the point at which participants detect ('just notice') a difference between the intensity of two stimuli, on average, 50% of the time.

Differential thresholds also apply to other senses as well as specific capabilities. For example, differential threshold is relevant to *visual acuity* — the sharpness of our vision and our ability to detect fine detail. A Snellen eye chart with letters that decrease in size is commonly used by optometrists as a measure of visual acuity.

Table 7.1 The absolute thresholds for some common stimuli illustrate the sensitivity of different human sensory systems.

Sense	Stimulus energy	Absolute threshold
vision	light	a candle flame seen from a distance of 50 kilometres on a clear, dark night
taste	chemical	one teaspoon of sugar dissolved in eight litres of water
hearing	sound	the ticking of a watch under quiet conditions at a distance of six metres
smell	chemical	one drop of perfume diffused throughout a three-room apartment
touch	pressure	the wing of a bee falling on your cheek from a height of one centimetre

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Digital document
Practical activities on thresholds

LEARNING ACTIVITY 7.1

Review questions

1. (a) Define sensation and perception.
   (b) How are sensation and perception best distinguished?
2. Why is perception considered to be an 'active process'?
3. (a) What are sensory receptors?
   (b) Are all sensory receptors neurons?
4. (a) What role does reception play in a sensory system?
   (b) Describe the relationship between a receptive field and reception.
5. (a) What is transduction?
   (b) Why is transduction essential in perception?
   (c) Where does information go after transduction and how does it get there?
6. (a) Explain the role of interpretation in a sensory system.
   (b) Give an example of a biological process and a psychological process involved in interpretation.
   (c) How might social factors influence perception?

LEARNING ACTIVITY 7.2

Reflection

We are not aware of all incoming sensory information. It is not until we pay attention to a physical stimulus that it is processed and enters conscious awareness. In this way, attention acts like a filter for sensory information, enabling selection of what may be relevant.

Comment on what the human experience could be like if we became aware of all sensory information that reaches our sensory receptors.

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Practical activity — Stroop effect

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Online Stroop effect experiment

VISUAL PERCEPTION

Visual perception occurs through the visual sensory system. The **visual sensory system** consists of the complete network of physiological structures involved in vision. This includes all the parts of the eyes, the neural pathways that connect the eyes and the brain, and the areas of the brain that process visual information. However, visual perception involves more than biological structures and processes. It is also influenced by psychological processes, many of which occur automatically to assist our interpretation of what we are looking at, as well as social factors.

Although the diverse range of influences on visual perception can be classified as biological, psychological and social, this does not mean that a neat line or boundary can be drawn between different types of factors. To do so would be like trying to draw a line between sensation and perception. In the same way that sensation and perception are closely interrelated, so too are biological, psychological and social factors that influence any perception interrelated. The interaction between them is responsible for the unique personal realities we each construct of the world around us.

Visual perception starts at the eye where light is received, transduced then sent to the brain for interpretation. We consider key structures of the eye and the roles they play in enabling visual perception.

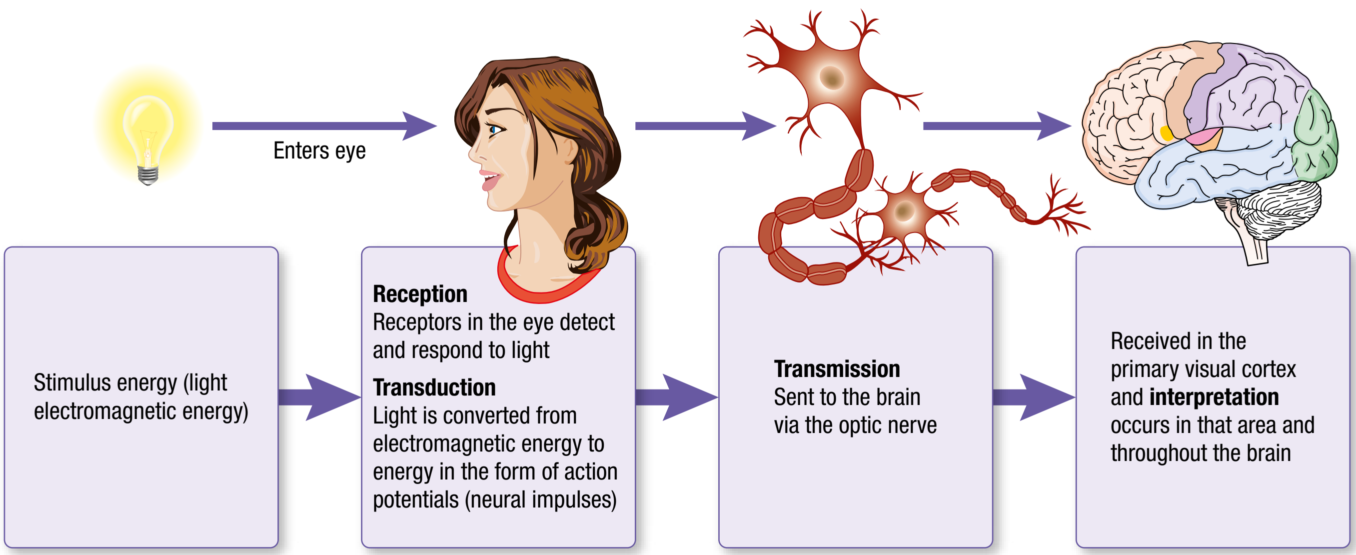

Figure 7.5 Reception, processing and interpretation of visual sensory information

From eye to brain

The eye is the sense organ for vision. An important function of the eye is to collect light that has been reflected or given out by objects in the environment. Light enables sight to occur.

Light initially enters the eye through the **cornea**, a transparent, convex-shaped (curved outwards) covering which protects the eye and helps to focus light rays onto the retina at the back of the eye. After passing through the cornea, light then passes through the aqueous humour which fills the space between the cornea and the lens. The *aqueous humour* is a watery fluid which helps to maintain the shape of the eyeball and provides nutrients and oxygen to the eye, as well as carrying away waste products.

The passage of light continues through the **pupil** which looks like a black circle in the centre of the eye. The pupil is not a structure in itself, but an opening in the iris that helps to control the amount of light entering the eye. In a place where there is dim light, such as a darkened movie theatre, the pupil dilates (expands) to allow more light into the eye. However, in a place where there is bright light, such as at the beach on a clear summer day, the pupil contracts and becomes smaller to restrict the amount of light entering the eye. In a place where it is extremely bright, the pupil may be no larger than a pinhead. When it is extremely dark, the pupil may become as big as the diameter of a pencil.

The **iris**, which surrounds the pupil, is the coloured part of the eye. The iris is a ring of muscles which expand or contract to change the size of the pupil and control the amount of light entering the eye.

Having passed through the pupil, light then enters the **lens**, which is a transparent, flexible, convex structure located immediately behind the pupil. The lens plays a major role in focusing light onto the retina for processing. In order to focus light onto the retina, the lens adjusts its shape according to the distance of the object being viewed. Its shape is changed by the *ciliary muscles* attached to each end of the lens. These muscles expand and contract, enabling the lens to automatically bulge to focus nearby objects onto the retina and flatten to focus distant objects onto the retina.

After incoming light passes through the lens, it continues through vitreous humour. *Vitreous humour* is a jelly-like substance which helps to maintain the shape of the eyeball and also helps focus light. Finally, the light reaches the retina at the back of the eye.

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Animation on eye structures and functions 2 m 46 s

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Videos on animal eye dissections

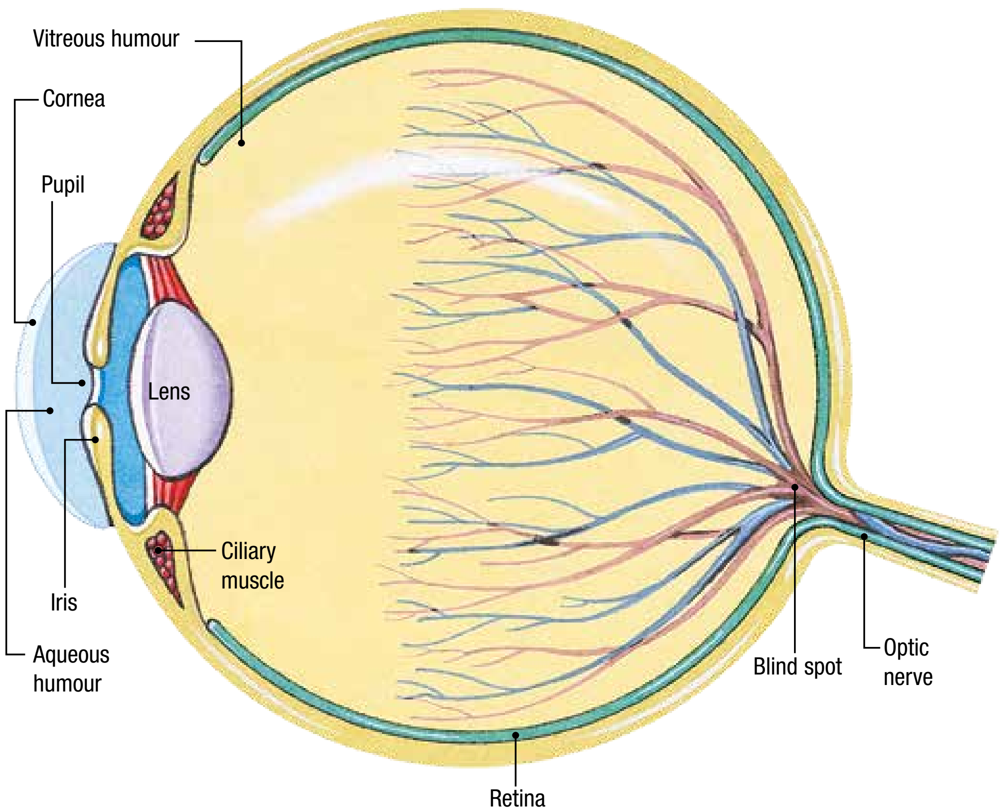


Figure 7.6 The structure of the eye

The **retina** receives and absorbs light, and also processes images. The image focused onto the retina is an inverted (upside-down) and reversed (back-to-front) image of the object being viewed. When received at the brain, it is rearranged so that we can perceive whatever we are looking at as it is in reality.

The retina consists of several layers of nerve tissue made up of different types of neurons that include light-sensitive visual receptor cells called **photoreceptors**. There are two types of photoreceptors — rods and cones — that react to light in different ways.

Rods respond to very low levels of light and are primarily responsible for night vision. They are very poor at detecting the fine details in an image and are not involved in colour vision. This is why everything on a dark, moonless night appears as shades of grey. In contrast to rods, **cones** respond to high levels of light (and do not respond well to dim light). They are primarily responsible for our vision in well-lit conditions, and for detecting fine detail and colour vision. When rods and cones detect light, they respond by changing the light energy into a form of energy that can be sent to the brain for further processing.

The photoreceptors do not transmit what the eye has sensed directly to the brain. They convert light into signals that can be processed by other types of neurons in the retina. These signals are sent to ganglion cells located elsewhere in the retina for processing (see Figure 7.7 below). *Ganglion cells* then generate action potentials which enable transmission of the information to the brain via their axons.

The axons of the ganglion cells from all over the retina are gathered into a bundle that forms the

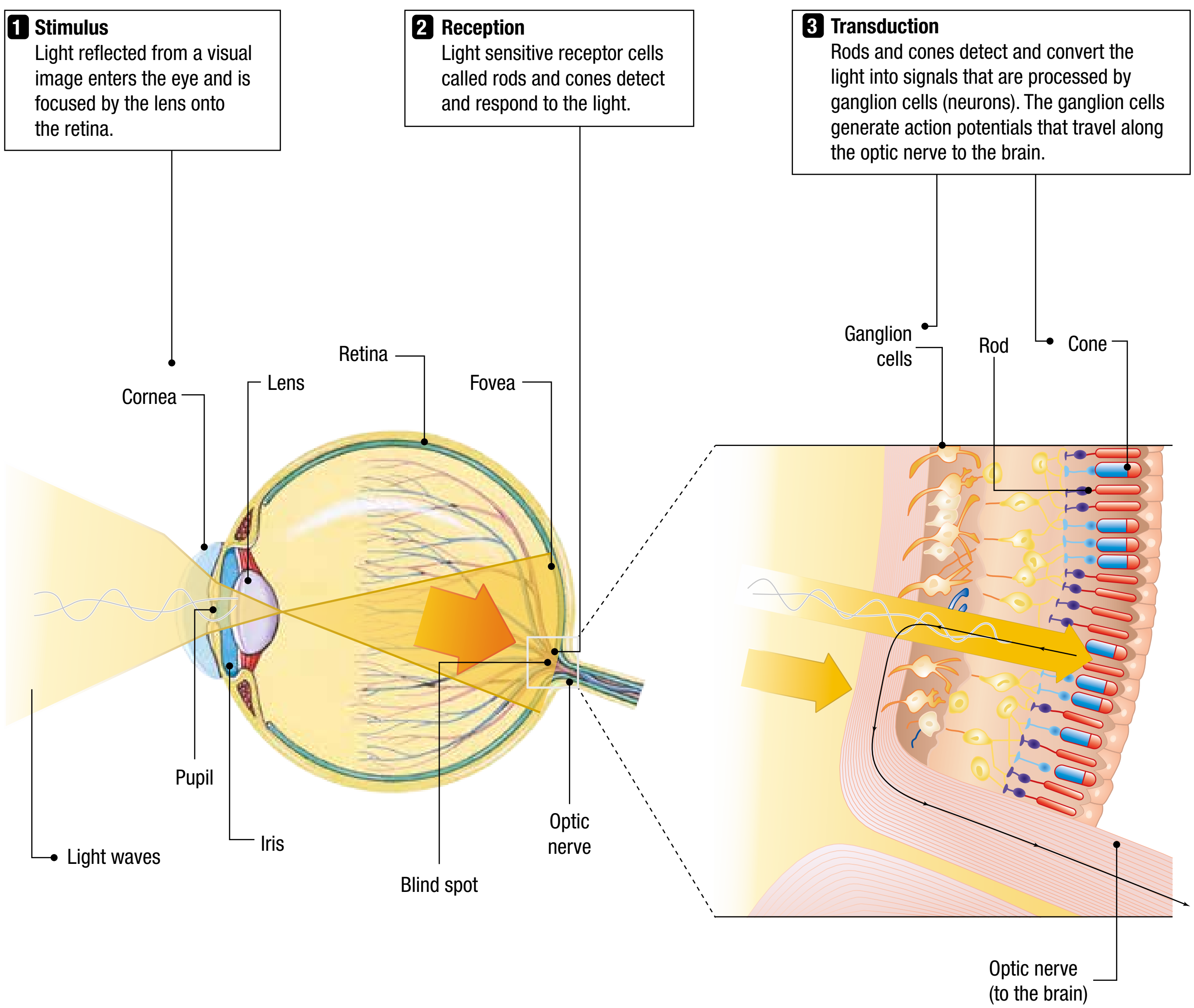
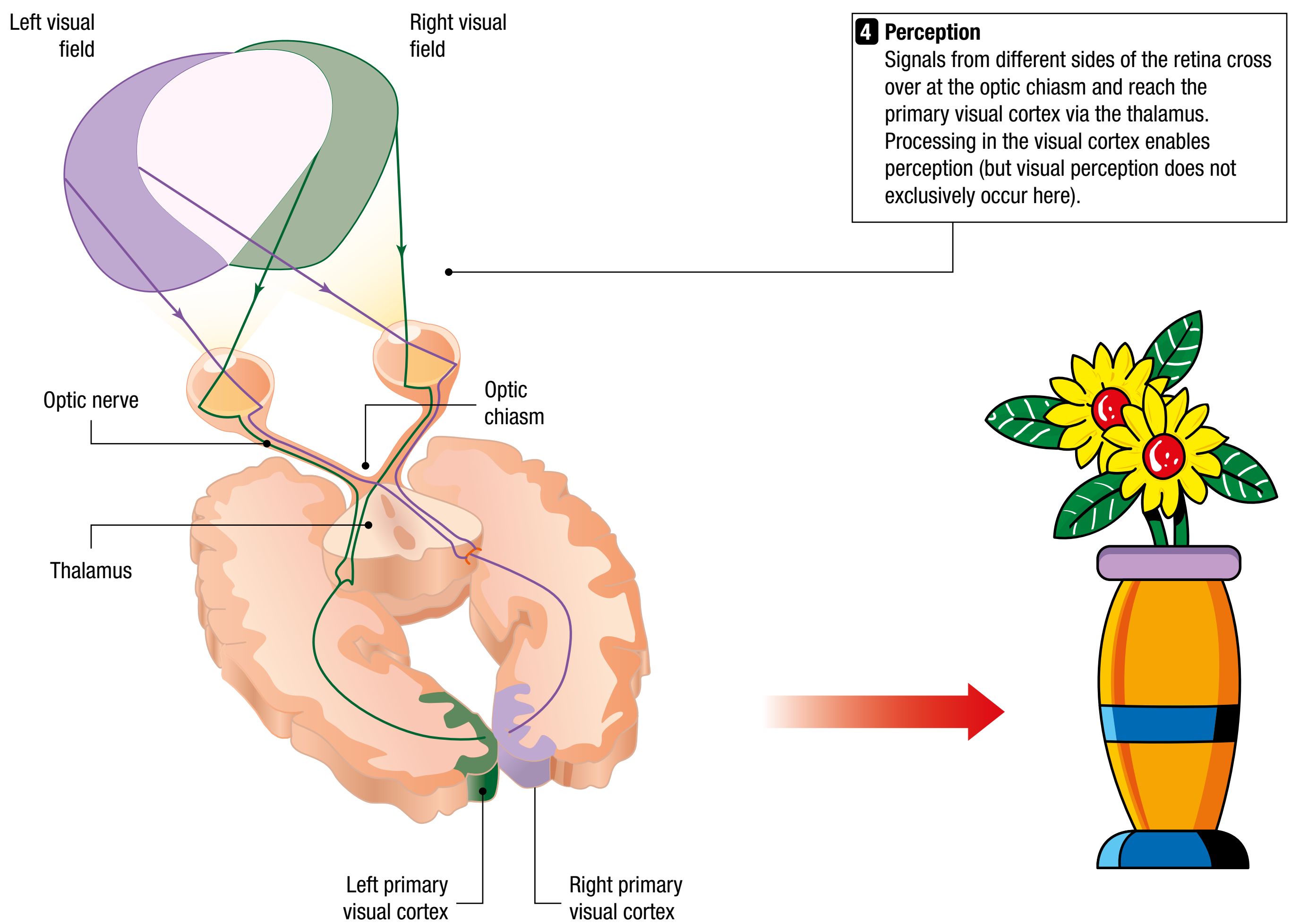


Figure 7.7 How we see — biological processes in visual sensation and perception

optic nerve. The **optic nerve** carries the visual information from the retina to the primary visual cortex. The optic nerve exits the eye at the back of the retina, the same point where blood vessels enter and exit the eye. There are no rods or cones here so it is known as the blind spot. The term **blind spot** refers to the fact that there are no photoreceptors on that small area of the retina so light cannot be detected there. This means that any part of a visual image that is focused on this 'spot' will not be visually processed and we will remain 'blind' to it.

We are seldom aware that we have a blind spot and that some visual information escapes us. If visual information entering one eye hits the blind spot, usually the other eye provides information that can compensate for any gaps in the overall image. This occurs because we receive slightly different images on each retina (as the eyes are set a small distance apart). Therefore, the gap in visual information from one retina can be filled in by the equivalent part of the image from the other retina.

The optic nerve provides the pathway for the transmission of action potentials carrying visual information to the primary visual cortex, via the thalamus. The axons of ganglion cells in the optic nerve that originate from the left side of each retina transmit visual information that reaches the left visual cortex. The axons that originate from the right side of each retina transmit visual information to the right visual cortex. This occurs because the transmission of visual information from each retina involves a partial cross-over of neural pathways. The point where the axons cross is called the **optic chiasm** (see Figure 7.7 below).



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Zimbardo on sensation and perception 14 m 13 s

BOX 7.2 Visible light

The human eye captures and responds to visible light. Light is a part of the range of electromagnetic energy (radiation) to which we are exposed. Electromagnetic energy is a form of energy produced by electrically charged particles that travel in waves. Light waves vary in length (frequency) and height (amplitude). The length of the waves (wavelength) determines the colour of the light. The height of the waves determines the intensity of the light.

Photoreceptors in the human eye are sensitive only to a very narrow range of electromagnetic waves commonly called the *visible light spectrum*. The visible light spectrum extends from about 380 nanometres (perceived as violet light) to about 780 nanometres (perceived as red light) depending on which source is used. It also depends on the sensitivity of an individual's eyes. One nanometre is equivalent to one billionth of a metre. Electromagnetic waves outside the visible light spectrum cannot be detected by the human eye. For example, waves of 350 nanometres and 810 nanometres would not normally be detected.

While the human eye responds only to a limited range of wavelengths in the electromagnetic spectrum, other species can detect certain wavelengths that we cannot. For example, many insects are capable of responding to wavelengths shorter than 380 nanometres (they can detect ultraviolet), and reptiles and fish respond to wavelengths greater than 780 nanometres (they can detect infra-red).

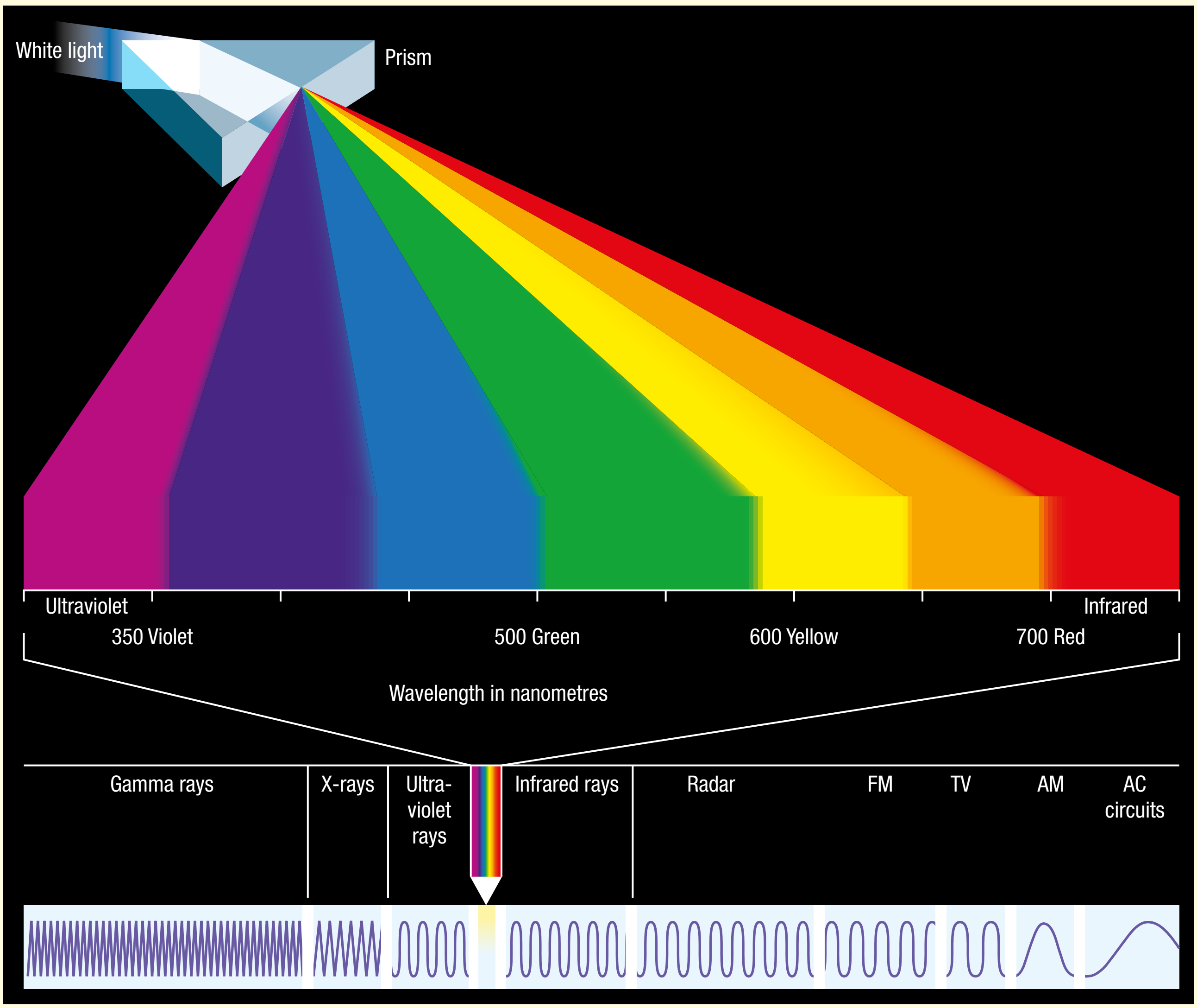


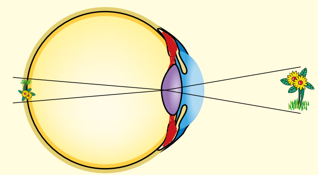
Figure 7.8 The visible light spectrum is just a tiny 'slice' of the total electromagnetic energy (radiation) spectrum.

BOX 7.3 Visual impairments

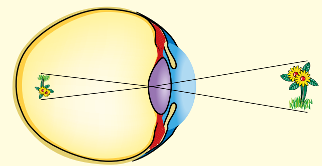
Some visual impairments develop because of abnormalities in the structure of the eye. In particular, either the eye itself is misshapen (e.g. too short or too long), a structural part is misshapen (e.g. the cornea or the lens), or a structural part lacks flexibility. These are quite common problems that can be corrected with glasses, contact lenses or surgery to make vision clearer.

Farsightedness (*hyperopia*) means that you can see better far away than you can close up. This occurs when the distance between the lens and the retina is unusually short because the eye is smaller than average. Incoming light is therefore focused behind the retina rather than on the retina, which blurs the image.

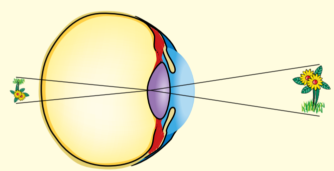
Nearsightedness (*myopia*) means that you can see better close up than you can at distances far away. This occurs when the distance between the lens and the retina is unusually long because the eye is larger than average. The light that is focused in the eye lands in front of the retina rather than on the retina, regardless of the lens elongating (or 'flattening') to its maximum length. Again, the image on the retina is not focused and is therefore blurry.



Normal vision The image is focused on the retina.



Nearsightedness (myopia) The eyeball is too long and incoming light waves focus in front of the retina, which blurs the image for distant objects.



Farsightedness (hyperopia) The eyeball is too short and incoming light waves focus behind the retina, blurring the image for nearby objects.

Figure 7.9 Common visual impairments

LEARNING ACTIVITY 7.3

Review exercise

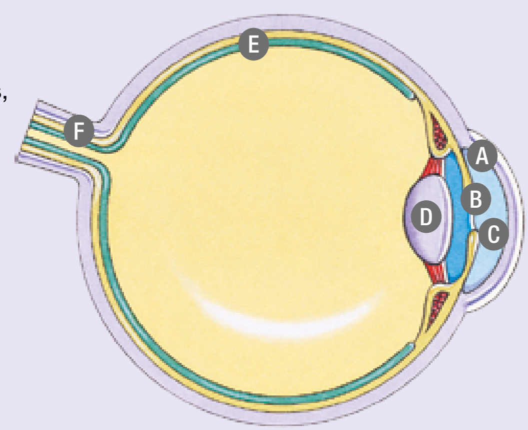
Part A Matching eye structures and functions

Match each structure in the left column with the correct function in the right column.

Structure	Function
1. cornea	a. a round band of muscles which expand and contract to control the amount of incoming light
2. pupil	b. focuses light onto the retina
3. iris	c. generates action potential
4. lens	d. protective cover on the eye and helps focus incoming light
5. photoreceptor	e. opening which helps regulate the amount of incoming light
6. retina	f. light sensitive visual receptor cell
7. ganglion cell	g. receives, absorbs and processes light

Part B Location of eye structures

Without looking at the diagram of the eye on page 369, identify the following structures on the diagram on the right: cornea, pupil, iris, lens, optic nerve, retina.



Part C Pathway of light in vision

Create a flow chart or another type of diagram which shows the pathway of light as it travels from the cornea to the retina. Identify the various anatomical structures through which light passes and briefly describe the role of each structure. Present your diagram digitally or as a poster on paper.

Visual perception principles

Visual perception principles are 'rules' that we apply to visual information to assist our organisation and interpretation of the information in consistent and meaningful ways. These help us to 'make sense' of visual information that is sometimes inconsistent or incomplete. We tend to automatically use these principles, without any conscious effort or awareness that we are doing so.

Visual perception principles can also be intentionally used. This can be seen in the work of artists, designers of road traffic signs and advertisers. For example, many artists make use of visual perception principles to give the impression of three-dimensional depth and/or distance on a canvas or piece of paper, which is a two-dimensional medium. Designers of road signs may also use visual perception principles to help ensure that the signs stand out in an often cluttered environment so that they can be interpreted and understood quickly. Symbols are also used by advertisers to attract attention to their products and services or to try to influence our interpretation in a certain way. For example, a symbol such as an abstract eye might be used as a company logo for a vision restoration clinic in order to draw our attention to it (through its novel or unusual form) and to consider the clinic whenever we see the symbol.

Visual perception principles can be classified into three broad categories: Gestalt principles, depth cues and perceptual constancies.

Gestalt principles

Gestalt principles of visual perception refer to the ways in which we organise the features of a visual scene by grouping them to perceive a whole, complete form. This is usually done in the simplest possible way. For example, if part of what we are looking at is hidden or covered, then, in order to make sense of what is being observed, we simply construct a 'whole' or complete form by mentally filling in the part that we cannot see. In this way, Gestalt principles help us construct a meaningful whole object from an assortment of parts that, when considered as individual bits, lack any real meaning. Artists experimented with the concept of parts which make up the whole long before Gestalt psychologists considered the principle scientifically.

Psychologists have identified numerous Gestalt principles that are used in visual perception. These include figure–ground organisation, closure, similarity and proximity.

Figure 7.10 A food artist has used Gestalt principles to create this buffet display. The individual 'parts' are various fruits and vegetables which are organised into the 'whole' form of a person.

Figure–ground organisation

Figure–ground is used when you read this sentence — the words printed in black (figure) stand out against the white paper (ground) on which they are printed. Similarly, a classroom teacher is perceived as the figure against the background of the rest of the classroom. When we use **figure–ground**, we organise visual information by perceptually dividing a visual scene into a 'figure', which stands out from the 'ground', which is its surroundings. By making an object the centre of our focus it becomes the figure, while all other visual information becomes the (*back*)ground.

Figure–ground organisation is generally achieved when we separate the figure from the ground using a line or boundary between the figure and ground, which may or may not exist in the scene. This line of separation between the figure and ground is known as a *contour*. The contour is always perceived as belonging to the figure. In Figure 7.11, the contour can belong to either the faces or the vase. This means that we can perceive either faces or a vase, depending on whether we view the faces or the vase as the figure.

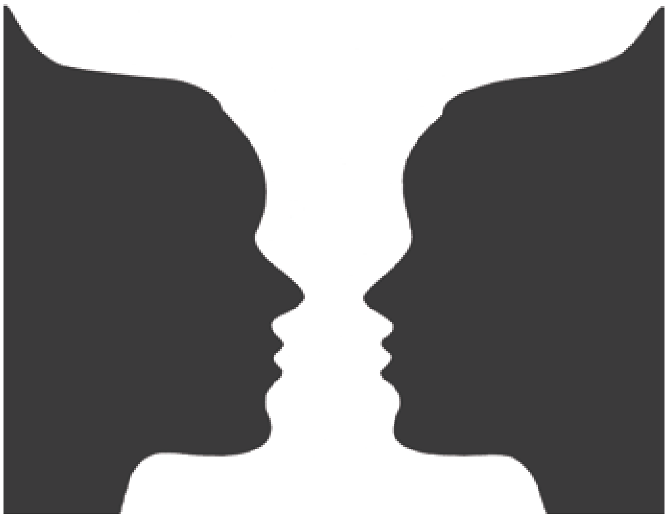


Figure 7.11 In 1915, the Danish psychologist Edgar Rubin produced an image like this one. It is commonly called an ambiguous or reversible figure. The term *ambiguous figure* refers to the fact it can be perceived as either two silhouetted faces in front of a white background or as a white vase against a black background. The term *reversible figure* refers to the fact that it can produce alternative perceptions based on whether we identify the faces or vase as the figure or ground. The differing interpretations of the image occur with shifts in attention and how we perceive the contour. When we focus our attention on the vase, the contour belongs to the vase and this separates it from the ground. When we focus on the two faces, they 'own' the contour and the vase becomes the ground.

Signs are frequently designed so that the figure stands out clearly from the background. Road traffic signs in particular, are designed so that the figure stands out from the background. For example, the letters on the 'STOP' sign in Figure 7.12 are written in white to stand out as the figure against a contrasting red background. Similarly, signs indicating speed limits that need to be seen quickly and clearly, make use of black numbers against a contrasting white background. The contours are attributed to the numbers, making them the figure against the white background.

Some artists make clever use of figure–ground in their works by presenting artworks that have an ambiguous contour. Normally, we can quickly perceive the contour as belonging to the figure, and the rest of the scene is perceived as the ground. Artists such as Maurits ('M.C.') Escher have produced many artworks that deliberately confuse the observer into making alternating interpretations of the same scene (see Figure 7.13 overleaf). The confusion occurs because the artworks make it possible for us to perceive the contour as belonging to either the figure or the ground, depending on our focus of attention. Visual stimuli that enable figure and ground to be perceived as 'legitimate' alternatives are commonly called *reversible figures*.

The importance of being able to attribute a contour to part of the stimulus (the figure) in order to separate it from the background is highlighted when we have difficulty in doing this. When this happens, either by design or unintentionally, it creates camouflage.

Camouflage occurs when the figure and ground are not easily separated, but blend together. Camouflage restricts our ability to separate the figure from the background because the colour(s) and pattern (or design) of the figure are similar to the background. For example, military uniforms are designed to use the colours of the surrounding environment so that the figure (soldier) is difficult to separate from the ground (environment) in which the soldier is located.

Figure 7.12 Road signs use the figure–ground organisation principle to support quick perception of their messages.

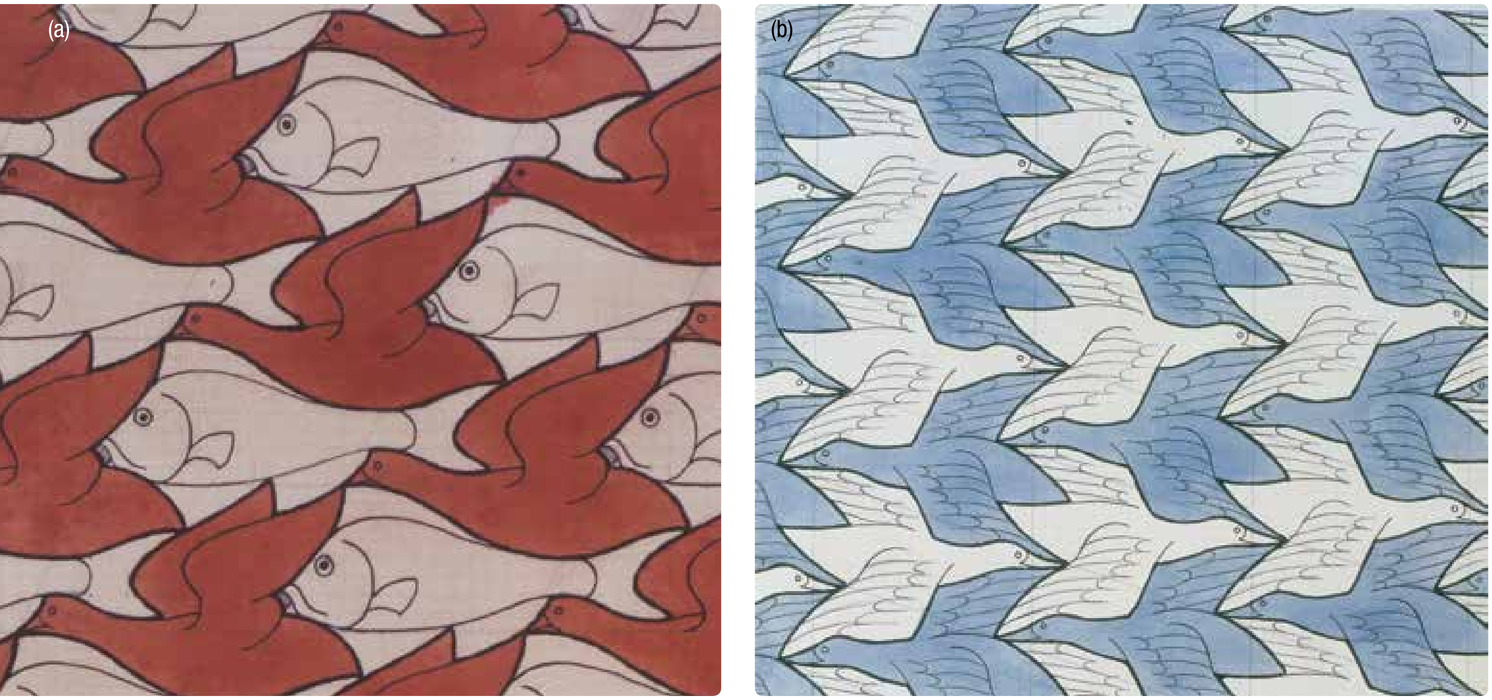


Figure 7.13 In these artworks, Dutch artist M.C. Escher (1898–1972) used figure–ground reversal to create an ambiguous figure from which two interpretations are possible. (a) Can you see birds and fish? (b) Can you see birds flying in two directions?

Figure 7.14 Can you find all the people in this photo? Camouflage makes them difficult to spot.

Closure

Closure is the perceptual tendency to mentally 'close up', fill in or ignore gaps in a visual image and to perceive incomplete objects as complete ('whole'). For example, with the IBM logo in Figure 7.15, we fill in the gaps between each of the horizontal lines to mentally form solid letters and/or ignore the gaps that prevent solid letters.

Closure is also applied to non-verbal information. For example, the standard sign for disabled people's facilities requires the use of closure to reach the interpretation of a person in a wheelchair. Similarly, we use closure to organise then interpret the shape in the Australian Made, Australian Grown logo as a kangaroo and the World Wildlife Fund logo is a panda.

Figure 7.15 Company logos and signs often require the use of closure by the observer to mentally complete an incomplete figure.

Similarity

The principle of **similarity** involves the tendency to perceive parts of a visual image that have similar features — such as size, shape, texture or colour — as belonging together in a unit, group or 'whole'. For example, this principle is used when we group people wearing the same uniform and identify them as belonging to the same team, school or workplace.

Similarity is applied by the designers of uniforms for school, sports teams, emergency services and defence forces personnel, as well as to uniforms worn by employees of commercial organisations such as fast food chains, supermarkets and petrol stations so as to identify people as belonging to a particular group. Whether it is students from different schools at a bus stop, players in opposing sports teams, or even bikies dressed in particular clothes that are typical of their gang, we visually group those who are dressed similarly and perceive them as belonging to the whole group.

Tests for colour blindness examine whether we have normal colour vision by requiring us to use the principle of similarity to group sections of the images in the test items to visually perceive numbers. These numbers will remain hidden if we are unable to group the dots accurately on the basis of colour. An example of an image like one used in tests of colour blindness is shown in Figure 7.16(b). Can you perceive the number 12?

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Online Ishihara colour blindness test

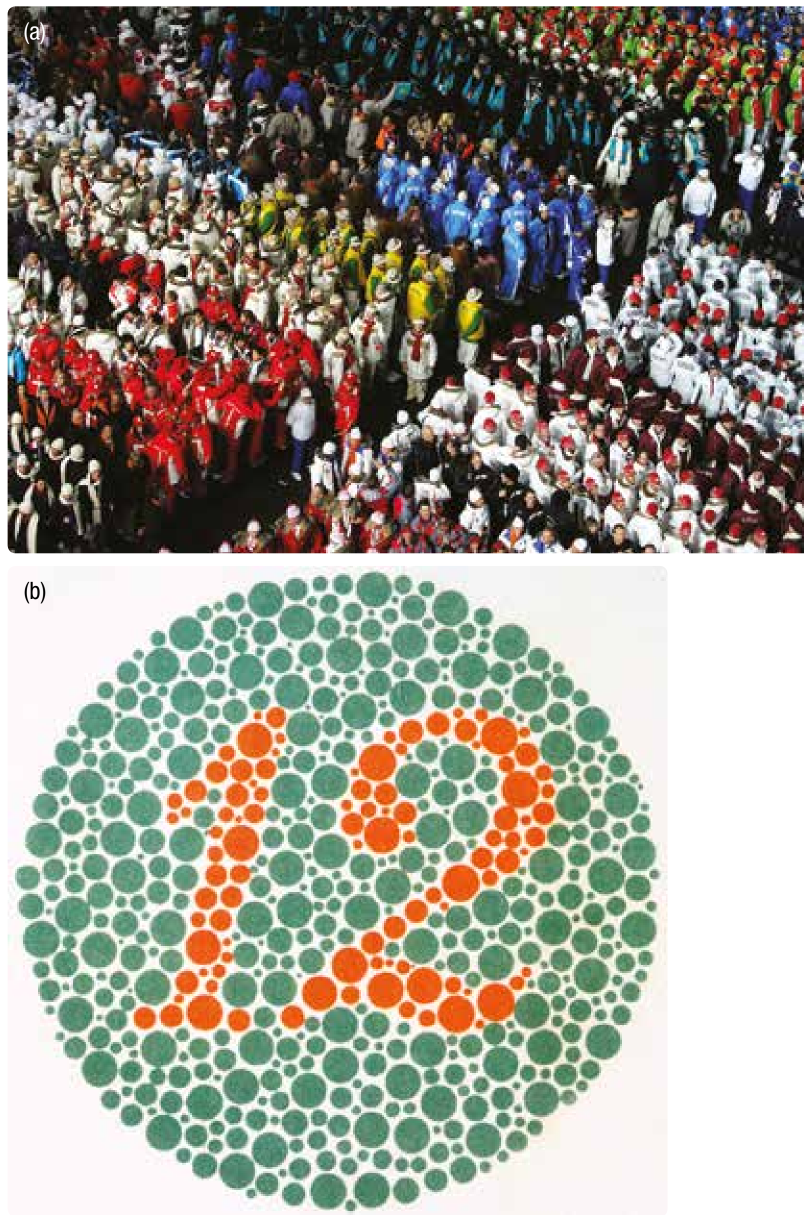

Figure 7.16 (a) Individuals in this photo can be perceived as belonging to different groups based on uniform colour when you apply the principle of similarity. (b) This image is similar to one used in the tests for colour blindness.

Proximity

The principle of **proximity** (also called *nearness*) is the tendency to perceive parts of a visual image which are positioned close together as belonging together in a group. We group the separate bits into a whole based on how close they are to each other. For example, a series of letters located physically close together might be grouped to be perceived as a word (see Figure 7.17), or a series of musical notes grouped together on a score may become a melody (see Figure 7.18).

Figure 7.19 shows two examples of the principle of proximity. In Figure 7.19(a) we perceive four horizontal rows of blocks, whereas in Figure 7.19(b) we perceive four vertical columns of blocks.

What's that on the road ahead?

What's that on the road a head?

Figure 7.17 The series of letters located physically close together might be grouped to be perceived as a word.

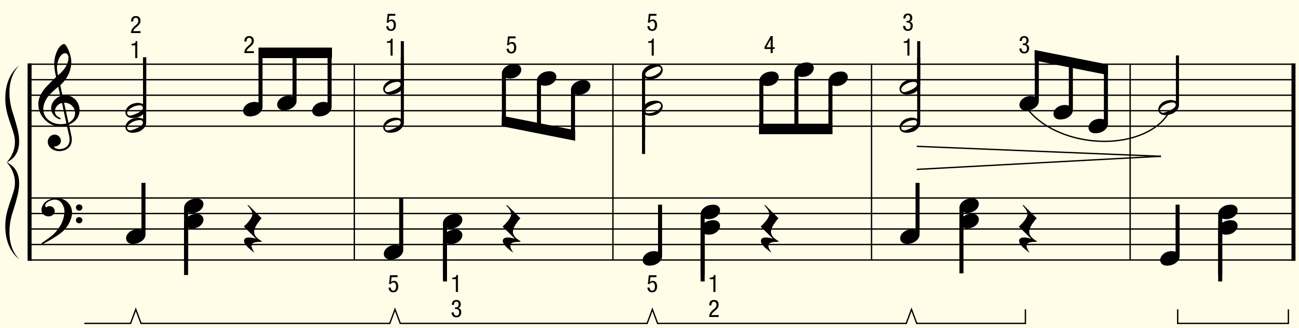

Figure 7.18 The musical notes that are closer together in this musical score will be perceptually grouped (by those who read music) to be interpreted as a melody.

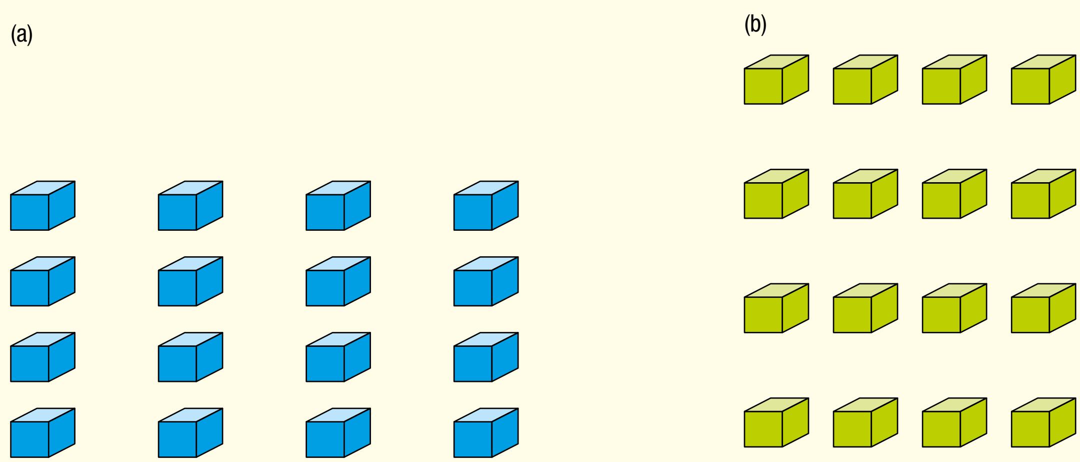

Figure 7.19 The proximity of the parts which comprise these two diagrams determines whether we perceive rows or columns.

BOX 7.4 Influence of socio-cultural factors on the use of Gestalt principles

Prominent Russian psychologist Alexander Luria (1902–1977) was a pioneer of a specialist area now called cultural or socio-cultural psychology. From this perspective, he queried Gestalt principles of perceptual organisation such as closure, proximity and similarity.

Many of the Gestalt principles had been developed from experimental research by German psychologists using participants who were university educated and lived in big cities such as Berlin and Munich. Luria was interested in finding out whether the Gestalt principles were also relevant to people from other socio-cultural backgrounds. He was particularly interested in studying people who lived in rural areas and did not have any formal education.

In what is regarded by many psychologists as a pioneering study, Luria (1976) conducted experimental research using five groups of participants which he described as follows:

1. Ichkari women living in remote villages who were illiterate and not involved in any modern social activities
2. peasants in remote villages who were illiterate (and self-supporting)
3. women who attended short-term courses in the teaching of kindergarten children. As a rule, they still had no formal education and almost no literacy training.
4. active kolkhoz (collective farm) workers and young people who had taken short courses. They actively involved themselves in running the farms; had acquired a much broader outlook than had the isolated peasants; had attended school only briefly; and many were still barely literate.
5. women students admitted to a teachers' school after two or three years of study. Their educational qualifications, however, were still fairly low.

In sum, Groups 1 and 2 had no formal education and were illiterate, Groups 3 and 4 were semi-literate, and Group 5 had been formally educated and were literate.

Luria was concerned that an experiment in a laboratory setting would be entirely inappropriate. He believed that such a formal situation would be too far removed from the real life experiences of many participants and may therefore influence the results in unwanted ways. Instead, he conducted a field experiment during which he tested participants in what he described as their 'habitual' (or normal) environments. In his research report, he described a part of his procedure as follows:

> *As a rule our experimental sessions began with long conversations (sometimes repeated) with the subjects in the relaxed atmosphere of a tea house — where the villagers spent most of their free time — or in camps in the fields and mountain pastures around the evening campfire.*

Luria and his research assistants tested participants with the visual stimuli shown below in Figure 7.20. When asked to name the shape in each stimulus, the formally educated female students (Group 5) were the only ones who identified each items using the correct term.

For example, items 1–3 were all identified as a circle, regardless of whether it was made of a solid line (item 1), an incomplete line (item 2) or a solid colour (item 3). However, most of the participants in Groups 1–4 named the shapes according to the objects they resembled. For example, a circle was called a watch, plate or moon, and the square was called a mirror, house, or even an 'apricot-drying board'. When asked if items 12 and 13 were alike, one Group 1 participant answered, *'No, they're not alike. This one's not like a watch, but that one's a watch because there are dots'.*

Based on his research findings, Luria suggested that Gestalt principles may only be relevant to people who have studied geometrical concepts in a formal education system, such as in a school or university. Contemporary psychologists have suggested that experience with two-dimensional drawings on a sheet of paper may also be a factor that explains the results (Matsumoto, 2000; Price & Crapo, 1999).

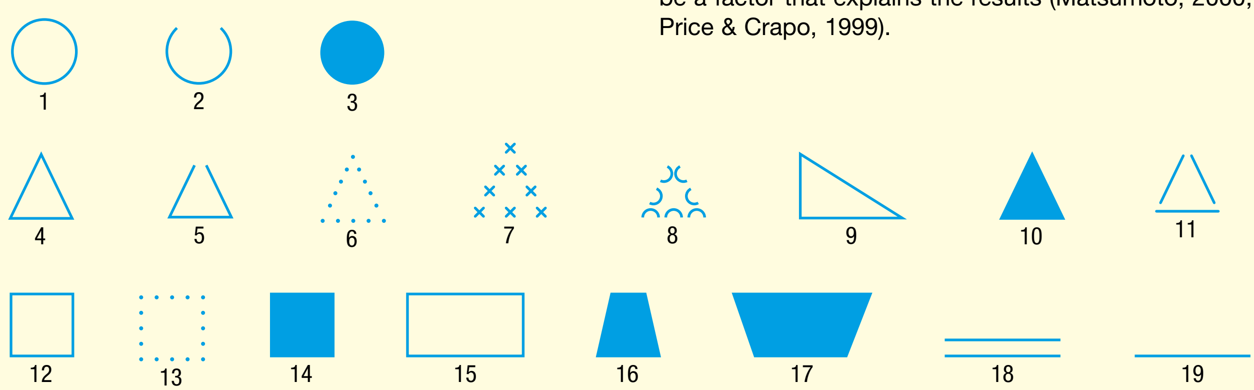

Figure 7.20 Luria's visual stimuli

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Socio-cultural research findings on the use of Gestalt principles — options and variations

LEARNING ACTIVITY 7.4

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Word copy of table

Review questions

1. Explain the meaning of:
   (a) visual perception principle
   (b) Gestalt principle of visual perception.
2. Complete the table below to summarise four Gestalt principles described in the text and an additional principle you identify through your own research. Write a definition of each principle and give two examples of artworks, signs and/or symbols that illustrate the four principles in the text. For each principle, one of the examples should be your own. For the fifth principle you identify, include at least two examples in total.

Principle	Definition	Examples
figure–ground		
closure		
similarity		
proximity (nearness)		

3. Outline how Luria investigated the role of socio-cultural influences on the use of Gestalt principles, as described in Box 7.4 on page 379.

LEARNING ACTIVITY 7.5

Application of Gestalt principles

1. Consider the image in Figure 7.16(b) on page 377, which is like those used to diagnose colour blindness. When tested for colour blindness, people are required to visually perceive a number located within the stimulus figure. Explain, with reference to two Gestalt principles, how someone who is not colour blind (or colour weak) would visually perceive the number within the visual stimulus.
2. Identify two Gestalt principles used to organise and interpret the figure shown in Figure 7.21 below.
   For each of these principles:
   - describe the area of the figure to which you are referring
   - name the relevant principle
   - explain how it contributed (or could have contributed) towards your interpretation of the whole figure.
3. Consider Figure 7.22 below. Do you perceive a young woman with her head turned away, or an old woman with a large nose, in semi-profile? Explain the alternate perceptions of the image with reference to figure–ground.

Figure 7.21

Figure 7.22

BOX 7.5 Research on the Gestalt approach to visual perception

Israeli psychologist David Navon was intrigued by the Gestalt approach to visual perception. In particular, Navon was interested in whether we first perceive the elements (parts) of a visual scene and build them up to a whole, complete image, or whether we perceive the whole first and then perceive the elements through further visual processing.

In order to conduct an experiment on this question of research interest, Navon (1977) distinguished between 'local' and 'global' features of a visual stimulus. The 14 participants were required to briefly observe a large letter (global feature) that was made up of many small letters (local features) such as those shown in Figure 7.23.

Each participant was required to make responses under two different experimental conditions. The conditions required their attention to be focused either globally ('the whole') or locally ('the parts'). In the globally focused condition, the participant had to indicate whether the *global letter* was the letter H or the letter S. In the locally focused condition, the participant had to indicate whether the *local letter* was the letter H or the letter S. On half the trials the global and local letters were the same letter of the alphabet, and on the other half they were different, as shown in Figure 7.23.

The participants were asked to identify the letters as quickly and accurately as possible. They were paid a monetary bonus for their responses. The amount paid depended slightly on speed, but more on accuracy. Navon recorded the speed and accuracy with which participants could recognise the same or different global/local letters.

The results showed that the type of local letters used (whether the same or different from the global letter) had no effect on the speed with which the global letter was recognised. However, identification of the small, local letters (that is, accuracy) was less accurate when the global and local letters did not match.

From these results, Navon concluded that we mentally process the whole before we analyse the parts (or detail); that is, we perceive the entire global letter before we start to analyse its composition of local letters.

Drawing on the results of Navon's experiment, some psychologists have argued that it may be virtually impossible to avoid perceiving the whole (Eysenck & Keane, 1990). However, researchers who have replicated Navon's experiment to test factors that may influence a global preference have found that variables such as mood state, motivation and cultural background can influence the results, sometimes even producing opposite results (Dale & Arnell, 2014; Davidoff, Fonteneau & Fagot, 2008).

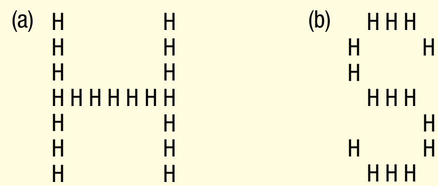

Figure 7.23 (a) Global and local letters that are the same (b) Global and local letters that are different

LEARNING ACTIVITY 7.6

Analysis of research by Navon (1977) on visual perception

Consider the experiment by Navon (1977), described in Box 7.5 above, on how research participants 'mentally processed' local and global features of a visual stimulus.

Analyse the research by answering the following questions.

1. What is the aim of this experiment?
2. Identify the operationalised independent and dependent variables in the experiment.
3. Identify the two conditions of the experiment.
4. Briefly state the results obtained by Navon.
5. Briefly state the conclusion(s) that was drawn from these results.
6. Identify any extraneous or confounding variables that may not have been adequately controlled and suggest why they may have affected the results.
7. To what extent can the results be generalised to visual perception by people in everyday life? Explain your answer.

Depth cues

One of the most important tasks of our visual perception system is to locate objects in space. Without this ability, we would find it difficult to navigate and interact with our world. In order to locate objects in space, we need to judge whether one object is above, below, or to the left or right of another. We also need to judge how far away objects are from each other and ourselves.

We need to make these judgments automatically and rapidly or our interaction with the world would be something like being in continual slow motion. Judgments about where objects are in space enable you to efficiently reach for a pen on your desk. They are also vital for your survival. For example, when crossing a street you need to judge where approaching vehicles are in relation to yourself and judge the distances between you and the vehicles so that you safely reach the other side. Locating objects in space involves depth perception.

Depth perception is the ability to accurately estimate the distance of objects and therefore perceive the world in three dimensions. Many psychologists describe our depth perception as a 'remarkable' ability because objects in our world are arranged in three dimensions — length, width and depth — but our retinas hold only two-dimensional images of the world around us.

Depth cues provide the information that enables us to translate the two-dimensional images on the retinas into three-dimensional reality. **Depth cues** are sources of information from the environment (external cues) or from within our body (internal cues) that help us to perceive how far away objects are and therefore to perceive depth. Depth cues are often categorised into two groups — binocular or monocular.

Binocular depth cues

Binocular depth cues require the use of both eyes working together in order to provide information to the brain about depth and distance. These cues are especially important in determining the distance of objects that are relatively close. Consequently, if for some reason our vision is limited to the use of only one eye, tasks requiring us to focus on detail over short distances can be difficult to accomplish.

Convergence

Imagine you are watching someone approach a small, round, shiny object on the footpath. If you could watch their eyes as they picked it up and brought it in close to their eyes to work out what it is, you would see their eyeballs turning in slightly towards their nose. If they held the object right up near the tip of their nose, their eyeballs would turn inwards ('converge') like the girl's eyeballs in Figure 7.24.

Convergence involves the brain detecting and interpreting depth or distance from changes in tension in the eye muscles that occur when the two eyes turn inwards to focus on objects that are close. The brain interprets greater tension in the eye muscles as an object gets closer and less tension as an object gets further away.

Convergence is particularly useful when the object we are looking at is within about six metres. Beyond this distance, the lines of sight from our eyes to the object are virtually parallel and there is no need for our eyes to converge to keep the object in focus. For example, fully extend one of your arms in front of you and point a finger upwards. Slowly move the finger towards your nose. You should be able to 'feel' the muscle tension associated with the convergence of your eyes, particularly as your finger gets very close to your nose. Your eye muscles relay this information to your brain, enabling you to make judgments about how far away your finger is as you focus on it.

Figure 7.24 Convergence involves the two eyes turning inwards to focus on objects that are very close.

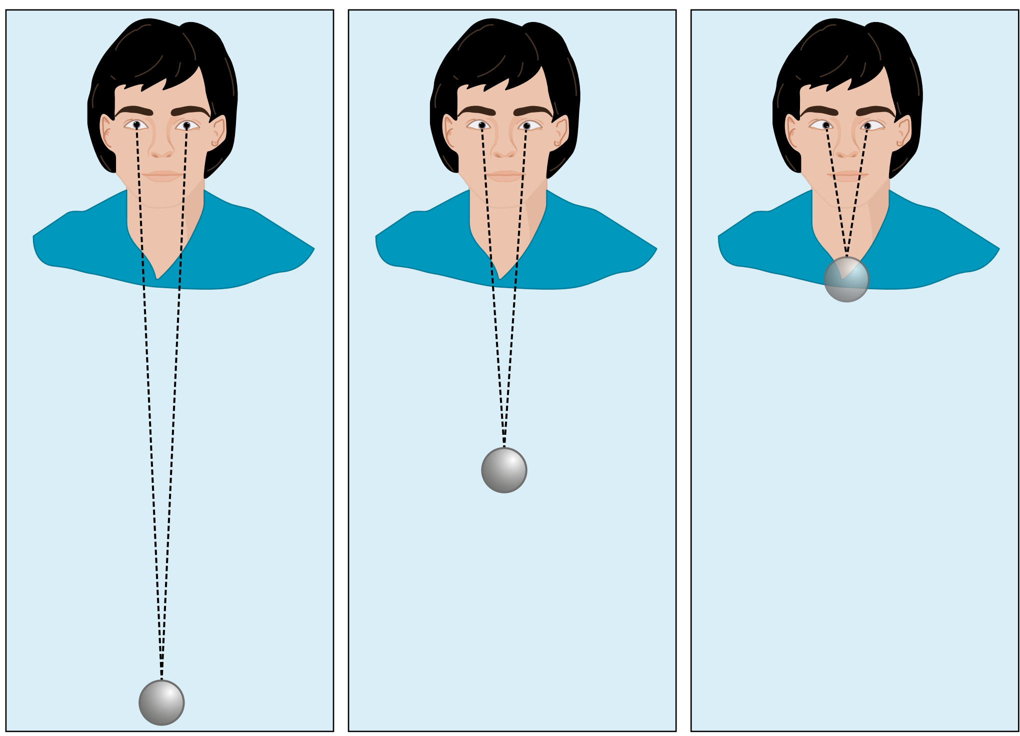

Figure 7.25 Our brain receives information from the muscles that turn each eye in towards the nose as an object in focus gets closer. The change in muscle tension is used by the brain to perceive depth and distance.

Retinal disparity

Because our eyes are about six or seven centimetres apart, each retina receives a slightly different visual image due to the different angle of view from each eye. The difference in the visual image cast on each retina decreases as the object we are viewing moves further away from us. Beyond about 10 metres or so, there is hardly any difference in the image cast on each retina.

Retinal disparity refers to the very slight difference ('disparity') in the location of the visual images on the retinas (due to their slightly different angles of view), which enables us to make judgments about the depth or distance of an object.

When the two different retinal images are fused (combined) in the brain, the images received from each eye are compared. Any disparity or difference between the two images provides information about the depth of the object or its distance from the viewer.

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Video on Magic Eye images and how to perceive 30 m 1 s

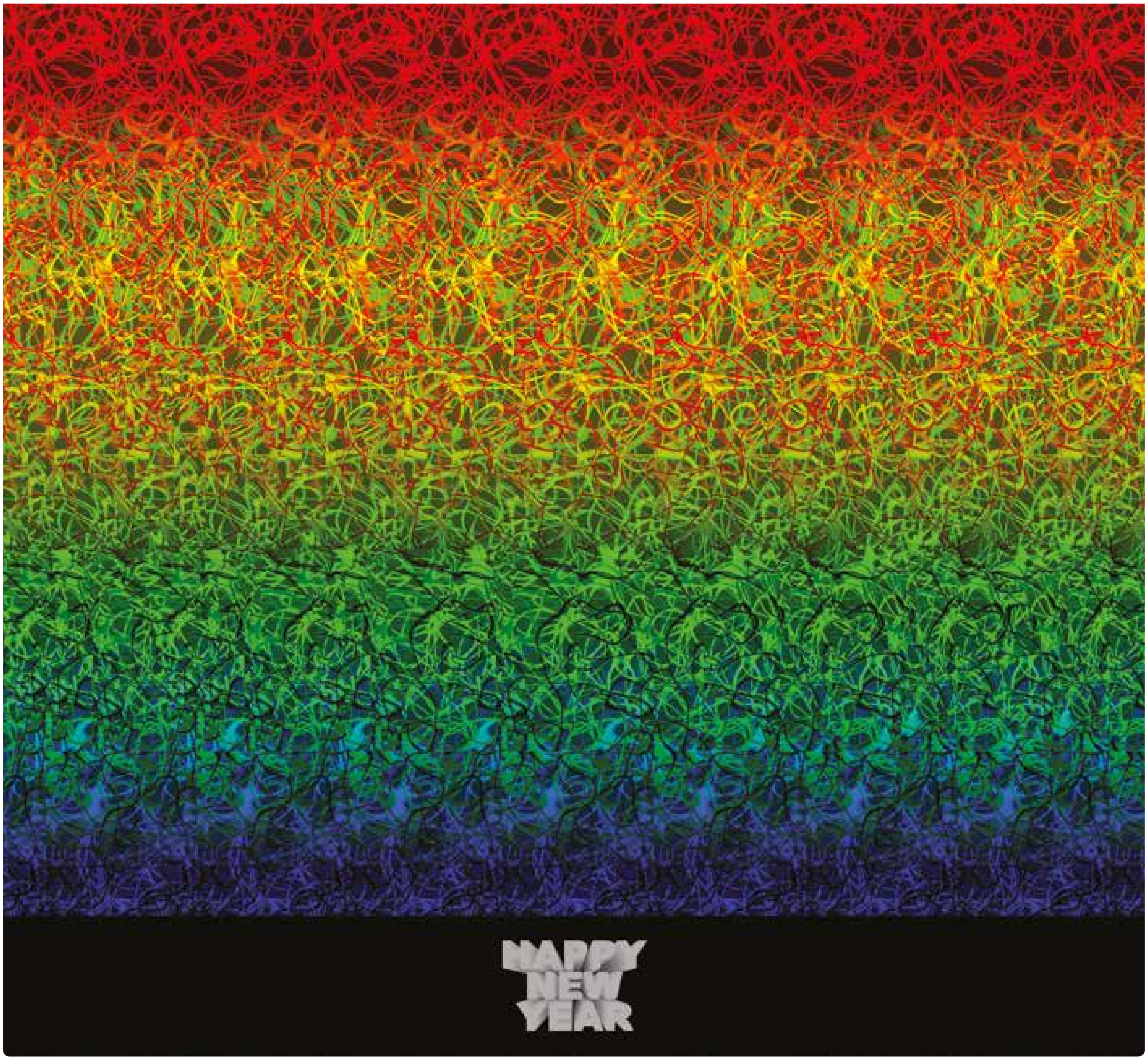

Figure 7.26 'Magic Eye' images take advantage of retinal disparity. Hold the centre of the image right up to your nose. It should be blurry. Stare as though you are looking through the image. Very slowly move the image away from your face until you begin to see depth. Now hold the image still and try not to blink. Most people eventually see the three-dimensional image and the message within.

LEARNING ACTIVITY 7.7

Demonstration of retinal disparity

To see how retinal disparity changes with distance, hold a pencil vertically about 10 centimetres in front of you, then close one eye and notice where the pencil is in relation to the background. Next, open that eye, close the other one and notice how much the pencil 'shifts'.

These are the two different views of the pencil received by each eye. If you repeat this procedure while holding the pencil at arm's length, you will notice less disparity or 'shift' because there is less difference in the angles at which the two eyes view the pencil.

Monocular depth cues

Monocular depth cues require the use of only one eye to provide information to the brain about depth and distance, but they also operate with both eyes. Most depth cues are monocular, so we can still perform many of our daily activities without difficulty if we lose vision in one eye.

Monocular depth cues include accommodation, and pictorial cues such as linear perspective, interposition, texture gradient, relative size, and height in the visual field. Pictorial cues are commonly used to create depth and distance in artworks.

Accommodation

The size of the visual image of a large object viewed at close range would normally be too large to fit onto the retina. The lens in each eye plays a key role in enabling images of close, large objects to fit onto each retina. The flexibility of the lens enables it to bulge to fit ('accommodate') close objects on the retina and to elongate (flatten) when looking at objects that are further away. The closer (and therefore larger) the object, the more the lens needs to bulge to fit the object's image on the retina.

Accommodation involves the automatic adjustment of the shape of the lens to focus an object in response to changes in how far away the object is. The brain monitors the movement of the ciliary muscles that control the shape of the lens. The ciliary muscles contract to enable the bulging of the lens, and expand to allow it to elongate (flatten), as shown in Figure 7.27.

Information about how much the lens bulges or elongates is used by the brain to determine the depth and distance of the object in focus. For example, as you watch a golf ball leave the club head and travel 200 metres down the fairway, the lens quickly elongates. Alternatively, as you watch a basketball come towards you, the lens quickly bulges.

Pictorial cues

Many monocular depth cues are referred to as pictorial cues. **Pictorial cues** are so named because artists use them to create depth and distance on two-dimensional surfaces such as paper and canvas. Pictorial cues include linear perspective, interposition, texture gradient, relative size and height in the visual field.

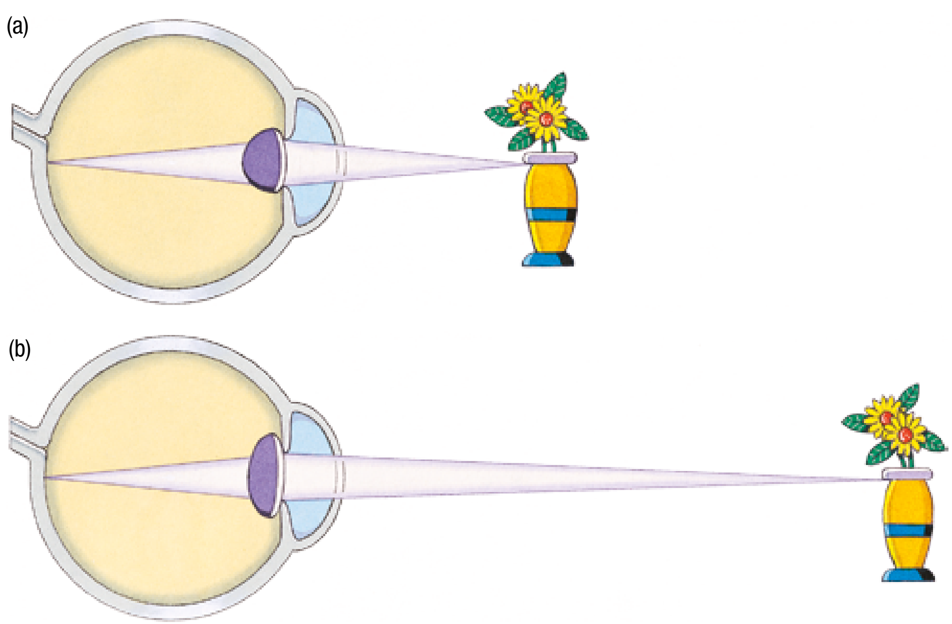

Figure 7.27 (a) The lens bulges to focus the light rays reflected from a nearby object such as the flowers. (b) The lens elongates (flattens) to focus the light rays when the object is further away.

Linear perspective

When you are travelling in a car on a long, straight highway through the countryside and you look ahead, the view through the front windscreen is one of a road that appears to be narrowing. In fact, if you look all the way to the horizon, it will look as if the two parallel edges of the road have come together to a single point. This illustrates the depth cue called linear perspective. **Linear perspective** is the apparent convergence of parallel lines as they recede ('go back') into the distance.

Interposition

When we see two footballers racing for the ball from a front-on perspective, it's sometimes difficult to tell which player is going to get there first. However, when one player starts to block our view of the other, we know that the partially 'covered' player is behind the other player and therefore further away. The image received on the retina of one footballer overlapping the other provides the brain with information about which player is closer and which player is further away. **Interposition**, also called *overlap*, occurs when one object partially blocks or covers another, and the partially blocked object is perceived as further away than the object that obscures it (and vice versa).

Figure 7.28 Linear perspective is evident in this photo by the parallel tracks and other lines that appear to converge as they recede into the distance.

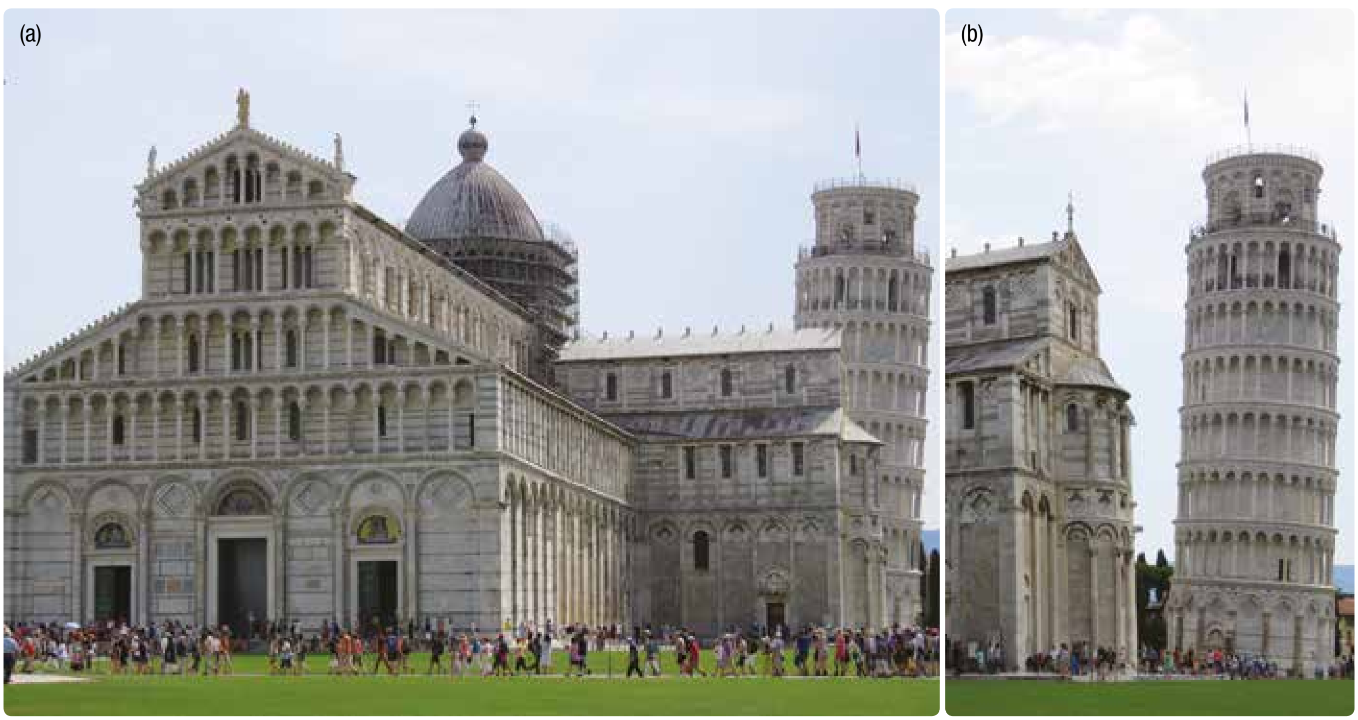

Figure 7.29 (a) The building on the left partially covers the Tower of Pisa on the right so we can use interposition as a depth cue to judge that the tower is further away than the building that covers it (and vice versa). (b) Non-availability of the interposition cue from another viewpoint makes it difficult to judge which of the two buildings is more distant.

Texture gradient

When we look down a long pathway made of pavers, the amount of detail that we can perceive in the pavers reduces more and more the further we look. For example, at our feet we can see individual pavers that make up the pathway, whereas if we look 30 or 40 metres further along the pathway, it looks like a single surface, with little detail.

Texture gradient refers to the gradual reduction of detail that occurs in a surface as it recedes into the distance, compared with a surface that is close and perceived in fine detail. Thus, our judgment about depth and distance is influenced by the extent to which we can detect fine detail. We perceive objects for which fine detail is clear as being closer and those that lack detail, as being further away.

Figure 7.30 Note that the pavers and vegetation closest to us in this photo can be seen in detail and as these recede into the distance they become a blur and less detail is apparent. This use of texture gradient helps us to judge depth and distance. Linear perspective is also helpful, demonstrating that we use combinations of depth cues.

Relative size

Imagine watching a cartoon about outer space. The cartoon shows a huge explosion of a planet and pieces flying through space in all directions. Some of the pieces appear to be hurtling towards you. How does the artist who draws each separate image that makes up this scene lead you to perceive how far away the pieces are?

The pieces that appear to be coming towards us are drawn as larger in each image than those going away or sideways from the exploding planet. The size of the pieces in relation to each other provides us with information about distance from us. As we move around in the real world, we use this information about the size of objects in relation to each other to judge depth and distance.

Relative size refers to the tendency to visually perceive the object that produces the largest image on the retina as being closer, and the object that produces the smallest image on the retina as being further away. However, the objects being perceived must be *expected* to be about the same size in real life. For example, we do not necessarily perceive that a car is further away than a truck because the car is smaller. We take into account what we *know* about their size, which is learned through past experience, and enables us to become familiar with the size of different objects in our environment.

Figure 7.31 Photo (a) shows a man leaning against a wall in the foreground and two men in the background. Our familiarity with the relative size of objects enables us to perceive the largest image on the retina (the man leaning against the wall) as closer than the smaller images on the retina (the other two men). Photo (b) has been manipulated. The retinal-sized image of the man in the white shirt has been placed next to the man leaning against the wall so that both the man leaning against the wall and the man in the white shirt are the same distance from the observer. If you measure the height of the image of the man in the white shirt you will realise that he is exactly the same size in both photos.

Height in the visual field

When we draw a picture, objects that are in the sky, such as clouds, birds and planes, will be perceived as further away when they are drawn near the horizon. When we draw objects on the land, such as trees, animals and cars, they will also be perceived as further away when they are drawn near the horizon. **Height in the visual field** refers to the location of objects in our field of vision, whereby objects that are located closer to the horizon are perceived as being more distant than objects located further from the horizon.

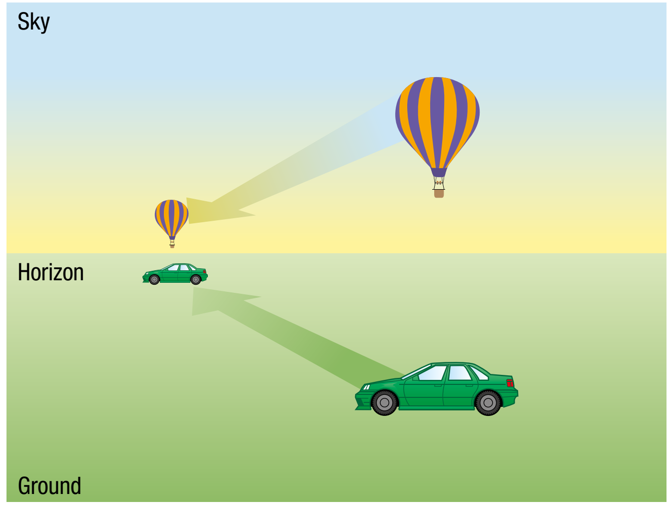

Figure 7.32 The hot-air balloon that is higher in the visual field is perceived as closer than the other balloon as it is further away from the horizon. The car lower in the visual field (but also below the horizon) is also perceived as closer, as it is further away from the horizon.

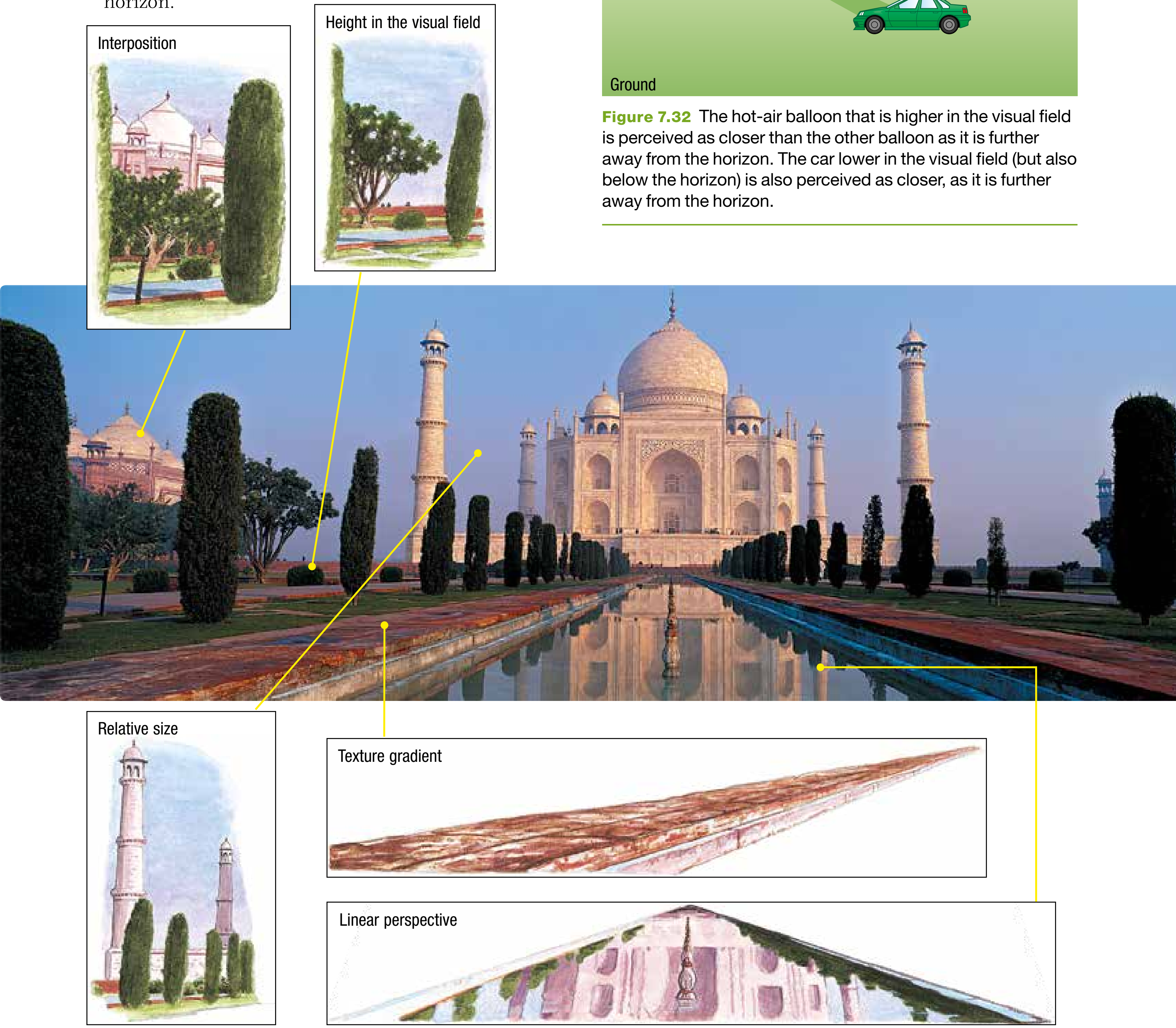

Figure 7.33 The photo above of the Taj Mahal illustrates the use of all five pictorial depth cues.

BOX 7.6 Cultural differences in pictorial depth cues

Look at the picture of the hunting scene in Figure 7.34 below. This was used to test the ability to respond to pictorial depth cues. Which animal is closer to the hunter, the elephant or the antelope?

Using pictorial depth cues (monocular), you probably chose the antelope. The picture was shown to tribal Bantu indigenous people in Africa, who had little or no formal education and lived in isolated areas. Many of these participants selected the elephant, which is physically closer to the tip of the spear in the picture.

The researcher classified this answer as a two-dimensional response. The Bantu people had not used the interposition depth cue, nor had they taken into account what they know about the relative size of the animals; that is, that an elephant is bigger than an antelope (Hudson, 1962).

This cultural evidence also indicates the importance of past experience in visual perception. It is possible that the Bantu who made incorrect perceptual judgments did so because they had limited opportunities to see three-dimensional representations in two-dimensional forms. Therefore, they have difficulty judging distance from pictures (Deregowski, 1989).

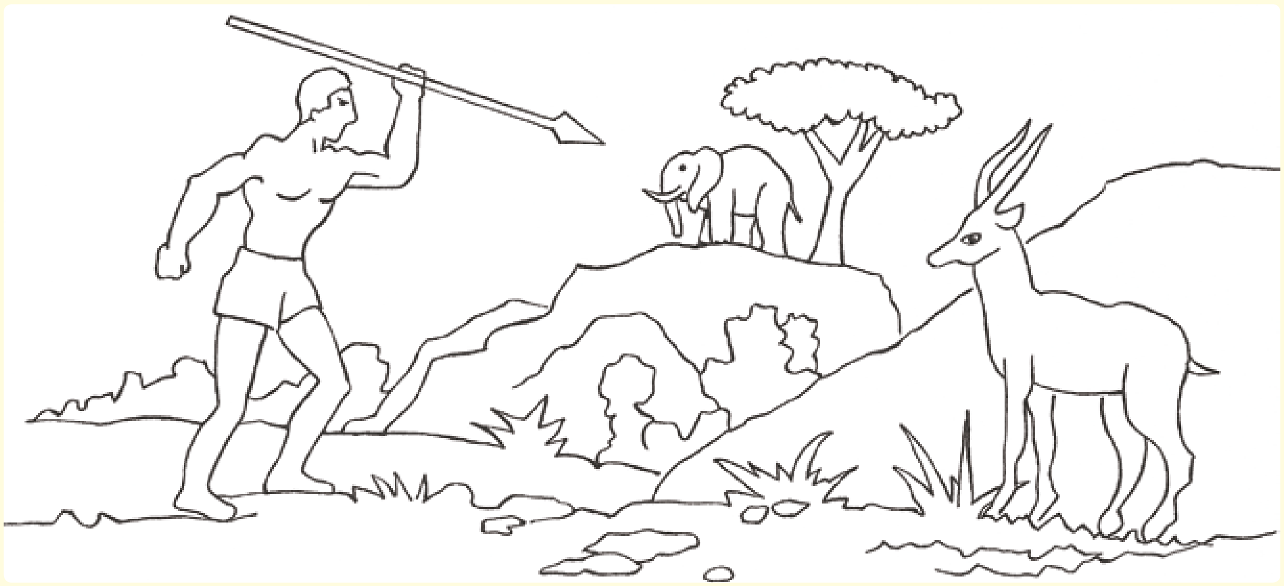

Figure 7.34 Which animal is closer to the hunter?

LEARNING ACTIVITY 7.8

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Word copy of table

Summarising depth cues

Complete the table below to describe and classify each depth cue listed, and give an example that illustrates each cue.

Depth cue	Description	Monocular (M) or Binocular (B)	Example
convergence			
retinal disparity			
accommodation			
linear perspective			
interposition (overlap)			
texture gradient			
relative size			
height in the visual field			

LEARNING ACTIVITY 7.9

Review questions

1. (a) Briefly describe a task that would be difficult for a person with sight in only one eye.
   (b) Which depth cues would this person be unable to use?
   (c) How would the inability to use both eyes affect the person's performance on this task?
2. The lens can alter its shape for near or distant objects.
   (a) Name the depth cue that uses information associated with change in lens shape.
   (b) Explain how and why the lens would change shape as a jeweller looks on a shelf for a tiny part to repair a watch, then closely inspects the part.
3. The retina receives a two-dimensional image, yet we visually perceive a three-dimensional environment. Explain how this occurs, with reference to depth cues.
4. Examine the Renaissance painting shown in Figure 7.35 and the street scene in Figure 7.36. Identify three depth cues that are evident in the artwork and three in the photo.
5. Explain, with reference to three examples of pictorial cues, why it is difficult to judge depth or distance in Figure 7.37.

Figure 7.35 *The Annunciation* by Crivelli, c.1430–95. © The National Gallery London

Figure 7.36

Figure 7.37

LEARNING ACTIVITY 7.10

Visual presentation using depth cues to perceive depth and distance

Prepare a digital presentation or A3-size poster that identifies, describes and explains the use of pictorial depth cues in an artwork. The presentation should include a copy of the artwork.

You could use an artwork you may have created yourself (such as a painting or photograph). When selecting the artwork, ensure that at least three of the following pictorial cues can be identified: linear perspective, interposition, texture gradient, relative size and height in the visual field. Figure 7.33 on page 387 shows a way of organising your presentation.

LEARNING ACTIVITY 7.11

Reflection

What are some of the difficulties that could be experienced in everday life if someone had impaired depth perception?

Perceptual constancies

As we move around, the images that are cast on each retina are constantly changing. Yet, we still perceive the world as a fairly stable place. Objects such as trees, houses and people are not perceived as changing in size, shape or brightness from one minute to the next. Despite the stable nature of the real world, visual information received at the retinas *is* constantly changing. For example, as you move away from an object, such as a tree, the size of the image it casts on the retina becomes smaller. But you do not perceive the tree to be shrinking. Similarly, a car is not perceived as changing in shape as we walk around it and view it from different angles, despite the fact that different shapes are produced on the retina. These are examples of what is known as perceptual constancy.

In vision, **perceptual constancy** refers to the tendency to perceive an object as remaining stable and unchanging ('constant') despite any changes that may occur to the image cast on the retina. Three of the perceptual constancies involve size, shape and brightness.

Size constancy

Size constancy involves recognising that an object's actual size remains the same, even though the size of the image it casts on each retina changes. For example, when you are on a railway station platform watching a train coming towards you, the image it casts on each retina gets progressively bigger. However, you do not perceive the train as actually increasing in size. Similarly, when you watch a train depart into the distance, the size of the retinal images become progressively smaller. Despite this, you still perceive the train's size as remaining constant. You know it hasn't shrunk. This indicates the role of learning in size constancy. Past experience with objects has enabled you to become familiar with objects of different sizes and you now know that they don't necessarily change size if they appear smaller.

Figure 7.38 Size constancy helps ensure we do not perceive an approaching train as actually increasing in size.

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Digital document
Practical activity — size constancy

Shape constancy

As you move around a room which has a round clock on the wall, the angle from which you view the clock changes. Consequently, the image of the clock cast on the retina also changes. It might change from a circle when viewed face-on to an ellipse (oval shape) when viewed from side-on. Despite these changes to the retinal image, your perception is still of a clock that is circular in shape (see Figure 7.39 on the next page).

Shape constancy is the tendency to perceive an object as maintaining its shape despite any change in shape of the image of the object on the retina. As we move around in our daily lives, the angles at which we view objects change. Consequently, the image of the object that is cast on the retina also changes. If we interpreted the image in terms of how it actually occurs on the retina, the object would be perceived as constantly changing shape. However, by automatically using the principle of shape constancy we know that the object hasn't changed shape and we perceive it as remaining stable (i.e. constant).

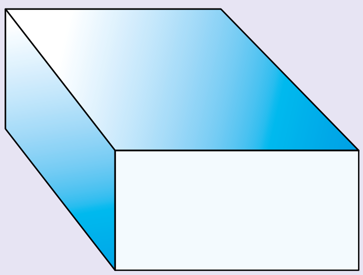
Figure 7.39 We tend to perceive this clock as maintaining its shape despite the changes in the image it produces in the retina when we view it from different angles.

LEARNING ACTIVITY 7.12

Demonstration of size and shape constancy

Look at the figure below. Try to imagine whether you could fit a five cent, 10 cent, or 20 cent coin on the top surface of this figure. Which coin(s) do you think would fit?

Now use real coins to see which (if any) fit on the top surface. What did you find? Explain your answer in terms of the concepts of size and shape constancy.



Brightness constancy

Suppose you are seated in a room at dusk with overhead lighting on. Suddenly, the electricity supply is cut off. Despite the changed lighting conditions, you still perceive the objects around you as remaining the same colour. You know, for example, that the cover on the lounge chair hasn't suddenly become dull even though there is a reduction in brightness ('light intensity') on the image produced on the retina and it 'looks' duller.

Because everything in your immediate environment has been reduced in light intensity by the same amount, the colours of all objects are perceived with the same brightness as they were before the lights went off. In this situation, your visual perception system has maintained brightness constancy. **Brightness constancy** is the tendency to perceive an object as maintaining its level of brightness in relation to its surroundings, despite changes in the amount of light being reflected from the object to the retina.

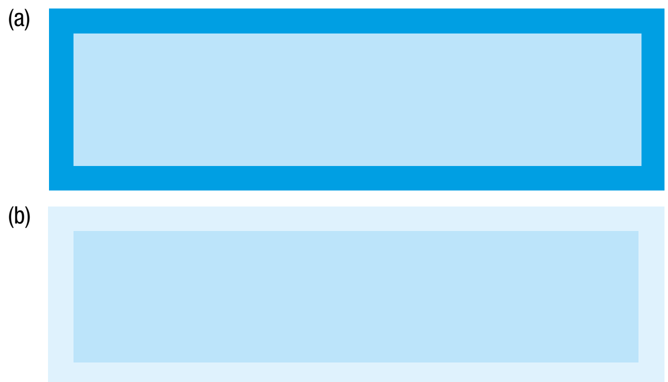


Figure 7.40 Look at the two inner rectangles. Most people perceive the inner rectangle in (a) to be lighter than the one in (b). If you cover the outer surroundings of each rectangle, you will see that they are of equal brightness. The brighter surrounds of (b) lead you to perceive the inner rectangle as relatively darker.

LEARNING ACTIVITY 7.13

Review questions

1. (a) What is size constancy?
   (b) Give an example of a psychological or cultural factor that may influence the use of size constancy.
2. (a) What is shape constancy?
   (b) Suggest how we might perceive objects or events if we did not use shape constancy.
3. (a) What is brightness constancy?
   (b) Explain how you use brightness constancy when you look at the colour of your bedroom wall under different lighting conditions — in the middle of a sunny day and at night.
4. What do you think orientation constancy is? Suggest a definition.

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Practical activity — brightness constancy

Weblinks

A blue/black or white/gold dress?

Perceptual set

Look closely at the illustration of a seal act for a circus in Figure 7.41 below. What do you see?

You may have identified a seal balancing a ball on its nose with its trainer on the right holding a fish in one hand and a stick in the other. However, if you had been told that this picture was of two people at a costume party, how would you then have described it? Would your perception of the same illustration have been different? Look again at Figure 7.41 until you can identify the woman on the left handing the man on the right an object. He has a sword in his right hand.

Figure 7.41

The ambiguous illustration demonstrates that an individual can arrive at entirely different perceptions from the same visual information. Why is it that our perceptions of the same visual scene can differ? Why is it that you could be led to perceive the same visual scene in two different ways? This can be explained by perceptual set, one of the most widely researched psychological factors that influences visual perception.

Perceptual set is the predisposition, or 'readiness', to perceive something in accordance with what we expect it to be. Our expectations of what an object or event will be make us more likely to interpret the object or event in the predetermined way. Perceptual set is often referred to as *expectancy* because various psychological and social factors create an 'expectation' to perceive something in a particular way. Experimenter effects in research described on page 39 in chapter 2 are attributed to perceptual set and its expectancy influence.

Visual perception is usually assisted by perceptual set when we correctly anticipate what something is and therefore interpret it more quickly. For example, as your teacher writes on the board at the front of the classroom, a perceptual set may enable you to interpret a misspelt word such as 'rember' as a meaningful word (remember) in order to make sense of what is being written. Thus, you perceive the total message more quickly than if you had to try to work out what the word 'rember' meant before interpreting the whole message.

Sometimes, however, perceptual set can lead to perceptual distortions or mistakes. For example, look at the photo in Figure 7.42 below and complete the activity. Our expectations of what something might be may cause us to notice only the information that is consistent with our expectations and ignore or overlook information that may be relevant. This can lead to a misinterpretation of an object or event.

Consider the situation of waiting for a friend on a busy corner in the Melbourne CBD. The two of you have arranged to meet there and go to a movie. Your *past experience* with this person tells you that she walks faster than most people. You also know from past experience that she is always late, and today is no exception. Given the busy setting (i.e. *context*), you

Figure 7.42 Consider this photo of Jennifer Lawrence, who co-starred in *The hunger games* movies, then turn to Figure 7.46 on page 395 and complete the simple activity.

may be predisposed to look for the person walking fastest in the approaching crowd.

A perceptual set, such as one based on these factors, often enables you to visually perceive information quickly. You would eliminate all the people in your field of vision who are not walking quickly, because you expect your friend to be in a hurry. However, what if she has sprained her ankle, and is now hobbling slowly to meet you? Or, what if you rush to greet a fast-moving young woman who resembles your friend to find that you are totally mistaken?

There are several factors that may interact in influencing or bringing about perceptual set. Most of these involve personal characteristics of the perceiver, such as their past experience, motivation, emotional state and cultural background. The context in which the perception occurs may also influence perceptual set.

Context

In visual perception, **context** refers to the setting or environment in which a perception is made. When interpreting visual information, we often take account of the setting and pay more attention to those aspects of the setting that are immediately relevant. In this way, context has a 'focusing' role in visual perception and usually assists us to make a quick and accurate interpretation of what we are looking at.

For example, consider the different interpretations that could be made of a fast-moving bright light in the sky that has a tail streaking behind it. How would you interpret this visual stimulus if you observed it in the sky over:

1. outback central Australia?
2. a war zone?
3. a NASA launch site in the USA?
4. Melbourne's Yarra River on New Year's Eve?
5. a ship at sea?

As the context of the visual stimulus changed, your interpretation may also have changed from: (1) a meteorite, (2) a missile, (3) a rocket headed for outer space, (4) a skyrocket, (5) a distress flare.

Context can also lead us to make slower or inaccurate interpretations. For example, have you ever bumped into someone who seems familiar but found you cannot recall their name or where you know them from? The person may have been one of your primary school teachers, but because they were 'out of context' in a different situation from that in which you have known them, you were unable to readily identify them.

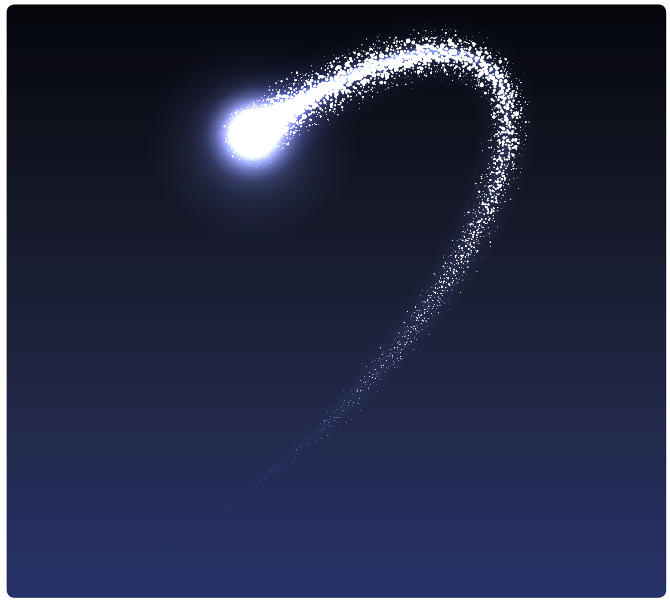

Figure 7.43 Our perception of a bright light with a tail streaking across the night sky is likely to be influenced by the context in which it is observed.

BOX 7.7 Pioneering research on context

The importance of context in visual perception was first demonstrated in an experiment by American psychologists Jerome Bruner and Leigh Minturn (1955).

In this experiment, one group of participants who were assigned the role of observers (Group A) was shown a visual stimulus like that in Figure 7.44 for 80 thousandths of a second *after* viewing the series of letters L, M, Y, A. Another group of observers (Group B) was shown the same visual stimulus for the same exposure time *after* viewing the series of numbers 16, 17, 10, 12. The task given to each group of observers was to identify what they saw and to draw it.

Results from Group A (who saw the letters first) indicated that 92% of the participants perceived the visual stimulus as a 'B'. For Group B (who saw the numbers first), 83% of the participants perceived the visual stimulus as a '13'.

Bruner and Minturn concluded that the context of either letters or numbers 'set' predisposed the observers to interpret the ambiguous symbol in accordance with the type of symbols that had preceded it. A perceptual set had been established by the time the ambiguous figure was shown. Observers expected the next symbol to be one that was consistent with the established context.

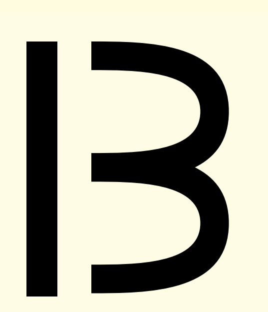

Figure 7.44 The ambiguous 'B or 13' stimulus figure used by Bruner and Minturn (1955)

LEARNING ACTIVITY 7.14

Analysis of research by Bruner and Minturn (1955) on context in visual perception

Consider the experiment on context summarised in Box 7.7 on page 393. Analyse the research by answering the following questions.

1. Formulate a possible research hypothesis.
2. Identify the operationalised independent and dependent variables in the experiment.
3. Briefly state the results that were obtained.
4. Briefly state a conclusion for the experiment based on the results obtained.
5. Would a perceptual set have been established by showing one number/letter prior to showing the ambiguous figure? Explain your answer.

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Practical activity — the effect of context on the interpretation of visual stimuli

Motivation

Motivation can also influence perceptual set. **Motivation** refers to internal processes which activate behaviour that we direct towards achieving a particular goal. Motives can be influenced by psychological factors (such as interests, ambitions and desires), biological factors (such as bodily processes associated with hunger or thirst), or social factors such as the influence of our cultural background on people and institutions within our society.

Visual perception can be influenced by our motives when, for example, we see what we *want* to see, rather than what is actually there. When supporters of opposing teams are sitting side by side at a football match, the difference in their perceptions of the same event may be considerable. Physically, the images cast upon their retinas are almost identical, but the influence of their respective motivational states to see their team win brings about perceptual differences which can be so great that they may appear (to the impartial observer) to be watching two different games.

Emotional state

Our **emotional state** — how we are feeling — can also influence the way in which we perceive visual information. Different emotions can 'set' us to perceive information in a particular way which is consistent with the emotion being experienced. For example, a child who is afraid of being in their darkened bedroom may interpret the shadow of their dressing gown hanging on the back of the bedroom door as a ghost, or the teddy bear sitting on the end of the bed as a monster.

Figure 7.45 Many AFL fans will arrive at a game with a perceptual set established by their motivation to see their team win.

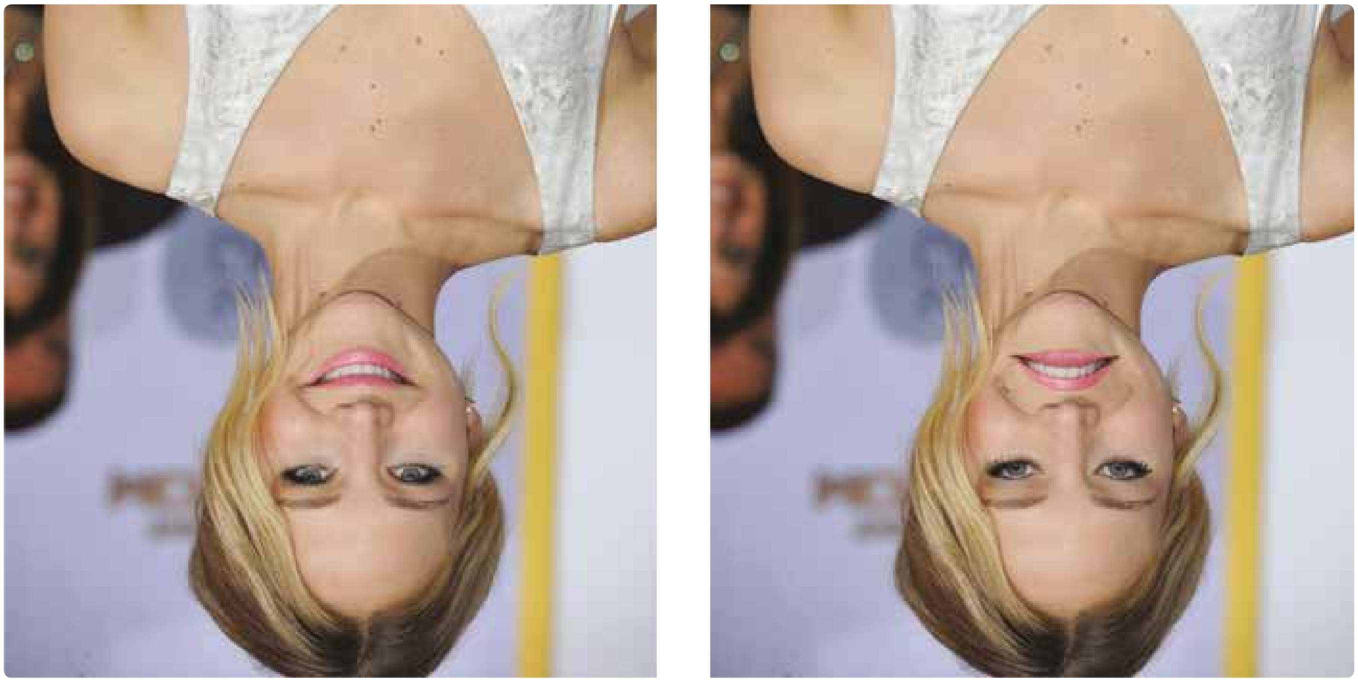

Figure 7.46 Consider the photos above and answer the following questions. Who is in the photo? Other than being of the same person, can you identify anything that clearly distinguishes the two photos? Now turn the photos upside down. Most people name Jennifer Lawrence as the person in the photos when previously shown the photo in Figure 7.42. Most people also expect the photos to be of Jennifer Lawrence smiling. Perceptual set has predisposed them to answer in these ways. Most people expect the photos to be 'normal' because of perceptual set.

Past experience

Past experience refers to our personal experiences throughout our lives. This includes everything we have learned both intentionally and unintentionally. Our unique combination of past experiences can lead to many individual differences in perception. Such experiences also predispose, or 'set', us to perceive information in a particular way.

A well-known experiment on the effect of past experience on perceptual set was conducted by American psychologists Hans Toch and Richard Schulte (1961). They hypothesised that past experience (operationalised as 'type and stage of training') influenced which illustration would be perceived more readily when two illustrations were briefly presented to participants.

The Toch and Schulte experiment involved the use of binocular rivalry. Binocular rivalry occurs when a different visual image is briefly and simultaneously presented to each eye. Usually one image or the other is seen, but participants rarely see both.

All participants were presented with nine pairs of illustrations. In each pair, one illustration was of a violent scene and the other was of a neutral (neither violent nor non-violent) scene. One of the pairs of illustrations used in this experiment is shown in Figure 7.47. The illustrations were deliberately drawn to be somewhat ambiguous in order to maximise the potential influence of the participants' training on their perceptions.

The participants were drawn from three different backgrounds: Group 1 had completed police-style training at the School of Police Administration and Public Safety at an American university, Group 2 had just begun their police-style training at the same school, and Group 3 were university students with no police-style training of any kind.

The results indicated that Group 1 participants perceived the violent pictures on 52% of the trials, compared with Group 2 on 26% and Group 3 on 22%. Toch and Schulte concluded that the past experience of police training (which had involved considerable time discussing, recognising and managing potentially violent and dangerous situations) increased the probability of perceiving the violent pictures.

Figure 7.47 Figures such as this pair were presented to participants in the Toch and Schulte (1961) experiment.

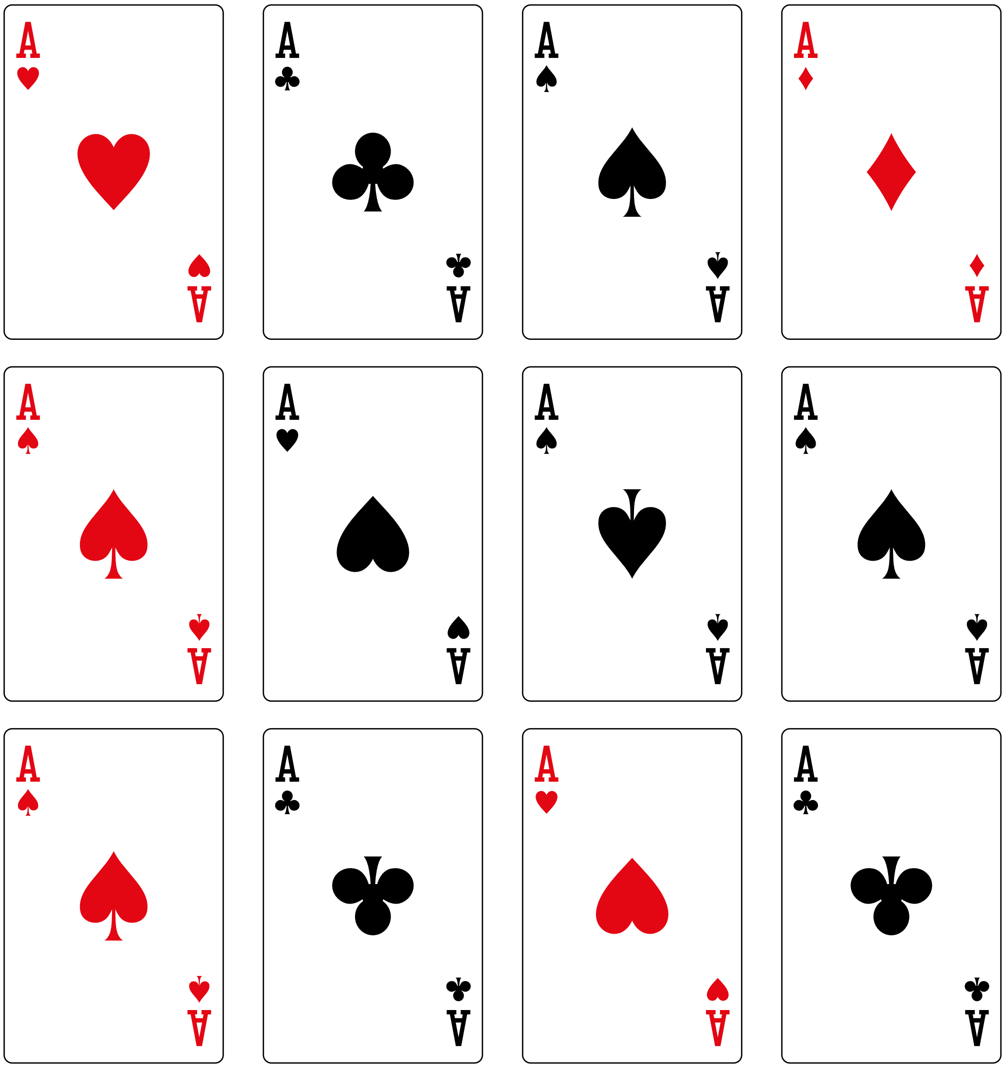

Figure 7.48 How many aces of spades do you see? Most participants shown the above display for a few seconds report seeing three aces of spades. However, there are actually five — two of them are coloured red instead of black. Because of past experience with playing cards, particularly with the ace of spade being coloured black, we are predisposed to look only at the black cards when given the task, which often results in an inaccurate perception. The above stimulus was used in a pioneering experiment conducted by American psychologists Jerome Bruner and Leo Postman (1949) who found that perceptual set based on past experience may cause perceptual error.

Culture

Culture refers to the way of life of a particular community or group that sets it apart from other communities and groups. Culture includes such things as the customs, traditions, beliefs, values, attitudes, rules about what is right and wrong, food and music, as well as any other features of that community or group which distinguish it from other communities, or groups.

Experience with or in a particular culture, can influence the way we process and interpret visual information. This was demonstrated in a study with Malawi people, a remote village community in Tanzania, Africa.

Before the Malawi people had access to photographs, a group of them were shown a black and white photograph of a dog. Despite the fact that many of the observers owned dogs or had experience with dogs, they were unable to identify the subject of the photograph as a dog. Even when the various features of the dog such as the head, ears and tail were pointed out to them, many of the Malawi people still had difficulty interpreting the photograph as a dog and, in some cases, the specific features of the dog, such as the paws and tail (Deregowski, 1980).

This could be explained by the possibility that, being a remote tribal community, the Malawi people had little, if any, exposure to picture books. Consequently, they had little or no experience with photographs or two-dimensional drawings of dogs on paper. When they were shown a two-dimensional photograph, they may not have been able to use relevant visual perception principles to identify the features and the overall image of the dog.

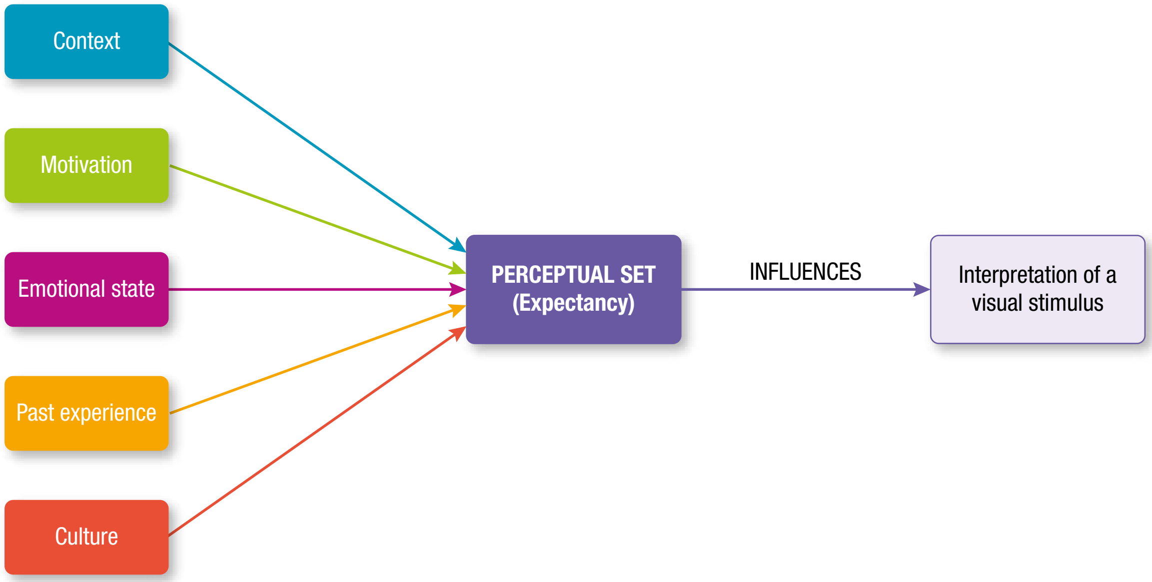

Figure 7.49 Psychological and social factors, individually or in combination, can establish a perceptual set and predispose us to perceive a stimulus in a certain way.

LEARNING ACTIVITY 7.15

Review questions

1. (a) Explain the meaning of perceptual set.
   (b) Suggest why perceptual set is sometimes referred to as 'expectancy'.
2. (a) What does context mean in relation to visual perception?
   (b) Give an example of how context may lead to a perceptual interpretation of having 'seen' a UFO, a Tasmanian Tiger, the Loch Ness monster or a similarly rarely sighted phenomenon.
   (c) In what way is 'context' an explanation of the results obtained by Bruner and Minturn (1955) in their experiment?
3. Briefly explain, with reference to relevant examples, how each of the following can influence perceptual set.
   (a) motivation
   (b) emotional state
   (c) past experience
   (d) culture
4. Explain how past experience can lead to errors in visual perception.

LEARNING ACTIVITY 7.16

Analysis of research by Toch and Schulte (1961) on the influence of past experience

Analyse the experiment on the influence of past experience on visual perception conducted by Toch and Schulte (1961). Your summary and evaluation should include responses to the following questions.

1. Formulate a possible research hypothesis for the experiment.
2. Identify the operationalised independent and dependent variables in the experiment.
3. Identify the experimental and control conditions of the experiment.
4. Briefly state the results that were obtained.
5. Briefly state the conclusion drawn by Toch and Schulte from their results.

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Practical activity — the effect of past experience on the interpretation of an ambiguous stimulus

TASTE PERCEPTION

Taste seems to be the least critical of our senses but long ago it contributed more directly to our survival. It is believed that taste evolved to protect us from eating things that are poisonous and to ensure we have an appetite for the calories and nutrients we need. For example, many toxic or spoilt foods and liquids are either bitter or sour. These are tastes we tend to avoid. In contrast, pleasure through sweet and salty-tasting foods helps ensure we meet nutritional requirements to keep us healthy. Identifying tastes is our brain's way of telling us about what's going into our mouth, and in some cases, keeping us safe.

Taste perception is of renewed interest in psychology because it plays a significant role in overeating and in the rising incidence of obesity, diabetes and other eating or food-related disorders. Research studies have found, for example, that people who have a low sensitivity to the taste of sweetness in foods tend to eat more sweet foods and are more likely to be overweight. In addition, loss of taste sensitivity can lead people to eat too much sugar or salt to make their food taste better. This can be a problem for people with diabetes or high blood pressure. In some cases, loss of taste can even lead to a mental health problem or disorder.

From mouth to brain

Our perception of taste, or gustation as it is formally called, starts with the physical stimulation of taste receptor cells in the mouth. The stimuli that produce taste sensations are chemical molecules in whatever you eat or drink. These molecules are dissolved by saliva, allowing the chemicals to stimulate taste receptors. Food, fluids or any substance that is soluble in saliva can stimulate the taste buds, which is why you can taste dirt and dust. Similarly, you may have noticed that after you have brushed your teeth in the morning, orange juice tastes bitter. The chemical residues from the toothpaste mix with those of the orange juice to produce a new taste sensation.

When taste receptors are stimulated, they convert the sensory input into signals that can be sent to the brain along neural pathways. The 'taste' pathways are cranial nerves which connect directly to the brain. Which one is used depends on where in the oral cavity the taste receptors that have been stimulated are located. Most taste messages travel to the brain along the facial cranial nerve.

After initial processing by the thalamus, the sensory information is relayed to the *gustatory cortex* for interpretation. Taste alone does not affect how much you like a certain food or drink so the information is combined with other sensory inputs about the food.

Taste receptors, sometimes called *gustatory cells*, are the sensory receptors that detect the chemical molecules that enable taste. The taste receptors are located within the **taste buds**. Most of the taste buds are on the tongue. But they are also found under the tongue, on the roof of the mouth, on the sides of the

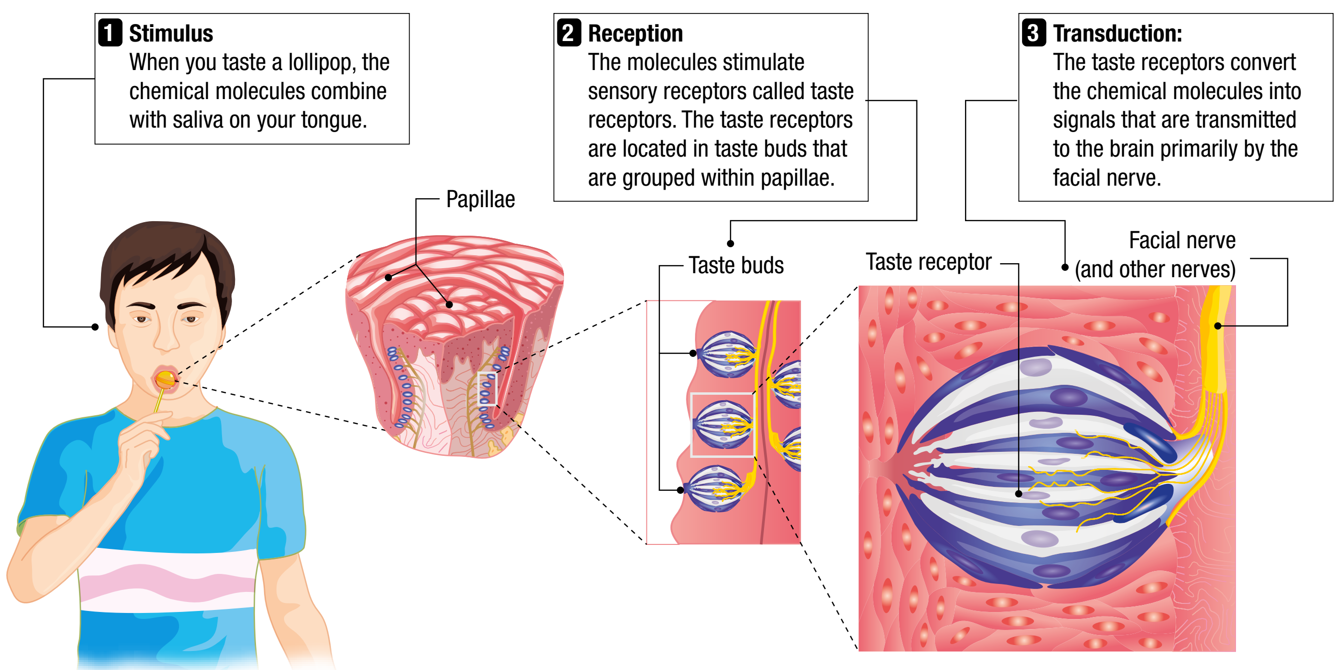

Figure 7.50 How we taste — biological processes in taste sensation and perception

mouth, and at the back of the mouth on the upper part of the throat behind the nose. It is estimated that most people have about 8000 to 10 000 taste buds, but the number of taste buds peaks in early childhood and gradually declines during adulthood.

On the tongue, the taste buds are located within the thousands of small bumps called **papillae** that you can see and feel on the surface. An individual papilla may hold one or more taste buds. Each taste bud consists of a cluster of 50–150 taste receptors. Unlike sensory receptors in the eye, taste receptors have a limited lifespan of about 10 days, so they are constantly being replaced. The sensory receptors in the eye are true neurons but taste receptors are not (because they do not have an axon and are replaced after they die).

Taste pores on the surface of the tongue open into the taste bud, thereby connecting the surface of the tongue to the taste receptors within the taste buds. The connection is through fine **gustatory hairs** that extend from the taste receptors into the taste pores. These hairs come in contact with tastants. **Tastants** are the dissolved chemical molecules that can be tasted. The hairs stimulate their connected taste receptor cells to pass signals on to sensory neurons which transmit the messages to the brain.

Not all papillae contain taste buds and therefore taste receptors. Those found around the sides and at the front of the tongue contain taste buds, whereas those found predominantly in the centre of the tongue do not have taste buds. Some papillae have other functions. For example, some are pain receptors that respond to hot and spicy sensations (caused by the substance capsaicin found in foods with chilli), others help break down fats and others are touch receptors that contribute to the perception of food texture. In addition, the tongue is sensitive to the temperature sensations of hot and cold.

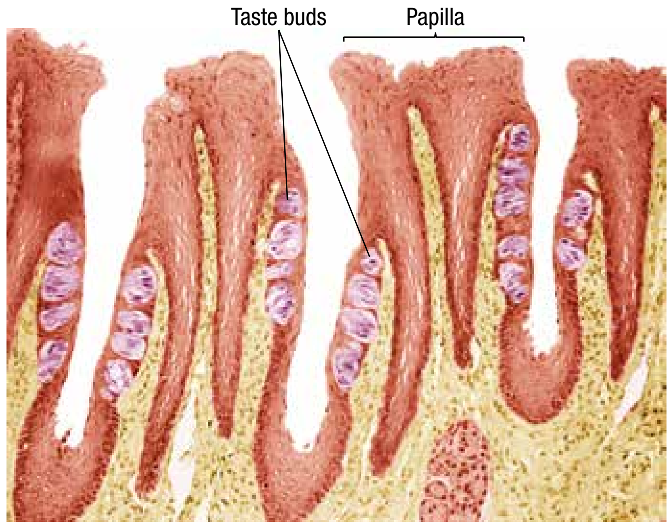

Figure 7.51 A cross-section of the tongue

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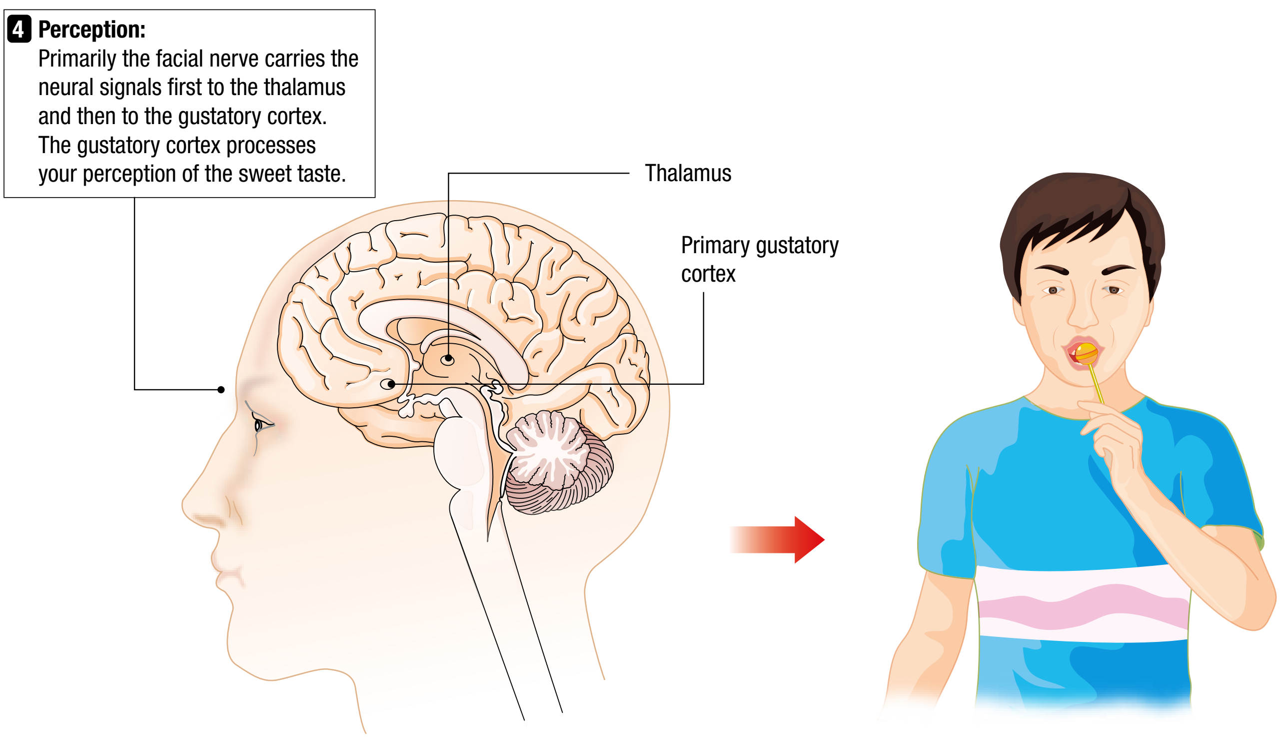
Weblinks
Videos on taste



Five basic tastes

The pleasure we can derive from eating delicious food suggests that we can discriminate many tastes. However, we detect only five basic tastes — sweet, sour, salty, bitter and umami.

The *sweet* taste is usually caused by sugar and its derivatives such as fructose or lactose, as well as artificial sweeteners such as saccharine. Other types of substances can also activate taste receptors that respond to sweetness. These include alcohols in fruit juices or alcoholic drinks.

It is mostly acidic solutions like lemon juice, lime juice and vinegar that taste *sour*. Tasting acidity helps us to judge the ripeness of food. Unripe fruits, for example, have less sugar and therefore taste sour. Foods that are 'off' can also become acidic and therefore taste sour, so the ability to taste sour also has a protective function.

Food containing table salt is mainly what we taste as *salty*. This is produced by salts containing sodium, such as sodium chloride (table salt) and sodium bicarbonate (baking soda). Mineral salts like the salts of potassium or magnesium can also cause a sensation of saltiness. Almost every fluid in our body contains salt (e.g. blood, sweat and tears) so we need salt to survive. Popcorn, pretzels and potato chips taste so salty because the grains of salt lie mainly on the surface of the food.

Bitter taste is produced by a variety of different substances and is generally identified as undesirable or unpalatable. Toxic chemicals produced by poisonous plants have a bitter taste which, from an evolutionary perspective, results in our negative reaction to bitter foods. Recognising which ones were poisonous was a matter of survival. Sugar can mask the taste of bitterness.

Umami, also called *savoury,* is a rich, 'mouth-filling' taste in protein-based foods due to the presence of glutamate. Meat, aged cheese, ripe tomatoes, mushrooms, soy sauce, Vegemite and MSG that is often added to food as a flavour enhancer are examples of foods that contain glutamate. Most people first experience umami in breast milk, which is rich in glutamate.

It was once believed that different parts of the tongue are more sensitive to certain tastes. It is now known that taste buds are spread relatively evenly throughout the tongue and mouth. Therefore, areas on the tongue do not differ too greatly in the taste sensations that they activate.

All five tastes can be experienced anywhere on the tongue where there are taste receptors. About half of the receptor cells react to several of the five basic tastes. They differ only by having varying levels of sensitivity to the different basic tastes. For example, a particular gustatory cell might be most sensitive to sweet, followed by sour, salty and bitter, while another cell will be more or less sensitive to other basic tastes.

Most taste experiences are complex and result from the activation of different combinations of more or less of the five tastes from the different parts of the tongue. Our appreciation of food, however, depends on more than taste alone. As you probably know from when your sense of smell is impaired by a stuffy nose, the perception of taste is dulled as well. Block your nose and an apple will taste the same as a raw potato. This occurs because taste perception relies very heavily on smell. Taste, smell, sight and other sensory inputs influence the perceptual experience we commonly call flavour.

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Practical activities on taste perception

Figure 7.52 Smell contributes heavily to taste perception. This is why smelling is part of the wine tasting ritual. Without smell it would be very difficult to taste subtle differences between wines.

Australian scientists say fat is the sixth taste

'The evidence now is comprehensive and overwhelming enough to call fat a taste,' said Russell Keast of Deakin University in Melbourne.

For many years, scientists agreed on the four primary tastes: sweet, salt, sour and bitter, and in 2002, they added umami, a savoury taste.

In the latest issue of the *Flavour Journal*, a team from Deakin University writes that the sixth addition is fat.

Despite fat being classified as a taste as early as 330BC by Aristotle, more recently it has been associated with texture, flavour release and thermal properties in foods, but not the sense of taste.

For fat to be considered a taste, it must meet five criteria.

In the paper titled 'Is Fat the Sixth Taste Primary? Evidence and Implications', Professor Keast describes how fat meets these criteria, which includes that the tongue has taste buds that can detect the presence of fatty acids.

The researchers believe their findings could help in the battle to curb the world's growing obesity problem.

Their previous research, which has involved up to 500 volunteers over several years, has shown those who are sensitive to the taste of fat eat less.

'We have to put a lot more fat into the trials we do for people who are overweight or obese so they are able to identify it, than healthy-weight people.'

'It has this relationship with diet which appears to be very important.'

'When we think about those foods that were put out in the '90s, low-fat foods that were often failures, maybe it's as simple as not understanding the role of fat.'

'You just can't remove the fat from a food and replace the textural components and replace the flavour release and expect it to be successful because you haven't matched the taste component, which has all of these other physiological and psychological effects that will affect the liking and acceptance of the food.'

Source: news.com.au (9 February 2015). Retrieved from http://www.news.com.au/national/breaking-news/aust-scientists-say-fat-is-6th-basic-taste/story-e6frfku9-1227213663626

LEARNING ACTIVITY 7.17

Review questions

1. Name the five basic tastes.
2. (a) Construct a definition for taste perception.
   (b) In what way does taste perception support successful adaption to the environment?
3. What is the physical stimulus for taste detection?
4. Describe the process of transduction in taste perception.
5. Outline with dot points how a physical stimulus for taste is detected. Refer to all of the following: taste receptor, taste bud, papilla, taste pore, gustatory hair, tastant.
6. Which brain structure will first receive incoming taste information before it reaches the gustatory cortex?
7. Where on the tongue would you find the equivalent of a blind spot for taste?
8. What is the role of smell in taste?

LEARNING ACTIVITY 7.18

Media analysis/response

Consider the article above on fat as a sixth taste. What would be required for fat to be widely adopted as a sixth basic taste by psychologists (and scientists in general)? Discuss with reference to information in this text.

INFLUENCES ON TASTE PERCEPTION

We each have individual taste preferences. For example, some people hate oysters while others love them. Some people love sour lollies while others prefer only sweet ones. Some people prefer the taste of dim sims with soy sauce and others avoid the taste. Our taste preferences are determined by perceptions that are shaped by the complex interaction of biological, psychological and social factors. We consider the influences of age and genetics (biological), perceptual set (psychological) and culture (social).

Age

The ability to taste many substances is already well-developed at birth. Even premature infants show characteristic responses to basic tastes. For example, they suck more in response to a sweet substance used to coat a dummy and try to spit out the dummy when it is coated with a bitter substance.

Full-term infants start out with relatively few taste buds, but during childhood the number steadily increases until the final total is reached. The persistence of an aversion to bitterness may help protect children from eating poisonous foods during their early development, before they have learned what can be eaten and what must not be eaten.

Research also shows that children are much more responsive to taste than adults. One explanation is that they have more taste receptors than adults. We start to lose taste buds as we age, but exactly how many and when remain unclear. Some researchers have estimated loss of more than half our taste buds by the time we turn 20, whereas others report that loss of taste buds may not start until at least age 50. Nonetheless, a greater number of taste buds in childhood may bring with it a greater range of taste sensations and partly explain why young children seem to be 'fussy eaters'. The explanation of fussiness in relation to the tastes of bitter and sour may have far more to do with genetics (Kolb & Whishaw, 2014; Schacter, Gilbert, Wegner, 2009).

There is also considerable research evidence that taste perception fades with age as part of the normal ageing process. In particular, there is some decline in taste in people aged over 60. Many report loss of taste and that it gradually deteriorates as they get older. Loss of taste receptors does not, however, fully account for this change. Many older people mistakenly believe they have a problem with taste, when they are actually experiencing a problem with smell. In older people, there is a normal age-related decline in the sense of smell which substantially contributes to loss of taste and the associated belief of having a taste problem.

True taste disorders are uncommon. Other than smell dysfunction, when a problem with taste exists it is more likely to be caused by upper respiratory infection, medications, a dental, mouth or throat disease, a cancer treatment, or a history of middle ear infection (one taste nerve travels through the middle ear on its way to the brain).

Figure 7.53 Fussy eater or too many taste buds resulting in a sensory overload of taste?

Chewing problems associated with tooth loss and dentures can also interfere with taste sensations, along with the reduction in saliva production. Rather than whole mouth taste loss, decline in specific areas of the mouth is much more common. Despite their higher prevalence in elderly people when compared with young people, most elderly people are unaware of regional taste deficits (Bartoshuk, 1989; Boyce & Shone, 2006).

Genetics

People vary in their ability to taste. One reason is that genetic differences make us more or less sensitive to the chemical molecules in different foods. Our genes can therefore influence how sensitive we are to bitterness, sweetness or any other tastes. For example, variants of one gene (called TAS2R38) have been found to influence how strongly an individual will be able to detect bitter tastes, which may explain why some people refuse to eat broccoli, Brussels sprouts and similar dark green, leafy vegetables throughout their lives.

If you enjoy these vegetables, this may seem a little strange. But some people actually experience the taste differently and research indicates this may be attributable to their genes (Perry, 2011; Rawal, et. al, 2013). American psychologist Linda Bartoshuk (2014), a prominent researcher in the study of taste, believes that 'bitter is hard-wired in the brain to hate' so 'we are born hating it', whereas 'we are born loving sweet'.

Bartostuk coined the term 'supertaster' to describe individuals who experience taste sensations intensely. According to Bartoshuk (2015a), supertasters find tastes to be 2 to 3 times as intense as do other people. Supertasters are extremely sensitive to bitter tastes, highly aware of food flavours and textures and are more likely than others to feel pain when eating very spicy foods. They also experience more intense likes and dislikes for certain foods.

Supertasters inherit an unusually high number of taste buds. This relationship with tongue anatomy indicates that the more taste buds we have, the more intense our taste experience is likely to be. It is estimated that 25% of the population are supertasters,

Figure 7.54 Are we born loving sweet?

with more men than women. About 25% of people are 'non-tasters' with an unusually low number of taste buds. The other 50% of people fall in between these extremes (Bartoshuk, 2015a, Duffy, et. al., 2010; Grison, Heatherton & Gazzaniga, 2015).

Although it might seem enjoyable to experience intense tastes, many supertasters are especially fussy eaters because particular tastes can overwhelm them. When it comes to taste sensation, more is not necessarily better. Supertasters tend to avoid bitter-tasting foods, which they find extremely distasteful. They also tend to get more 'burn' from chilli peppers and more creaminess from fatty foods and thickeners in foods. In addition, they experience pain in the mouth more intensely than non-supertasters. Non-tasters tend to find tastes less intense. They are often easier to please in food choices (Bartoshuk, 2000).

Avoidance of vegetables and fruits with tastes that are experienced as extremely bitter may place supertasters at an increased risk for colon cancers that bitter foods may protect against. However, their dislike of fatty, creamy foods means that they tend to be thinner and therefore have a decreased risk of cardiovascular disease. They are also less likely to smoke because of the bitter taste of nicotine and avoid the bitter taste in coffee or blunt it with milk and/or sugar (Bartoshuk, 2000).

Figure 7.55 A supertaster would tend to avoid this curry because they would get more 'burn' from the chilli, more creaminess from the coconut milk and feel pain from eating the spicy meal.

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Weblink
Supertaster test 4 m 7 s

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Weblinks
- Practical activities on identifying supertasters
- Inside the psychologist's studio with Linda Bartoshuk 43 m 02 s

Perceptual set — food packaging and appearance

The taste we experience is shaped by our perceptual set. This means that we often taste what we expect to taste. A significant influence is our expectation of how a food 'should look'. Sometimes what we see can override what we think we taste. Although taste perception is dependent on the various sensory properties of food, the process often begins with the eyes. This is why food producers, retailers and marketers pay so much attention to how they package and present food.

Past experience determines our expectations of how something should taste. Changing the known colour of a food is usually all it takes to manipulate our expectations and change the taste. Researchers have found, for example, that orange juice tends to taste better when it is bright orange, cheddar cheese is tastier when yellow rather than white, and tomato sauce will often taste more like tomato sauce when it is red rather than brown or blue. When sweet tasting pink soft drink is changed to yellow with a neutral food dye, it is likely to be reported as losing its sweetness despite no real change in its original taste properties (Piqueras-Fiszman, Giboreau & Spence, 2013; Spence et al., 2010).

Even a more subtle feature of food such as shape can influence perception of its taste. For example, French fries tend to be reported as tasting better when thin than fat (but not if the fries are too thin). And square donuts contradict what we know about the essential features of donuts. When given the opportunity to taste a square donut, people are not as confident in predicting its taste because their perceptual set for its taste has been distorted by the unexpected, square appearance. When tasting, they tend to take longer to report on the experience than the time taken for a round donut.

Figure 7.56 When given the opportunity to taste a square donut, people tend to be less confident in predicting its taste because their perceptual set for its taste has been distorted by the unexpected, square appearance.

We also use a food's appearance for clues on whether it is safe to eat. For example, appearance helps us judge whether a food is fresh or not fresh, ripe or unripe and rotten or not rotten. Each of these aspects of food is associated with taste. Colours associated with the ripening of fruits are particularly effective in influencing perceived sweetness, while foods and drinks with a green colour (which is associated with unripe fruits) are often judged to be sourer (Spence et al., 2010).

In addition, when we make an overall judgment that a particular food is safe to eat, our expectancy is that it will taste as it should and that it will not be harmful in any way. When we actually taste the food and it meets our taste expectation, the experience reinforces our perceptual set of its taste. Similarly, when we believe that food is unsafe to eat, we usually expect that it will have a bitter or sour taste, which are in themselves biologically determined signs to avoid such food.

Packaging, labelling and branding also influence our perception of taste. For example, research participants report that Coca-Cola™ and peanut butter taste worse when consumed from a plain, unlabelled container than from one marked with a familiar brand. Children tend to report that an apple tastes better if it comes from a bag with the McDonald's logo. Adults tend to report that red wine tastes more full-bodied and complex if it costs more. And plain, home brand bottled water will tend to taste just like expensive Perrier water when there is no label to give feedback about the source (Schrank, 2012).

Researchers have also investigated the effect that the arrangement of food on a plate has on taste perception. Food presented in a neat arrangement is liked more than the same food presented in a messy manner. In addition, participants *expected* to like the food in the neat arrangements more than in the messy ones and would be willing to pay more for them. They also indicated that the food in the neat arrangements came from a higher quality restaurant and that more care was taken with its preparation than the food in the messy ones (Zellner, et. al., 2011).

We also have expectations about food sounds that influence taste perception For example, food-eating sounds contribute to the perception of crispness and freshness in foods such as potato chips, biscuits, breakfast cereals and vegetables. When these types of foods have louder 'crisp-biting sounds', they tend to be rated by research participants as tasting significantly crisper (and fresher). Similarly, perceptions of the carbonation of a beverage served in a cup have been influenced by the intensity and frequency of the bubbly sounds they hear (Spence & Shankar, 2010).

In some cases we can develop a taste aversion whereby we expect that a taste experience will be extremely unpleasant. This may occur for a food that appears 'perfect' in every possible way and which is eaten with enthusiasm by most people. A *taste aversion* is learned through past experience with a food, usually when having become ill after tasting or eating it. It can take only a single experience of this kind to develop a taste aversion. Then, a perceptual set is created that is so strong that the mere sight of the food can make us feel or be sick. So we avoid eating it, let alone tasting it (see Box 7.8)!

Figure 7.57 Food plated in a neat arrangement tends to be more positively viewed than food plated in a messy arrangement.

Culture

Most cultures have food practices involving the use of basic ingredients, techniques and flavour principles when cooking. For example, diets in Asian cultures include many more sour and bitter tastes than Western diets. We are exposed to these cultural differences from birth and they are reflected in our perceptual judgments of what tastes good and what tastes bad.

Generally, we like and prefer tastes we grow up with. This tends to persist in childhood, but most people will eventually try 'new tastes' when presented with the opportunity. We may also change taste preferences through learning as we get older. For example, children tend to reject the bitter taste of beer but many adults have learned to appreciate its taste.

Direct experience with different foods is one of the most important influences on taste perception. As we grow up, most of this experience occurs within a family setting. The family environment also exposes us to the reactions of others when they taste food. Parents, siblings and relatives can act as role models who encourage tasting of new foods or influence taste preferences through positive or adverse reactions to foods. We may also be influenced in this way when watching people eating in a movie, during lunchtime at school, when out with friends, and so on.

Other cultural influences on taste perception include being encouraged by a parent or caregiver to eat certain foods because of the health benefits, attitudes to health foods and junk foods by the various people around us, having increased or decreased access to certain foods through socio-economic circumstances, and even school food policies. In addition, some religions have rules regarding what may be eaten or drunk and whether or not a food or drink item can actually be enjoyed.

In sum, what's delicious varies across cultures. In some cultures, fish eyes, parrots, scorpions, beatles, grasshoppers, dog meat, goat testicles, fried tarantula, chicken feet or live witchetty grubs are tasty delights, whereas in other cultures the thought of eating these foods would trigger a negative reaction in most people.

Cultural influences on taste appear to be determined early in life, perhaps even in the uterus. Research suggests, for example, that mothers can pass their food preferences on to their offspring during the months immediately before (via amniotic fluid) and after birth (via breast milk). In one study, pregnant women were randomly assigned to one of three groups. The women drank either carrot juice or water for 4 days per week for 3 consecutive weeks during the last 3 months before birth and then again during the first 2 months after birth.

Group 1 mothers drank carrot juice in the period before birth and water after birth. Group 2 mothers drank water before birth and carrot juice after birth. Group 3 mothers drank water in both periods before and after birth. All the mothers breastfed their infants, so the taste of what each mother consumed was in the breast milk which was the only source of food for the infant during the first two months after birth.

When the infants were about 3 months old, they were fed carrot juice, either alone or mixed in cereal. The infants were videotaped as they fed and immediately after the mothers rated their infants' enjoyment of the food on a 9-point scale. The researchers also monitored the infants' facial expressions for negative taste reactions.

The results showed that the infants whose mothers drank carrot juice during the three months before birth, the first two months after birth or during both periods showed a preference for carrot juice compared with the infants whose mothers drank only water during those same months. For example, Group 1 infants previously exposed to carrot juice showed fewer negative facial expressions while being fed the carrot-flavoured cereal compared with the plain cereal, whereas Group 3 infants whose mothers drank water in both periods before and after birth did not show such a difference. In addition, Group 1 infants who were exposed to carrot juice prenatally were perceived by their mothers as enjoying the carrot-flavoured cereal more compared with the plain cereal.

The researchers concluded that the infants' taste preference for carrot juice was passed on by the mothers and that this early experience may provide the foundation for cultural and ethnic differences in taste preferences (Mennella, Jagnow & Beauchamp, 2001).

Figure 7.58 Taste preferences may be acquired very early in life — during breast feeding and possibly in utero.

Figure 7.59 What's delicious varies across cultures and this may be influenced by how the cook prepares the food.

BOX 7.8 Taste aversions

Many of us have a dislike for certain foods. Sometimes there is a good reason for disliking the food, such as genuinely not liking the taste or smell of it. Sometimes the dislike is associated with the texture of the food (e.g. oysters or calamari) or the origin of the food (e.g. tripe or haggis). At other times there is simply an unwillingness to eat something perceived as disgusting (e.g. snails, witchetty grubs or frogs' legs), or possibly it is rejected on moral grounds (e.g. kangaroo, whale, bear paws or monkey brains).

All these reasons for the dislike of certain foods are personal and subjective. In a different circumstance, however, our dislike of a particular food occurs suddenly and decisively, yet with very little consideration or judgment. The term used for such a response is 'taste aversion'.

A *taste aversion* is a learned response that results from a person (or animal) establishing an association between a particular food and being or feeling ill after having tasted or consumed it at some time in the past. The association is usually the result of a single experience, and the particular food will be avoided in the future, hence the term 'aversion'.

Figure 7.60 A taste aversion may be learned for any food, not only for some of the more exotic foods but also for plain everyday foods.

LEARNING ACTIVITY 7.19

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Word copy of table

Review questions

1. Complete the following table to summarise the influences of age, genetics, perceptual set and culture on taste perception.

Influence	Description	Example
age		
genetics		
perceptual set		
culture		

2. Draw a Venn diagram like Figure 6.8 on page 300 to show the interaction of biological, psychological and social factors that may influence taste perception. Include factors in addition to those described in the text.

LEARNING ACTIVITY 7.20

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Word copy of table

Analysis of research by Mennella, Jagnow and Beauchamp (2001) on infants' taste preferences

Consider the experiment on the development of infants' taste preferences described on page 405. Analyse the research by answering the following questions.

1. Formulate a research hypothesis that would be relevant to the experiment.
2. Name the experimental design.
3. Identify the operationalised independent and dependent variables.
4. Use the following table to summarise the experimental conditions:

Group	Before birth	After birth
1		
2		
3		

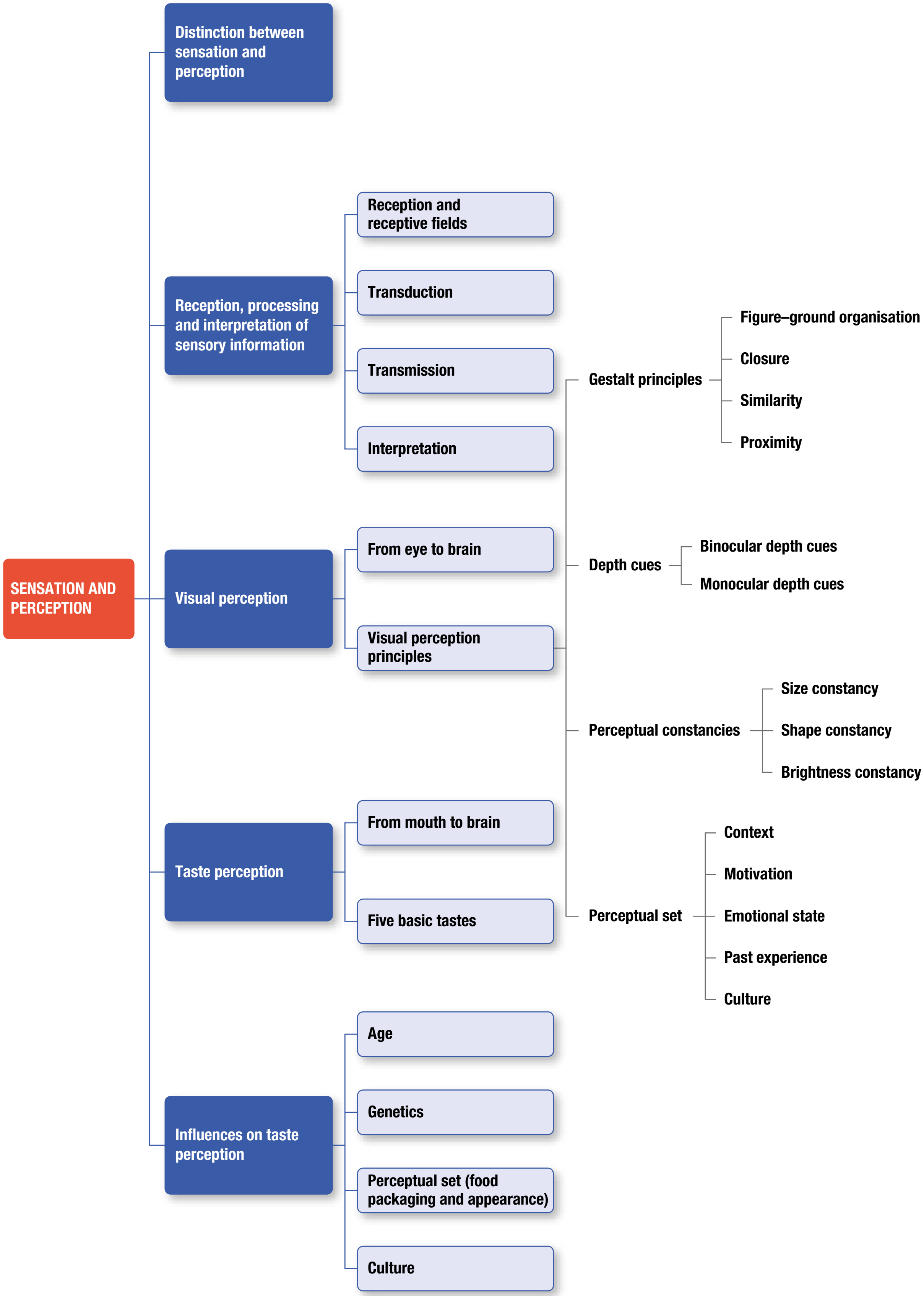
5. Which one or more of the three groups is the control group(s)?
6. What results were obtained for the different groups?
7. What conclusion about infant taste preferences and culture was drawn by the researchers?
8. Identify two extraneous variables that required strict control in this experiment.

LEARNING ACTIVITY 7.21

Reflection

Give an example of when food packaging or appearance contributed to a perceptual set resulting in a flavour judgment consistent with your expectations and an example resulting in a judgment that did not match your expectation.

CHAPTER SUMMARY



KEY TERMS

accommodation p. 384
binocular depth cue p. 382
bitter p. 400
blind spot p. 371
brightness constancy p. 391
closure p. 377
cone p. 370
context p. 393
convergence p. 382
cornea p. 369
culture p. 396
depth cue p. 382
depth perception p. 381
emotional state p. 394
figure–ground p. 374
Gestalt principle of visual perception p. 374
gustatory cortex p. 398
gustatory hair p. 399
height in the visual field p. 387
interposition p. 385
interpretation p. 366
iris p. 369
lens p. 369
linear perspective p. 385
monocular depth cue p. 384
motivation p. 394
optic chiasm p. 371
optic nerve p. 371
papillae p. 399
past experience p. 395
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perceptual constancy p. 390
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pictorial cue p. 384
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sensory receptor p. 398
shape constancy p. 390
similarity p. 377
size constancy p. 390
sour p. 400
sweet p. 400
tastant p. 399
taste bud p. 398
taste pore p. 399
taste receptor p. 398
texture gradient p. 386
transduction p. 366
transmission p. 366
umami p. 400
visual perception principle p. 374
visual sensory system p. 368

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 412–15. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about sensation and perception	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Concepts of sensation and perception			
• Distinction			
• Complementary processes			
• Roles in reception, processing and interpretation of sensory information			
– Reception and receptive fields			
– Transduction			
– Transmission			
– Interpretation			
Visual perception			
• From eye to brain			
– Eye structures			
– Pathway of light			
• Visual perception principles			
– Gestalt principles			
– Depth cues			
◦ Binocular			
◦ Monocular			
– Perceptual constancies			
– Perceptual set			
◦ Influences			
Taste perception			
• Five basic tastes			
• From mouth to brain			
– Taste structures			
– Taste process			
Influences on taste perception			
– Age			
– Genetics			
– Perceptual set (food packaging and appearance)			
– Culture			

CHAPTER 7 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

Which of the following sequences has perceptual processes in the correct order?

A. reception; interpretation; transmission
B. transmission; interpretation; transduction
C. reception; transduction; transmission
D. interpretation; transmission; reception

Question 2

Most of the gustatory cortex is located in the ____ lobe.

A. parietal
B. occipital
C. frontal
D. temporal

Question 3

Where are taste receptors located?

A. in taste buds
B. in papillae
C. in tastants
D. in the cranial nerve

Question 4

A receptive field is best described as

A. a sensory receptor.
B. a specific type of sensory information.
C. an area of space specialised to respond to the senses.
D. an area of sensitivity in which a receptor can respond to a stimulus.

Question 5

Which of the following is a depth cue for visual perception?

A. proximity
B. similarity
C. accommodation
D. closure

Question 6

The bumps on the tongue that are involved in taste perception are called

A. papillae.
B. taste buds.
C. taste receptors.
D. gustatory hairs.

Question 7

The taste of umami is based on detection of ____ in a substance.

A. acidity
B. glutamate
C. sugar
D. salt

Question 8

When we have difficulty separating a figure from the background in a picture or in an everyday setting, it is most likely due to an inability to

A. use linear perspective.
B. use monocular cues.
C. use retinal disparity.
D. perceive the contour lines which belong to the figure.

Question 9

When our brain monitors the muscles used to change the shape of the eye's lens, we are using

A. shape constancy.
B. retinal disparity.
C. accommodation.
D. convergence.

Question 10

The number of taste buds ____ with age.

A. increases
B. decreases
C. stabilises
D. remains the same

Question 11

Taste is most dependent on

A. the sense of sound.
B. the sense of smell.
C. what is eaten in the period immediately before birth.
D. what is eaten in the period immediately after birth.

Question 12

A white shirt looks just as white when you are ironing in conditions of artificial light as it does when you hang it on the clothes line in sunlight. This is an example of the effect of

A. brightness constancy.
B. binocular cues.
C. figure–ground organisation.
D. similarity.

Question 13

A tastant is

A. the person who is tasting.
B. a dissolved chemical that can be tasted.
C. the connection between a taste receptor and taste bud.
D. the connection between a taste receptor and taste pore.

Question 14

A taste bud has a lifespan of about ____ day/s.

A. 1
B. 5
C. 10
D. 50–150

Question 15

The correct sequence of the pathway of light through the eye and eventually to the brain in another form is

A. cornea, iris, pupil, retina, lens, visual cortex.
B. pupil, iris, lens, retina, optic nerve, visual cortex.
C. cornea, pupil, lens, retina, optic nerve, visual cortex.
D. pupil, lens, retina, fovea, optic nerve, visual cortex.

Question 16

Photoreceptors are located in the

A. lens.
B. pupil.
C. cornea.
D. retina.

Question 17

The difference in the images on the retina of each eye when an observer is viewing something is called

A. relative size.
B. retinal disparity.
C. texture gradient.
D. height in the visual field.

Question 18

About how many gustatory receptors are there in a typical taste bud?

A. 1–50
B. 50–150
C. 4000–8000
D. 8000–10 000

Question 19

When one object in a visual stimulus partially blocks another, the object at the back which is blocked from full view is perceived as being further away than the object in front of it. This is an example of

A. closure.
B. interposition.
C. constancy.
D. figure–ground organisation.

Question 20

The ____ assist us to see in conditions of dim light; whereas the ____ assist us to see fine detail, in colour and in bright light.

A. cones; rods
B. lens; cones
C. rods; cones
D. rods; lens

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (2 marks)

What is the difference between sensation and perception?

Question 2 (3 marks)

Explain what transduction is and what it involves in visual perception and taste perception, ensuring you refer to the relevant stimulus for each type of perception.

Question 3 (2 marks)

Explain why figure–ground should be considered when using camouflage.

Question 4 (3 marks)

Describe how taste perception occurs.

Question 5 (3 marks)

Explain the meaning of perceptual set in relation to visual or taste perception and how it may influence that type of perception with reference to a relevant example.

Question 6 (4 marks)

Give two arguments in support of a genetic component of taste perception and two arguments in support of environmental influences on taste perception.

Question 7 (3 marks)

Describe an influence of each of the following types of factors on visual perception.

biological

psychological

social

Question 8 (5 marks)

(a) Explain the meaning of depth perception. 1 mark

(b) Distinguish between binocular and monocular cues in depth perception with reference to an example of each type of cue. 4 marks

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.
The answers to the Section B questions are in eBookPLUS.

8 DISTORTIONS OF PERCEPTION

KEY KNOWLEDGE

- the fallibility of visual and gustatory perception systems, demonstrated by visual illusions and the judgment of flavours (influence of perceptual set, colour intensity and texture)
- distortions of perception of taste and vision in healthy, intact brains as providing insight into brain function related to perception, illustrated by synaesthesia

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), p. 21.

CHAPTER CONTENT

Perception occurs when sensory information reaching the brain is meaningfully interpreted. What we see, taste, hear, smell, and so on, is the result of brain activities that construct reliable representations of reality. This allows us to adapt to the environment and make sense of a constantly changing world.

Most of the time, our perception of the world closely matches the physical environment around us. However, this does not mean that perception is always error-free or perfect. We sometimes make mistakes and experience a perceptual distortion.

A **perceptual distortion** involves an inconsistency, or 'mismatch', between a perceptual experience and physical reality. Visual illusions demonstrate cases in which reality is misperceived for no immediately apparent reason. For example, the horizontal lines in Figure 8.1 below are parallel. You can confirm this with a ruler yet, whenever you look at the pattern, it is impossible to perceive the horizontal lines as parallel.

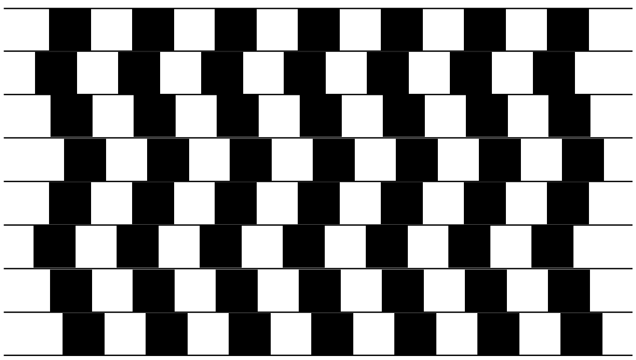


Figure 8.1 Are the horizontal lines parallel or do they slope?

Figure 8.2 Why does the moon look so much larger when on the horizon than when it is high in the sky? (See Box 8.1 on page 424.)

Similarly, consider the naturally occurring 'real life' moon illusion, whereby the moon appears larger when it is low in the sky near the horizon than when it is high in the sky. The moon does not actually change in size. Yet when the moon illusion is apparent, we cannot avoid perceiving the moon as bigger.

Perceptual distortions occur with all other senses too. For example, some people can perceive taste in something that has no chemical basis for what is tasted and some can hear things that may not exist in reality. Pain can also persist long after the injury that caused it has healed. For example, consider people with an amputated limb who continue to perceive chronic pain after the loss of an arm or leg (see Box 4.5 on page 204).

Consider also examples of when you perceive movement that is not real. Have you ever noticed how the moon appears to be moving across the sky as clouds pass in front of it on a cloudy, windy night? A similar effect can occur when you are sitting in a car at a stoplight and the vehicle next to you starts to move forward. For a moment you may feel that you are moving backwards. This is despite the fact that your vehicle has not actually moved and the adjacent vehicle is the source of real movement.

In this chapter we examine the fallibility of perception demonstrated in visual perception by visual illusions and in taste perception by the judgment of flavours. We also consider a specific type of distortion involving interaction of the senses in *synaesthesia* — when stimulation of one sense produces experiences in another sense.

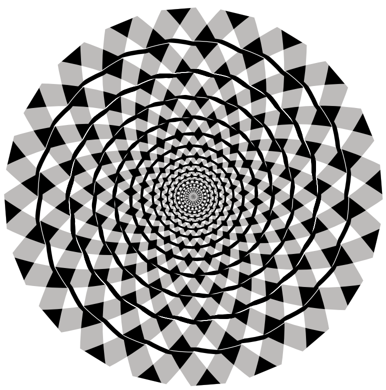
VISUAL ILLUSIONS

A **visual illusion** is a consistent misinterpretation (distortion or mistake) of real sensory information. It is an experience in which there is a mismatch between our perception and what we understand as physical reality. Every time we view the same sensory information, we have the same illusory experience.

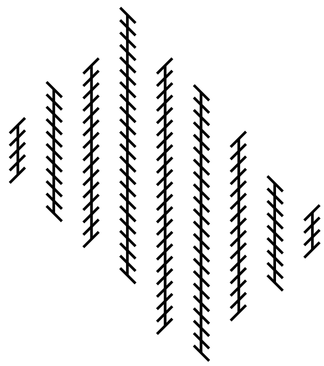
Psychologists have identified over 200 visual illusions, some of which are shown below. Generally, the illusory effects are unavoidable. Even when we know that we are looking at an illusion and have an understanding of why the illusion occurs, we continue to see the illusion as powerfully as when we first saw it.

Psychologists have enhanced their understanding of visual perception by examining the conditions under which it fails. For instance, visual illusions demonstrate the important role our brain plays in constructing our view of the world. They also demonstrate the effect of perceptual principles and factors such as learning (past experience) and context on the formation of our perceptions.

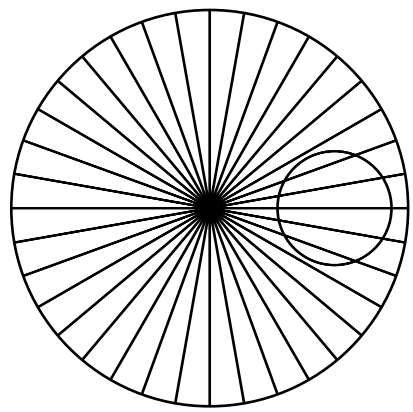
Two of the most widely studied illusions in psychology are the Müller-Lyer and Ames room illusions.



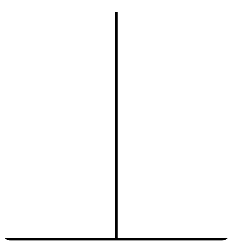
Fraser spiral: Although we perceive a spiral, this is actually a picture of a series of concentric rings.



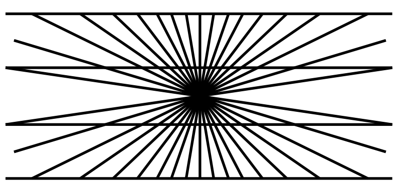
Zöllner illusion: The vertical lines are all parallel but do not look parallel because of the changing direction of the small diagonal lines crossing them.



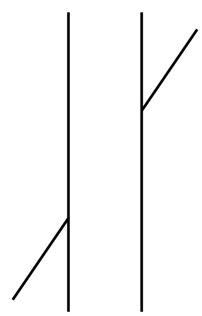
Orbison illusion: The smaller inner circle appears misshapen when placed in the 'spokes' of the larger circle.



Horizontal–vertical illusion: Although the two lines are equal in length, the vertical line appears to be longer.



Hering illusion: All four horizontal lines are parallel although the middle two appear to 'bow' around the central point where all the diagonal lines meet.



Poggendorf illusion: The diagonal line running from bottom left to top right appears to exit the vertical bar too high. A ruler placed on the line can confirm that the line is perfectly straight.

Figure 8.3 Some of the more widely studied visual illusions

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Visual illusions

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Weblinks
- Ted talks on visual illusions
- Videos on visual illusions

Müller-Lyer illusion

Are the vertical lines in Figure 8.4 the same length? Since illusions are being examined in this section, you probably realise that they are the same length and therefore answered 'Yes'. But do they *appear* to be the same length?

The answer is 'No'. Measure the two vertical lines to confirm that they are identical in length. Look again at the two lines. Despite the fact that you know they are of equal length, they still do not look equal. Your distorted perception has been caused by the configuration of lines that make up the Müller-Lyer illusion — an illusion that has attracted a great deal of research by psychologists.

Named after Franz Müller-Lyer (1857–1916) who originally described it in 1889, the **Müller-Lyer illusion** is a visual illusion in which one of two lines of equal length, each of which has opposite shaped ends, is incorrectly perceived as being longer than the other. As shown in Figure 8.4, the line with the 'feather tail' at each end (b) is perceived as being longer than the line with the 'arrowhead' at each end (a).

Psychologists have proposed a variety of explanations for the Müller-Lyer illusion. We consider explanations from biological, psychological and social perspectives.

Biological perspective

Explanations from the biological perspective emphasise the role played by our eyes, brains and/or nervous system when we view the illusion. One of the earliest biological theories proposed that the Müller-Lyer illusion was caused by the eye itself and explained the illusion in terms of eye movements and a failure of the brain to properly process differing information about eye movements.

Eye movement theory proposes that the arrowheaded and feather-tailed lines require different types and/or amounts of eye movements. Because the entire feather-tailed line in the illusion is longer, it lengthens the eye movements required to view the line. Therefore, we perceive this line as longer. Another version of the eye movement theory is that we perceive the feather-tailed line as longer because it takes more eye movements to view a line with inward pointing arrows than it does a line with outward pointing arrows.

Despite these different interpretations of eye movements, eye movement theory was rejected when researchers found that the illusion continues to be seen even when there is no eye movement at all.

More recent biological theories have been based on neuroimaging studies; for example, scanning the brain while participants with or without brain damage are looking at the illusion. These studies have identified specific brain areas that are active and inactive when we view the illusion, but they have not been able to satisfactorily explain *why* we perceive the illusory effects. It may be the case that we have an inborn tendency to misperceive simple geometric patterns when they are viewed in a two-dimensional form.

Psychological perspective

Some explanations from a psychological perspective emphasise the role of learning and past experience. For example, it has been proposed that we experience the illusion because it contradicts what we have learned throughout life about physical reality. Therefore, we cannot make sense of the illusion whenever we view it, even after the illusion is explained to us.

One learning-based explanation of the illusion that created a lot of interest is known as the *carpentered world hypothesis*. This explanation proposes that the illusion occurs because of its similarity to familiar architectural features in the real three-dimensional world we experience as part of everyday life (as shown in figures 8.4(c) and (d) below).

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Practical activity — measuring the Müller-Lyer illusion

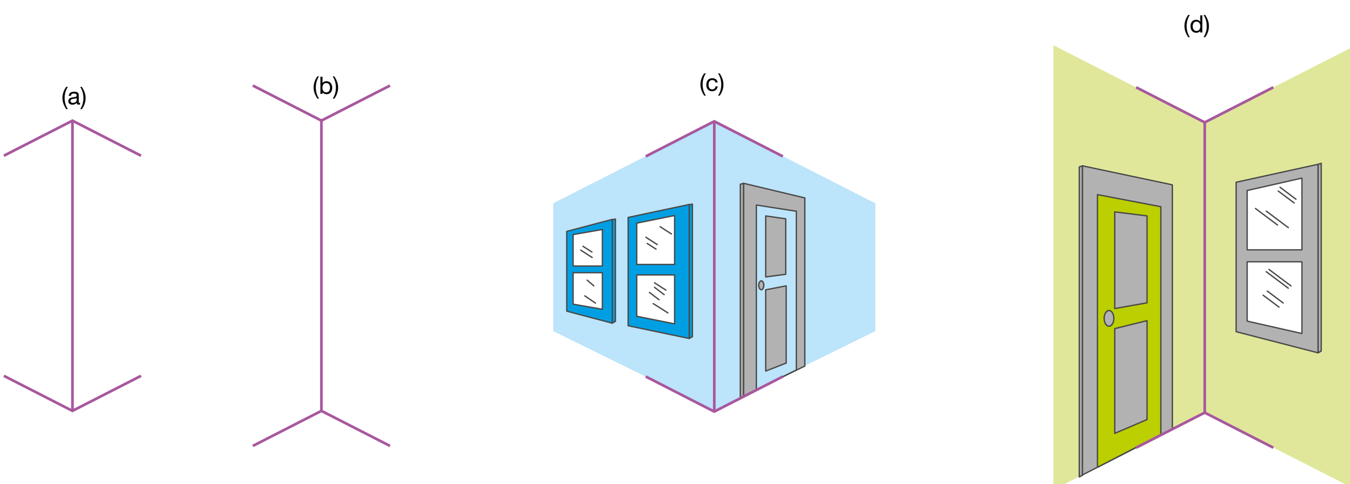

Figure 8.4 The standard Müller-Lyer illusion

In our three-dimensional world, we have grown accustomed to seeing corners everywhere and often use these and other angles and lines to judge depth and distance. As a consequence of this experience, the arrowheaded line looks like the nearer, outside, vertical corner and roofline of a room or building, whereas the feather-tailed line looks like the farthest, inside corner (including ceiling and floor) of a room. Consequently, the two vertical lines appear to be at different distances from the observer — the feather-tailed line appears further away. Our brain overrides information from the retinal images showing the two vertical lines as equal in length. Therefore, the line that appears further away (feather-tailed line) is perceived as longer.

Other psychological explanations of the illusion emphasise how we take in and process visual information in order to perceive the illusion. For example, it has been proposed that the perceptual error we make with the illusion may be due to using inappropriate mental strategies when interpreting the incoming visual information. For example, we may incorrectly use the principle of size constancy. This would lead us to make an interpretation that when two lines appear to be at different distances, and cast retinal images of equal size, then the line which appears further away (the feather-tailed line) must be longer. The incorrect interpretation results in the illusion.

In this way, the Müller-Lyer illusion can be said to result from inappropriate use of perceptual processes involved in maintaining size constancy, when we know from depth cues (same-sized retinal images) and past experience, that objects appearing to be at different distances can be of identical size or length. Furthermore, our perception of the illusion suggests that we sometimes don't interpret a retinal image as being what it really is, but rather what it represents.

Critics of this *misapplication of size constancy* theory have questioned why the illusion works equally well when the two lines are horizontal rather than vertical, as shown in Figure 8.5. Furthermore, psychologists have produced other variations of the Müller-Lyer illusion which use different shapes on the ends, which are also shown in Figure 8.5 below. These variations of the illusion are equally effective in producing the illusion as the original figures.

Social perspective

Research studies conducted from this perspective have focused on the role of social factors, particularly cultural influences on the perception of the Müller-Lyer illusion. These studies have also provided evidence for the role of learning and past experience in perceiving the illusion. For example, in some cultures, people have spent most of their lives in 'non-carpentered' worlds (see Figure 8.6(b) on the next page).

One such group are Zulus who live in tribal communities within remote areas of Africa. These Zulus live in circular houses with roundish doors and domed roofs — without all the familiar angles, corners and edges of our Western three-dimensional world. When shown the Müller-Lyer illusion, these Zulus are more likely to view the lines in their actual two-dimensional forms and therefore perceive the lines as equal in length. They have only limited, if any, experience of angles and corners in their three-dimensional worlds and are consequently less likely to perceive the illusion.

A socio-cultural study has also been conducted to compare responses to the illusion by white American children and Zambian children in Africa. The study included a comparison of Zambian children living in tribal communities in rural areas and Zambian children living in urban areas such as towns or cities. The results showed that the white American children were more likely to perceive the illusion than were the Zambian children living in urban areas. Furthermore, the Zambian children living in urban areas were more likely to perceive the illusion than the rural Zambian children. Since the rural Zambian children were much less exposed to rectangular structures, it seems that experience associated with the environment in which we grow up is a relevant factor in perceiving the Müller-Lyer illusion (Segall et al., 1990; Segall, Campbell & Herskovits, 1966).

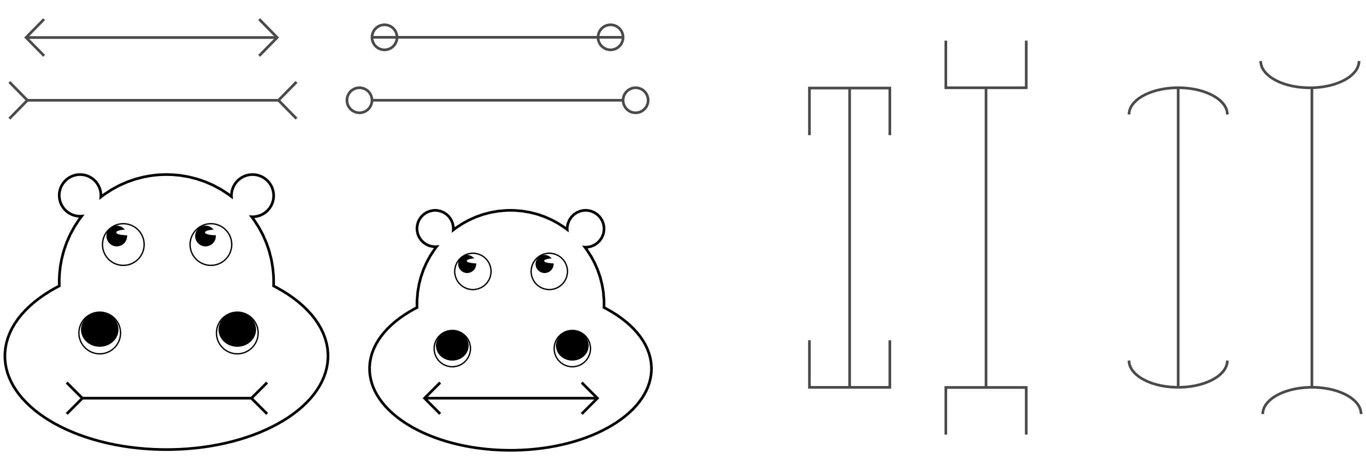

Figure 8.5 Variations of the Müller-Lyer illusion. These figures work just as well to produce the Müller-Lyer illusion without the depth cues said to cause the illusion in the original vertical figure.

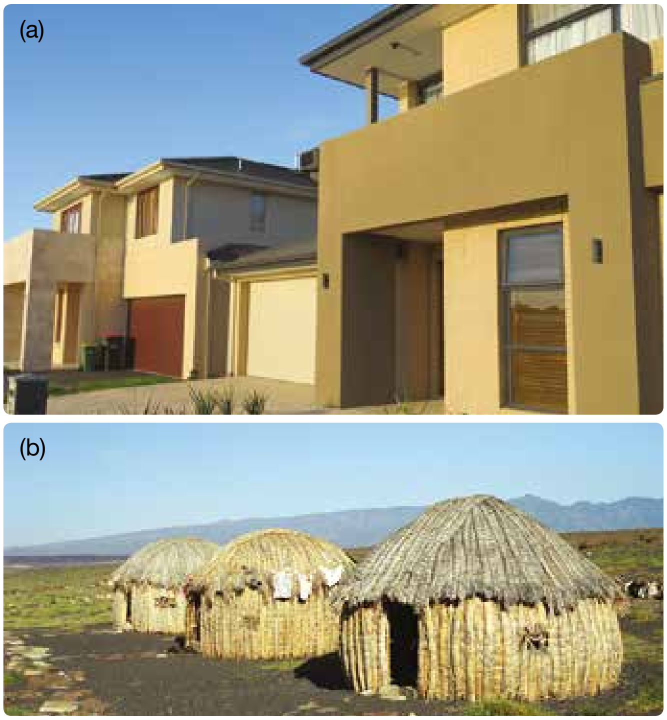

Figure 8.6 (a) Carpentered and (b) non-carpentered worlds

In sum, each of the different perspectives offers useful insights into factors that may influence our perception of the Müller-Lyer illusion. Psychologists with each of these perspectives have constructed and tested many hypotheses through experimental research. Many have also developed theories by drawing on the theories and research findings of other perspectives. However, psychologists from all perspectives mostly agree that there is not yet any single explanation of the illusion that is entirely satisfactory.

Ames room illusion

Examine the photograph in Figure 8.7 opposite. The person on the right appears to be much bigger than the person on the left. However, both people are actually of normal size. This **Ames room illusion** involves people appearing smaller or larger, depending on where they are standing. It is based on the unusual construction of the room, particularly the shape of the back wall.

The Ames room illusion involves a trapezium-shaped room that is longer and higher on one side than the other. When viewed through a peephole at the front of the room using only one eye, the room appears rectangular. The room's unusual shape and being restricted to the use of monocular vision to view it provides the basis for the illusion.

Although other items in the room such as windows, clocks and furniture may add to the impact of the illusion, these items are not essential for the illusion to occur. The illusion is named after American psychologist Adelbert Ames (1880–1955) who intentionally designed the room to distort visual perception, particularly the size of objects in the room.

The Ames room appears to be a normal rectangular room when viewed through a peephole located in a central position on the front wall. The back wall looks parallel to the front wall and the two back corners therefore appear to be exactly the same distance from the observer.

A crucial aspect of the illusion is that the back wall is actually slanted away from the observer (from right to left). This results in the far left corner being double the distance of the right corner from the peephole. When observing a person standing in the right corner at the back of the room, the image of that person which is cast on the retina is larger because the person is twice as close to the observer (compared to a person standing in the back left corner). In addition, the ceiling slopes upwards from the right upper corner to the left upper corner of the room. This increases the height of the ceiling from right to left, which also helps ensure the illusion occurs.

As a result of these deliberately constructed 'deceptions', Ames was able to make people appear small or large, depending on where they stood in the room. When we view the inside of the room through the peephole, our past experience with rectangular rooms leads us to expect that the people in the room are all the same distance away from us. However, in this situation, one person casts a smaller or larger retinal image than the other, so their sizes are perceived as different.

According to *apparent distance theory*, when two retinal images are the same size, but one image appears to be at a greater distance, then the one that appears further away will be interpreted as bigger or larger.

In the Ames room, the perceived rectangular shape of the room is consistent with the retinal image, but not consistent with the room's real shape. The back corners on either side of the room actually produce equal-sized retinal images because the vertical length of the further left corner is double the length (but twice the distance from the observer) of the nearer right corner. Therefore, the visual angle is the same for both corners from the observer's view. Because the observer does not have the depth cues available to 'work out' the real difference in distance between the two corners, the equal-sized retinal images of the corners are interpreted as equal in size. This produces an illusion of a rectangular room.

The Ames room illusion also illustrates our inability to maintain size constancy when our use of depth cues is restricted or the depth cues are misleading. Size constancy fails because the retinal information — the changing sizes of the people as they cross the floor — cannot be corrected due to the lack of accurate depth information. The illusion is so strong that a person observed walking from the right corner to the left corner is perceived as 'shrinking', even though the observer knows that this is not possible in the real world.

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Weblinks

- Video on Ames room illusion 2 m 54 s
- Teacher explanations of Müller-Lyer and Ames and other illusions

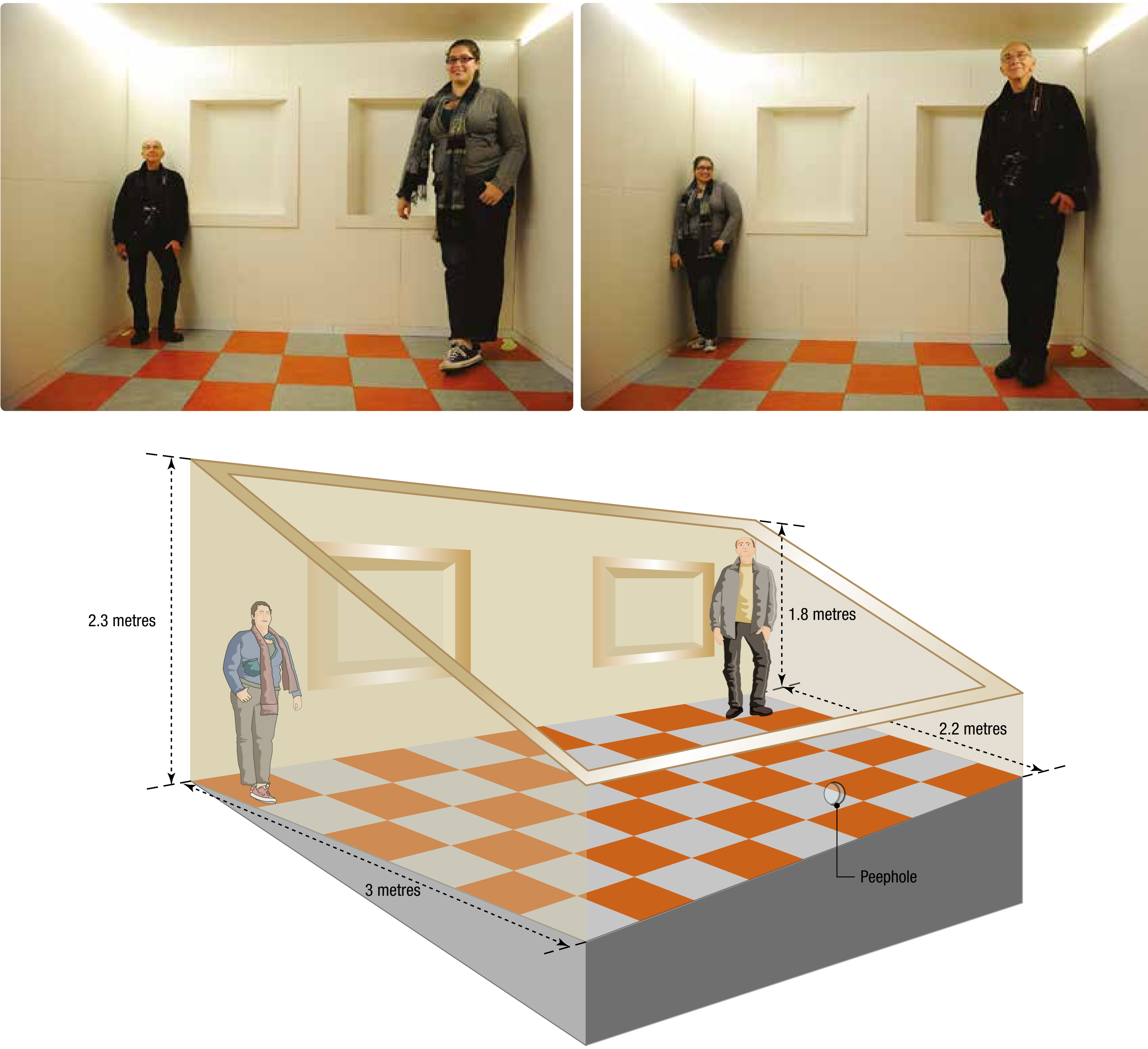

Figure 8.7 There is a distortion of the size of objects within the Ames room. A crucial feature of the room that creates the illusory effect is the back wall, which is actually slanting away from the observer, but appears to be a normal rear wall of a rectangular room. The measurements in the drawing show variations that contribute to the illusion. However, an Ames room can be built in virtually any size.

BOX 8.1 The moon illusion

Unlike the Müller-Lyer and Ames room illusions, which are artificially created, the moon illusion is naturally occurring. The illusion occurs when the moon appears considerably larger when near the horizon than when it is high up in the sky, even though the retinal image is equal in both situations, and the moon does not actually change its size as it moves across the sky. The illusion is more obvious with a full moon. It has intrigued people for many centuries and various theories have been proposed to explain it.

The most widely accepted explanation is in terms of *apparent distance theory* (which is also used to explain the Ames room illusion). This theory is based on the results of research conducted by American psychologists Lloyd Kaufman and Irvin Rock.

Kaufman and Rock (1962) proposed that viewing the moon over a visible stretch of terrain such as a landscape makes it appear further away. They found that when research participants viewed the moon at the horizon over a visible surface (e.g. trees and buildings), it appeared on average 1.3 times larger than the moon seen at its highest point in the sky (its zenith). However, when the terrain was kept out of vision by observing the moon through a hole in a sheet of cardboard, no difference in size between the horizon and zenith moons was reported.

Kaufman and Rock concluded that the terrain offers many depth and distance cues that provide 'evidence' to allow us to perceive the moon as more distant, whereas the sky offers no depth and distance cues, so we misperceive distance and underestimate the moon's size.

Not all psychologists agree with this explanation. For example, Coren and Aks (1990) have found that people sometimes perceive the horizon moon as closer, not more distant; Reed and Krupinski (1992) have found that the illusory effect cannot be created when the visual stimulus is a star rather than the moon; and Suzuki (1991) found that the illusion can still occur even when the moon is projected at different points in the sky without the presence of depth and distance cues, as in the total darkness of an indoor planetarium. In sum, a completely satisfactory explanation of the moon illusion has yet to be proposed (Kassin, 1995).

LEARNING ACTIVITY 8.1

Review questions

1. Why are visual illusions often referred to as 'distortions of visual perception'?
2. In what way can the study of visual illusions enhance understanding of visual perception?
3. In point form, outline an explanation of the Müller-Lyer illusion that you find the most reasonable and convincing.
4. (a) Briefly describe the Ames room illusion.
   (b) If you watch a person walk from the back right-hand corner of the Ames room to the back left-hand corner of the Ames room, they are likely to appear to shrink. Explain why you would perceive the person to be shrinking.
   (c) Why is the observer's view restricted to using monocular cues?
   (d) What is a possible explanation of the Ames room illusion?
5. The viewing service shown opposite enables tourists to perceive a 3D colour image of fully reconstructed buildings and monuments on the Acropolis in Athens, Greece. Explain whether their 'augmented reality' view is a visual illusion. The APP is demonstrated at www.moptil.com

6. Find an example of a visual illusion that you find intriguing.
   (a) Make a copy of the illusion (or provide information on where to find it).
   (b) Outline the illusory effect.
   (c) What is a possible explanation of the illusory effect?

JUDGMENT OF FLAVOURS

The perception of taste is a relatively limited experience that is based on five basic taste qualities. When we taste, what we actually perceive is the combined input from different senses, not just taste and other oral sensations. This overall experience results in flavour. Flavour is not in the food (or drink) — it is created from the food by the brain. Flavour tells us whether a food is delicious, good, unpleasant or even disgusting.

Flavour is a perceptual experience produced by a combination of taste and other sensations. A crucial component is smell. In addition, there is sensory information from receptors in papillae that detect temperature (e.g. hot or cold porridge), pain (e.g. too much chilli or spiciness) and the tactile sensation of texture (e.g. chunky or smooth peanut butter).

Many psychologists have broadened the concept of flavour to include auditory sensations, such as the sounds heard when food is bitten or chewed, especially noisy foods such as carrots, celery and potato crisps, and visual sensations involving what a food or drink looks like and how it is presented (Spence, 2015; Spence, 2010).

The pleasure of food and beverages is critically dependent on all the sensory components being 'right'. The ideal lasagne, salad, milkshake or mocktail is a perfect mix of all the sensory inputs. This also means that the taste of food can, for example, be ruined simply if it has an inappropriate colour or is not crunchy enough. In such cases, the influence of one type of sensory input may dominate or override other sensory input.

Given the multi-sensory nature of flavour, its perception is influenced by numerous factors. These include perceptual set, colour intensity and texture. Food producers and retailers recognise these influences when manufacturing and marketing their foods and beverages. Millions are spent on packaging and appearance to influence our choices, in our homes as well as in supermarkets, restaurants, school canteens and wherever else we may purchase food.

Perceptual set

The flavour we experience is influenced by expectations based on preconceived ideas about how foods (and drinks) should taste. These form through past experience. It is not even essential to have actually tasted something to have an expectation of flavour. For example, the mere thought of eating an uncooked cockroach is likely to disgust you without knowing what it actually tastes like. Your expectation is enough to produce disgust.

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Weblink
Australian psychologist explains flavour perception 3 m 56 s

Figure 8.8 Your expectation of what an uncooked cockroach tastes like can influence your judgment of the flavour if you actually tasted it.

One of the most significant influences on flavour judgment is our expectation of how food should look. Colour tends to be the single most important visual cue when it comes to our expectation about the likely taste and flavour of food (Spence, 2015). We start to associate specific colours with various types of foods and drinks during childhood and link them to certain tastes and flavours throughout life. For example, we expect yellow pudding to have a banana or lemon flavour and brown pudding to have a chocolate flavour. We also use colour to determine the ripeness and/or freshness of fruits, vegetables, meats, fish, dairy products and even lollies. If colour does not match our expectations, we may perceive the flavour of any one of these foods differently.

Figure 8.9 We use colour to determine the ripeness and/or freshness of all types of food. If colour does not match our expectations then our flavour perception may change.

When the colour of a food or drink is different to what we expect, our brain can interpret that it tastes different too. Researchers have used colour to manipulate expectations and distort flavour judgments of participants in numerous studies.

One of the best known demonstrations of this effect was reported by the American food researcher John Wheatley (1973). A group of people were served a meal of steak, French fries and peas under lighting conditions that masked the true colour of each food. All thought the meal was fine until the lighting was changed. Halfway through the meal, normal lighting was restored and it became apparent to the diners that they were eating blue steak, green fries and red peas. Upon realising this, many lost their appetite and some became ill.

According to Wheatley, the mere sight of the unnaturally coloured food was sufficient to induce nausea. In particular, the colour blue is often associated with spoiled, mouldy meat, creating an expectation that food of this colour won't taste very good and/or is likely to be off and cause some kind of food poisoning (Zampini & Spence, 2012).

Figure 8.10 We have expectations of how food should look and this perceptual set can influence our flavour judgment of the food.

Researchers have also investigated the effect of **perceptual set** on our judgment of drink flavours. In one of the best-known studies, the colour of a cherry-flavoured drink was manipulated. The addition of an odourless orange or green food-colouring solution that was actually neutral in flavour led participants to incorrectly identify the flavour. For example, when the red, cherry-flavoured drink was changed to an orange colour, 41% of the participants reported that the drink tasted of orange compared to 0% when the drink's colour had not been changed. Colouring the same drink green led to 37% lime-flavoured responses (DuBose, Cardello & Maller, 1980).

Even expert flavour tasters can be misled when their flavour expectations are manipulated. For example, some professional wine tasters and wine makers have been found to describe a white wine that had been artificially coloured red as having key characteristics of red wine. One explanation of wine experts being deceived in this way is that their expectations of the taste, aroma and flavour characteristics are much more strongly associated with a particular wine colour than in the non-expert (Spence, 2010).

Colour intensity

Colour tends to dominate over other sensory information when it comes to influencing our expectations about taste and flavour of food and beverages. In addition, changing the intensity of a colour can exert a sometimes dramatic impact on our expectations, and hence on the taste and flavour experiences. For example, a brighter or richer coloured food item can seem to taste different to a blander coloured one, even when there is no change in the ingredients that make up the flavour (Spence, 2015).

Regardless of our age or culture, there tends to be an expectation that more intensely coloured foods and drinks are likely to be more intensely flavoured. Research studies have found that simply adding more colouring to a food can lead participants to rate the taste and/or flavour as more intense. Most studies have been conducted with beverages. This is mainly because it is easier to manipulate the level of colour in solutions (Delwiche, 2012; Watson, 2013).

In one study, researchers investigated the influence of varying the intensity of colour on ratings of sweetness intensity. The participants were given two glasses of orange juice to compare and to rate in terms of their sweetness. The juices were lighter and darker shades of orange. The tasters rated the orange juice with the more intense, darker shade as being much sweeter. When later given two glasses of orange juice that had the same colour intensity but differing degrees of sweetness, most tasters did not report a difference in taste. Then, when asked to taste orange juice in which a flavourless green colour tinge was added, a significant number of participants reported the presence of sourness. In a similar study, participants who drank strawberry- and cherry-flavoured juices reported that drinks with more red colour tasted stronger and had 'more' and 'truer' strawberry and cherry flavours. The effect was stronger among older than younger tasters (Fernández-Vázquez et al., 2014).

Studies that have manipulated the colour intensity of food have also reported distorted perceptions of flavour. As with drink studies, the colour is intensified using a food dye but there is no actual change in flavour. The results of food studies also show that overall flavour intensity is influenced by the amount of colouring that is added — the more intense the colour the more intense the flavour that tends to be reported and vice versa. For example, chocolate pudding that is a richer shade of brown has a stronger flavour, as does chicken bouillon that has twice the level of normal colouring added. Egg yolks taste better when a rich orange colour, butter when pale yellow, margarine when it looks more like butter and brighter red salsas are perceived as spicier. When bright white colouring is added to skim milk it is perceived to be smoother, better tasting, and higher in fat than the uncoloured milk.

This type of colour intensity effect has been found with everything from noodles to vegetables, and from cheese through to yoghurt, as well as cake, jams, jellies, chocolates and sherbets (Chan & Kane-Martinelli 1997; Shermer & Levitan 2014).

Figure 8.11 There tends to be an expectation that more intensely coloured foods are likely to be more intensely flavoured. Overall flavour intensity is influenced by the amount of colouring that is added; for example, the more intense the colour of yoghurt, the more intense the flavour that is reported.

Figure 8.12 Texture is the property of food that contributes to flavour along with the sensory input.

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Weblink
Practical activity on colour and flavour perception

Texture

We often describe ice cream, yoghurt or custard as having a creamy taste. That 'creaminess' is more about how the food feels in the mouth than about actual cream content. **Texture** is the property of food or beverage that is felt in the mouth and contributes to flavour along with taste, vision and other sensations. Crispy, crunchy, crackly, gritty, grainy, chewy, sticky, soft, hard, smooth, rough, runny, lumpy, slimy, oily, greasy, dry, bubbly, fizzy, moist, rich, juicy and succulent are some of the other words that refer to texture when eating or drinking.

Texture stimulates tactile sensations and is therefore perceived in response to touch, primarily in the mouth. It can affect flavour in at least two important ways. First, the texture of the food or drink we consume helps to determine how much of its surface area can come in contact with our taste receptors. For example, consider the difference in flavour intensity between carrot chunks, grated carrot and carrot juice. When you put a big chunk of carrot in your mouth, you do not taste much until you crunch down on it and break it into smaller pieces. Taste a forkful of grated carrot, and its flavour is much more noticeable. Sip on a glass of carrot juice, and you are likely to get a blast of carrot flavour immediately (Zimmerman, 2004).

The length of time a food or drink spends in the mouth also affects how strong its flavour seems. Thicker liquids and rich foods coat the mouth. Consequently, their tastants spend more time exposed to taste receptors than thinner liquids and leaner foods, so they often seem more flavourful. Dense foods, likewise, come into contact with more receptors than do aerated, lighter foods. Chewy foods take longer to break down enough to swallow than do softer foods, so we get more flavour from them. Studies show that people, for example, tend to judge the flavour of yoghurt or custard as creamier and more flavoursome and filling when it is thick, provides more mouth coating and is slow to melt (McCrickerd, et al., 2012; Zimmerman, 2004).

In many cases, what we like and dislike about the texture of our food is a direct result of what we expect from a particular food. 'Chewy', for example, is a textural feature that we like when we are talking about a muesli bar or licorice, but not when we are talking about steak or biscuits. Similarly, crispy or crunchy is what we expect and want from Twisties or pretzels but not from custard or scrambled eggs.

Texture contributes to the overall acceptability of a food or beverage, as well as to its appearance and flavour. Our expectation of how a food or drink should feel in the mouth is manipulated by food producers and marketers to influence our choices. For example, potato chips and crackers are advertised as crispy, butter and margarine as smooth, oranges as juicy, meat and chicken as succulent, ice cream as creamy, gravy as rich and carbonated drinks as fizzy or bubbly. This occurs whether or not it is true. Chefs and food manufacturers use starches, thickeners and emulsifiers to help create the 'creamy' taste they promote. However, a sauce's flavour can be judged as being 'creamy' without actually containing cream.

Figure 8.13 The sight of the plated food may influence its preference over the handheld food. However, if blindfolded when tasting either of these foods, their texture will influence overall acceptability of one over the other.

BOX 8.2 Does the colour of the mug influence the taste of the coffee?

About a billion cups of coffee are consumed in cafés, restaurants and other outlets throughout Australia each year. Australian psychologist George Van Doorn and his colleagues (2015) conducted research to find out if consumers' perceptions of a café latte would be influenced by the colour (white, transparent or blue) of the mug from which it was drunk.

In one experiment, nine male and nine female volunteer participants aged between 18 and 62 years with a mean age of 31.5 years were randomly allocated to either of three groups, with three males and three females in each group. Participants were told that the purpose of the study was to assess certain characteristics of coffee.

All drank ~200 mL of café latte (~135 mL of full-cream milk and ~65 mL of coffee). Group 1 were given their coffee in a white, porcelain mug, Group 2 in a transparent, glass mug and Group 3 in a blue, porcelain mug (like the mugs shown below).

Once the participants had drunk their coffee, they rated the coffee on five characteristics using a 100-point scale. For example, for flavour intensity, a score of 0 = not intense at all and a score of 100 = very intense. Results are shown in Table 8.1 below.

The researchers concluded that the colour of the mug influenced participants' ratings of the coffee taste/flavour. On the basis of this finding, they recommended that 'café owners, baristas, as well as crockery manufacturers should carefully consider the colour of the mug and the potential effects that its colour may exert over the multisensory coffee drinking experience'.

Table 8.1 The mean subjective ratings of the perceived intensity, aroma, bitterness, quality and acceptability of the coffee as a function of mug type

Mug	Flavour intensity	Aroma	Bitterness	Quality	Acceptability (likeability)
White	35.46	38.18	36.00	50.57	40.38
Glass	29.97	24.08	24.86	33.85	43.80
Blue	31.16	29.71	27.34	49.48	55.58

Source: Van Doorn, G. H., Wuillemin, D., & Spence, C. (2014). Does the colour of the mug influence the taste of the coffee? *Flavour, 3*(10).

LEARNING ACTIVITY 8.2

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Word copy of table

Review questions

1. Explain the meaning of flavour.
2. How is flavour distinguished from taste?
3. Complete the following table to summarise how flavour is judged and can be influenced.

Factor	Description	Influence on flavour judgment	Example of manipulation by a food producer or marketer to influence purchase	Example of manipulation by a chef/restaurant to influence flavour judgment
perceptual set				
colour intensity				
texture				

4. To what extent might the setting or ambiance ('atmosphere') of the eating place influence flavour judgment in a positive and/or negative way. Explain with reference to an example.

LEARNING ACTIVITY 8.3

Analysis of research on mug colour and coffee taste

Consider the research about the colour of the mug and its influence on the taste of the coffee described in Box 8.2 on page 429.

Analyse the research by answering the following questions.

1. Formulate a relevant research hypothesis.
2. Identify the experimental research design.
3. Identify the operationalised independent and dependent variables.
4. Identify the experimental and control groups.
5. Describe the results obtained.
6. Suggest two potential extraneous or confounding variables relating to the coffee and/or mugs that needed to be strictly controlled.

SYNAESTHESIA

When Matthew Blakeslee shapes hamburger patties with his hands, he experiences a vivid bitter taste in his mouth. Esmeralda Jones sees blue when she listens to the note C sharp played on the piano; other notes produce different colours — so much so that the piano keys are actually colour coded, making it easier for her to remember and play musical scales. And when Jeff Coleman looks at printed black numbers, he sees them in colour, each a different colour. Blakeslee, Jones and Coleman experience the ordinary world in extraordinary ways. For them, the senses get intertwined instead of remaining separate. They are among a few otherwise normal people who have synaesthesia (Ramachandran & Hubbard, 2003).

Synaesthesia (pronounced 'sin-ess-THEE-zhah') is a perceptual experience in which stimulation of one sense involuntarily produces additional unusual experiences in another sense. The experience associated with the additional sense 'adds' to the overall perceptual experience without replacing the initial sense.

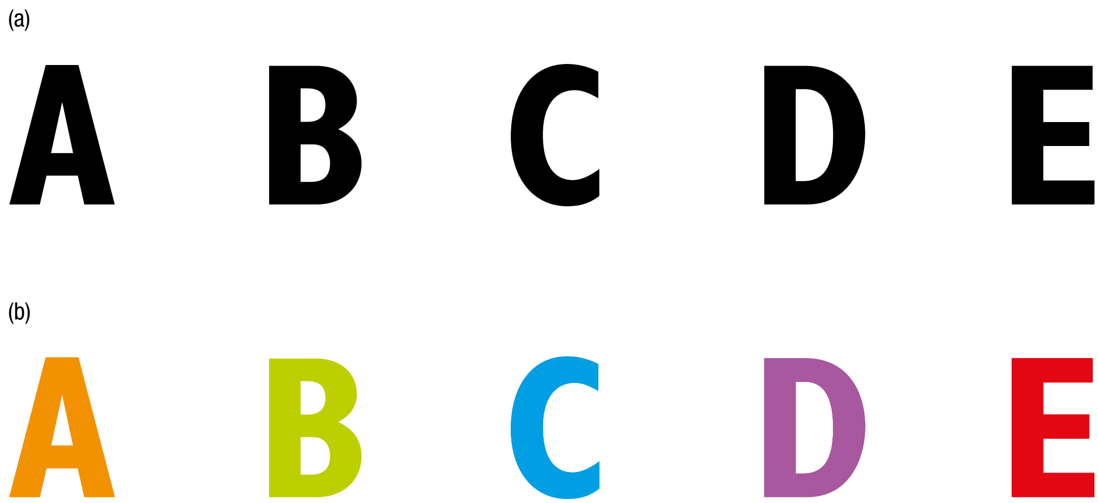

Figure 8.14 When synaesthesia occurs, stimulation of one sense triggers an unusual experience in another sense. Figure (a) shows how letters usually appear to a non-synaesthete and (b) how letters might appear to a synaesthete.

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Video: Researcher describes synaesthesia 2 m 07 s

Researchers have found that synaesthesia is a real experience (rather than imagined) and can be distinguished by a number of characteristics. Synaesthesia is involuntary and occurs automatically in response to the relevant sensory stimulation. It is extremely difficult to suppress. The experience is also vivid, highly memorable and consistent across time. For example, the synaesthete always associates the same colour with the same number, letter of the alphabet or sound. Blue will always be experienced with the number three, or T's are always red to the individual synaesthete. However, these specific cross-sensory experiences vary among individual synaesthetes. For example, one synaesthete may always experience blue with the number three, whereas another may always experience yellow with the number three. Finally, synaesthesia also tends to be one-way rather than bidirectional. If a sound produces a taste, the taste will not necessarily produce the sound (Carmichael et al., 2015; Hubbard & Ramachandran, 2003; Ward & Mattingly, 2006).

Although synaesthesia was first scientifically investigated around 1880, it was brushed aside as fakery or a mere curiosity for many years. More recently, psychologists have developed renewed interest in synaesthesia and are now conducting research investigations on the phenomenon.

Much research still needs to be done, but it has been found that there may be unusual brain processes associated with synaesthesia and that there may be a genetic basis to its experience, as it tends to run in families. However, there is no strong evidence for sex differences in its experience. A number of studies have reported that synaesthesia is found more commonly in women, with up to 6 times more synaesthetes than in males. Other studies have reported that such results are due to a confounding variable — female synaesthetes are more likely to volunteer for research on the condition. (Hubbard & Ramachandran, 2003; Simner & Carmichael, 2015).

Synaesthesia is relatively rare and there are substantial individual differences among people in how they experience it. It generally does not interfere with normal daily functioning.

Estimates of its prevalence vary from as much as 1 in 20 people to as few as 1 in 25 000 people. An estimate of about 1 in 2000 people seems to be widely accepted within psychology. Some forms of synaesthesia are more common than others. For example, the experience of seeing colours produced by sounds, or seeing letters in specific colours, is more common among synaesthetes than a smell produced by touching a particular shape or a taste produced by hearing words.

One of the most common and widely studied forms of synaesthesia is called *grapheme-colour synaesthesia*, in which viewing letters or numbers produces the experience of colours. Synaesthetes who have this experience report that looking at a specific letter of the alphabet will evoke a specific colour or a 'coloured overlay'. Other synaesthetes report that they do not actually see the colours but instead just 'know' that a particular letter is a particular colour. Still others report experiencing specific colours but say that the colour is experienced somewhere within their 'mind's eye' (Carmichael et al., 2015; Hubbard & Ramachandran, 2003).

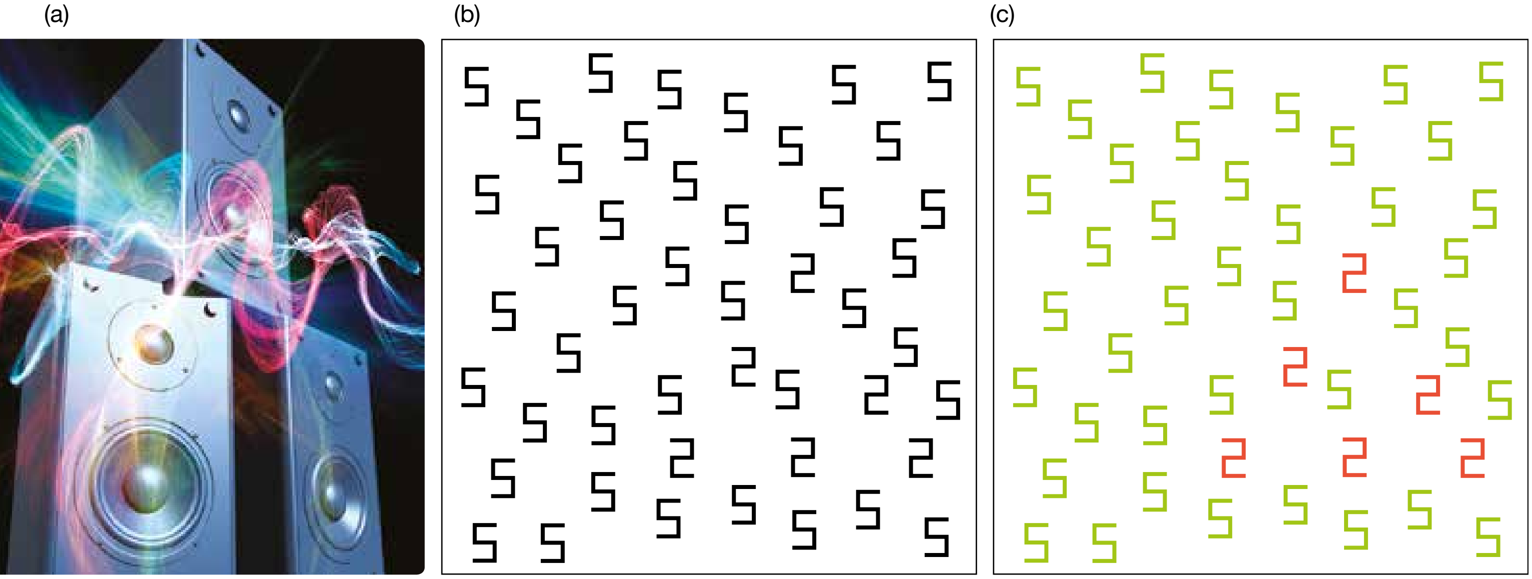

Figure 8.15 (a) It is estimated that about 18.5% of people with synaesthesia see visual images like colour or shapes when they listen to music. This form of 'coloured hearing' is called Chromesthesia or Sound-to-colour synaesthesia (Day, 2005). (b) Someone with grapheme-colour synaesthesia will tend to find it difficult to pick out the black twos from the black fives in this test item. (c) However, if the numbers are coloured, someone with grapheme-colour synaesthesia will tend to see the triangle of twos almost instantly.

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Weblink
Video on synaesthesia 3 m 57 s

eGuide*plus*

Weblink
Documentary on synaesthesia 44 m 32 s

Explanations of synaesthesia

Researchers still know relatively little about synaesthesia and why it is experienced. Some describe it as a neurological condition, others as an inherited condition, others as a familial condition, and still others as a combination of two or more of these.

Many explanations have been proposed for its occurrence. Some researchers have suggested that synaesthetes are unusually sensitive to external stimuli. Others have proposed that synaesthesia may result from a breakdown in sensory and perceptual processes. It has also been suggested that synaesthesia can be linked to the excess of neural connections formed during early development that are normally pruned and refined as the brain matures over time. Therefore, synaesthetes may be people who retain rather than lose these neural connections.

Many psychologists agree that it is likely that the brains of synaesthetes possess unique structural and/or functional properties. Consequently, explanations often refer to the possibility of differences in the architecture of the synaesthete's brain. For example, the brains of synaesthetes may have abnormal neural pathways or be 'wired' differently, so that neighbouring sensory areas in the brain cross-activate one another, thereby triggering additional sensations — the experience of seeing colour when looking at shapes might be due to cross-activation of the colour and shape recognition (Carmichael et al., 2015; Simner & Carmichael, 2015).

Neuroimaging technology has been very useful for studying brain areas that are active during synaesthesia, but the images are not yet detailed enough to allow researchers to see whether the individual connections in the brain are cross-wired. Generally, these studies show that cortical areas involved in processing the relevant sensory information are activated as occurs in non-synthaesthetes. When enough known synaesthetes die and donate their brains for research, post-mortem examinations may provide valuable information on what is actually different about their brains and what may therefore account for their extraordinary perceptual experiences.

It is likely that something is 'going on' in the sensory areas of the brain, but precisely what still remains unclear. It is, however, clear that synaesthesia is not associated with any serious brain abnormality or problems with cognitive functioning. Nor is it some kind of 'sixth sense'.

Researchers usually study synaesthesia not only because it is a perceptual distortion involving an unusual perceptual experience, but also because it may shed new light on how the brain is organised and how we sense and perceive the world. It may offer new insights on brain areas and cognitive processes involved in perception. For example, it raises questions on how the different senses interact in the brain; how we 'bind' all perceptions together into one complete whole; how different types of information are represented in the brain; and on the overlap between cognitive processes such as perception, imagery, language, memory and conscious awareness.

A special few can 'taste' a word before they can say it

By J.R. Minkel

TASTE OF THE UNKNOWN: Words caught on the tip of the tongue elicit tastes in people with an unusual mixing of the senses called synesthesia.

Having a word stuck on the tip of the tongue is enough to activate an unusual condition in which some people perceive words as having different tastes, according to a new study. When people with the inherited condition, called synesthesia, looked at pictures of objects that come up infrequently in conversation, they perceived a taste before they could think of the word.

Some researchers believe synesthesia is an extreme version of what happens in everyone's mind. If so, the result suggests that all abstract thoughts are associated with specific perceptions, says neuropsychologist Julia Simner of the University of Edinburgh, co-author of the report. 'The extent to which abstract thought is truly abstract — that's really what the question is.'

Simner and her colleague Jamie Ward of University College London tested six synesthetes by showing them pictures of 96 uncommon objects such as a gazebo, sextant, catamaran, artichoke or castanets. Out of 550 trials in total, Simner and Ward induced 89 tip-of-the-tongue states. In 17 of these 'um, um' moments, the synesthete reported perceiving a taste while still trying to conjure the word. In short, the word's meaning alone elicited the taste.

To confirm that these reports were truthful the researchers called the participants out of the blue a year later and retested them. The synesthetes consistently associated the same tastes with the same words, the researchers report in the November 22 *Nature*.

'This looks pretty clever,' says neuroscientist David Eagleman of Baylor Medical College, who was not involved in the study. Synesthesia research has blossomed in the last five years, as researchers have gained confidence in the subjective reports of presumed synesthetes, especially those who perceive letters or numbers as being colored, he says. 'Essentially all the synesthesia literature is about color just because it's easier to study. This is stepping beyond that.' Some experts have estimated that there are more than 150 kinds of synesthesia, based on the possible combinations of subjective sensations, he says.

Prior experiments found that the word-taste associations are locked in during adolescence and have some definite patterns, Simner explains. These synesthetes tend to taste childhood things such as chocolate and lollipops, she says. 'Some of these tastes are really strong and some of them are really unpleasant — some of them taste of earwax and bodily fluids,' she notes. 'It starts with words like 'mince' and 'cabbage,' and the taste experience spread to similarly sounding words.' 'Prince' might also taste of mince, for example. Some of the associations have seemingly obvious roots — 'newspaper' might taste like fish and chips, which traditionally comes wrapped in newsprint, she adds.

The brain wiring necessary for synesthesia seems to be present in everyone. Dropping acid or drifting to sleep can both cause synesthetic perceptions, and people who are blindfolded for extended periods may start seeing colors for different sounds, the experts note. 'It's possible that we all have that connection but the synesthetes have them to an extreme degree,' says Simner.

Some scientists have theorized that we are born synesthetic but lose or block most of the pathways that cause the unusual perceptions, Simner observes. Eagleman disagrees, saying that the condition may be the result of an imbalance in brain signals. He hopes to identify the gene for familial synesthesia in order to learn more, he says.

Source: Minkel, J.R. (2006). A special few can 'taste' a word before they can say it. *Scientific American*. Retrieved from http://www.scientificamerican.com/article/a-special-few-can-taste-a/

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Weblinks

- I see words as colours
- What is synesthesia and what's it like to have it?

BOX 8.3 Assessing synaesthesia

The Synesthesia Battery was developed by researchers to assess synaesthesia in a 10 minute online session. Specifically, synesthetes log on to the testing site (www.synesthete.org) and specify which form(s) of synesthesia they experience. The testing platform then presents their triggering stimuli (e.g. the 26 letters of the alphabet) one by one in randomised order, and participants are required to select their synesthetic colour for each trigger. Each stimulus (e.g. letter) is presented three times, and a score is generated to quantify the consistency of participants' responses (e.g. did the participant choose the same/similar colours each of the three times she saw a particular letter?) This score represents the geometric distance in RGB (red, green, blue) colour space, where R, G, and B values are all normalised to lie between 0 and 1. If the mean overall score of colour-distance is less than 1, the participant is classified as a synesthete; if the score is 1 or higher, the degree of inconsistency classifies the participant as a non-synesthete. However, it remains an open question whether this limited retest interval is sufficient to truly distinguish synesthetes from non-synesthetes.

Source: Carmichael, D. A., Down, M. P., Shillcock, R. C., Eagleman, D. M., & Simner, J. (2015). Validating a standardised test battery for synesthesia: Does the Synesthesia Battery reliably detect synesthesia? *Consciousness and Cognition, 33*, 375–385.

LEARNING ACTIVITY 8.4

Review questions

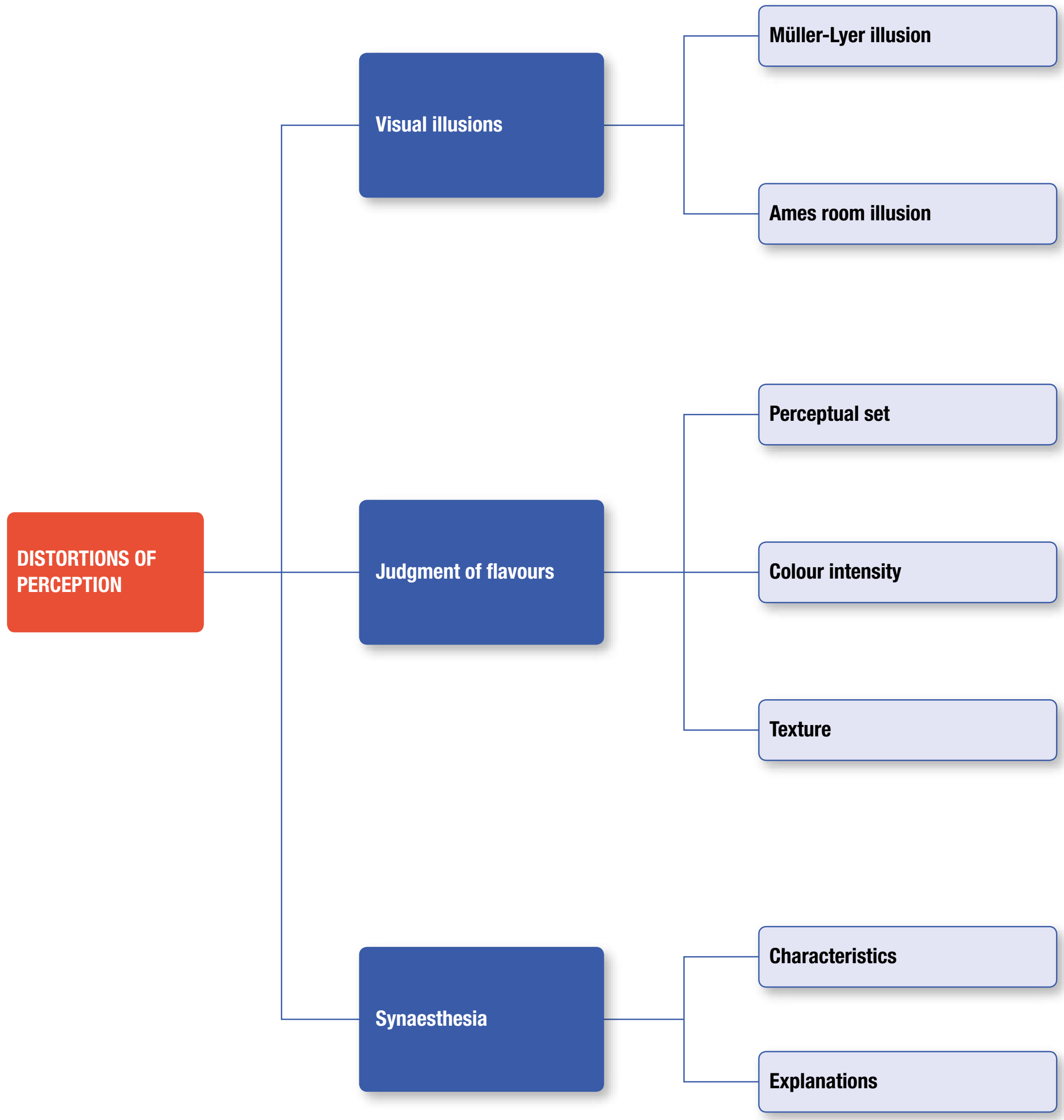
1. Explain what synaesthesia is.
2. List the key distinguishing characteristics of synaesthesia.
3. Suppose that you had synaesthesia. Write a one paragraph primary data description that reports a perceptual experience at a single point in time, ensuring you name the type of synaesthesia. You may refer to a type other than one described in the text.
4. Give a possible explanation of synaesthesia that is based on
   (a) brain dysfunction
   (b) healthy brain function.

LEARNING ACTIVITY 8.5

Media analysis/response

Read the article on synaesthesia on page 433 and explain how accurately it describes and explains synaesthesia with reference to information in this text.

CHAPTER SUMMARY



KEY TERMS

Ames room illusion p. 422
colour intensity p. 427
flavour p. 425
flavour judgment p. 426
Müller-Lyer illusion p. 420
perceptual distortion p. 418
perceptual set p. 427
synaesthesia p. 430
texture p. 428
visual illusion p. 419

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 437–9. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about distortions of perception	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Meaning of perceptual distortion			
Visual illusions			
• Müller-Lyer illusion			
– Description			
– Explanation			
• Ames room illusion			
– Description			
– Explanation			
Judgment of flavours			
• Meaning of flavour			
• Perceptual set			
• Colour intensity			
• Texture			
Synaesthesia			
• Characteristics			
• Explanations of synaesthesia			

CHAPTER 8 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

A visual illusion is best described as

A. consistent misinterpretation of real sensory stimuli.
B. a trick involving the visual perception system.
C. a false belief despite obvious proof that what is being looked at is incorrect.
D. a perception that occurs without external stimulation of the eye.

Question 2

The Müller-Lyer illusion demonstrates that if the retinal images of two lines are identical, then people who grew up in 'carpentered worlds'

A. cannot be fooled.
B. can make perceptual errors unless a ruler is available.
C. will usually interpret the two lines as being of the same length.
D. can find themselves making errors of judgment by ignoring 'carpentered world' cues.

Question 3

An explanation of an illusion in terms of 'misfiring neural impulses' is likely to be based on the _____ perspective.

A. biological
B. psychological
C. social
D. biopsychosocial

Question 4

The Ames room illusion demonstrates that

A. viewing objects over a stretch of visible terrain can distort perception.
B. perception is more accurate when we use monocular cues as well as binocular cues.
C. we always maintain size constancy over shape constancy.
D. if two things appear to be the same distance away but have retinal images indicating that they are different sizes, then perceived size is determined by the size of the retinal images.

Question 5

In relation to taste perception, which of the following is a characteristic of texture?

A. colour
B. labelling
C. packaging
D. mouthfeel

Question 6

The physical stimulus for texture perception is

A. colour.
B. mouthfeel.
C. touch.
D. colour intensity.

Question 7

Which of the following points is correct about synaesthesia?

A. an imagined experience
B. involves perceptual distortions
C. causes brain injury
D. caused by brain injury

Question 8

The flavour of food is determined by

A. taste.
B. tastants.
C. the brain.
D. the food properties.

Question 9

The visual cue that tends to be predominant in the judgment of flavour is

A. colour.
B. labelling.
C. packaging.
D. light.

Question 10

Research findings indicate that more intensely coloured foods or drinks are likely to be perceived as

A. sweeter.
B. unhealthy.
C. lacking in flavour.
D. more intensely flavoured.

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (2 marks)

Explain the meaning of the phrase 'distortion of perception'.

Question 2 (5 marks)

(a) Give an explanation of a visual illusion from a biological, psychological or social perspective. 3 marks

(b) Explain whether illusions or misperceptions of tastes or flavours may be better understood if approached from a biopsychosocial perspective rather than a single perspective. 2 marks

Question 3 (3 marks)

(a) Define food texture. 1 mark

(b) Explain the role of tastants in texture perception. 2 marks

Question 4 (2 marks)

Distinguish between taste perception and flavour perception.

Question 5 (3 marks)

Explain how perceptual set can influence flavour perception with reference to an example.

Question 6 (5 marks)

(a) List three distinguishing characteristics of synaesthesia. 3 marks

(b) Explain whether synaesthesia can be considered to be a perceptual distortion. 2 marks

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.
The answers to the Section B questions are in eBookPLUS.

9 SOCIAL COGNITION

KEY KNOWLEDGE

- the role of person perception, attributions, attitudes and stereotypes in interpreting, analysing, remembering and using information about the social world
- the applications and limitations of the tri-component model of attitudes
- attitudes and stereotypes that may lead to prejudice and discrimination

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), p. 21.

CHAPTER CONTENT

We communicate with and interact with others on a number of different levels in everyday life. Our interactions may range from the intimacy of a close personal relationship through to the more impersonal and formal interactions with people we know less well. The way in which we relate to another person depends, to a large extent, on the type of relationship we have with them. Our interactions with strangers will differ from the way we interact with people we know and like, and these interactions will be different again from those with people we know well, but don't like.

As we interact with others, we often try to understand the thoughts, feelings, motives and other influences that may explain why they are behaving in a particular way. When we do this, we tend to draw conclusions about them, often without even knowing them. For example, we may decide whether we like or dislike them, whether we can trust or not trust them, whether they have acted appropriately or inappropriately, whether they have done something poorly or well, whether or not we want to work with them again, and whether or not we want to see them again. The mental processes involved are part of social cognition.

Social cognition is concerned with how we make sense of our social world. More specifically, **social cognition** involves how we interpret, analyse, remember and use information to make judgments about others in different social situations.

Social cognition usually serves us well and we get better at understanding others as our cognitive abilities develop and we learn through experience. But it is not an error-free process. For example, we can decide to trust someone who shouldn't have been trusted, and someone who first impressed as likeable can turn out to be unlikeable. Some mistakes in judgment are harmless. Other mistakes can have significant consequences; for example, when a friend trusted with an intimate secret reveals it to the 'last person' you would ever want to know or when an elderly person is exploited by an unscrupulous financial adviser who was trusted with their life savings.

There are many aspects of social cognition. In this chapter we consider how we form impressions of other people (person perception), how we go about explaining the behaviour of other people (attributions) and how we form attitudes towards people, particularly attitudes and stereotypes that may lead to prejudice and discrimination.

Figure 9.1 Some mistakes in social cognition judgments can have significant consequences, such as when a friend trusted with an intimate secret reveals it to the 'last person' you would ever want to know.

PERSON PERCEPTION — FORMING IMPRESSIONS OF OTHER PEOPLE

Consider the thoughts that pass through your mind when you first meet someone, or even when someone walking by catches your attention. Most likely, you form a quick impression based on a 'snapshot' of information. This could include judgments such as this person seems attractive, or someone you would like to know better, or someone who could not be trusted, or someone who is likely to be aggressive. The judgments you make when forming your impression demonstrate person perception.

Person perception refers to the mental processes we use to form impressions and draw conclusions about the personal characteristics of other people. Making judgments about others, whether they be friends, peers, acquaintances, family or strangers, is a common and vital part of our life as social beings.

These judgments, including first impressions, guide the various types of relationships we develop with others. For example, an impression that someone is helpful might encourage you to approach that person rather than someone else for directions. An impression that someone is careless might lead you to avoid lending something that is of sentimental value to you. Similarly, general positive or negative impressions of others — our liking or not liking them — influence our choices of companions to spend time with or share personal thoughts and feelings with and, ultimately, influence the close relationships we form (Smith & Mackie, 2000).

Understanding other people depends on accurate information on which to base our judgments, but this is not always available. Sometimes there is little or no information. Sometimes the information is misleading or is shaped by our personal biases and expectations. Sometimes the situation in which we form the judgment dominates other information. Each of these can influence the accuracy of the understanding we achieve (Gilovich, et al., 2013).

Psychologists have been particularly interested in factors that influence our impressions when we first meet someone, or even when we see someone in passing. Since we cannot actually see anyone's personality traits, values, mental state, motivations, intentions and so on, perceptions of other people begin with visible cues.

First impressions are primarily based on the way people look and the way they act. These cues are informative only because we believe that appearance and behaviour reflect personal characteristics, even when we know that we have observed only samples of behaviour. First impressions are so powerful that they can override what we are told about people. They can also be very difficult to change (Gunaydin, Selcuk & Zayas, 2016; Kassin, et al., 2008; Smith & Mackie, 2000).

Figure 9.2 First impressions are primarily based on the way people look and the way they act. They tend to be lasting and difficult to change.

Impressions from physical appearance

Physical appearance is an important characteristic of first impressions, especially attractiveness. Many research studies have found that people we judge as physically attractive are generally perceived as more interesting, warm, mentally healthy, intelligent, independent, outgoing and socially skilled than unattractive people. In addition, good-looking people are more likely to be perceived as less lonely, less socially anxious and more popular (Aronson, 2011; Feingold, 1992).

Individuals who are physically attractive benefit from the halo effect. The **halo effect** is a cognitive bias in which the impression we form about one quality of a person influences our beliefs and expectations about the person in other qualities. For example, in relation to person perception, it is assumed that positive qualities 'go together', as do negative qualities. So, if a person is good looking, then they will also have good personal qualities. If we judge someone as beautiful rather than ugly, we are also likely to rate that person as nice rather than mean, friendly rather than unfriendly, cheerful rather than sad, and so on. We transfer our judgment from one visible characteristic to others that cannot be seen or are unknown (Aronson, 2011).

Researchers have found a halo effect for physical attractiveness across a wide variety of situations when people have minimal information about each other. For example, physical attractiveness is a reliable predictor of whether we want to date someone. Strangers are more likely to stop and give help to a physically attractive person than to someone who is less attractive. More attractive people tend to be given higher salaries than less attractive people with the same qualifications. Judges can be more lenient with more attractive defendants when hearing bail applications and giving sentences for minor offences (but not serious crimes). Adults and adolescents are more likely to give an attractive person the 'benefit of the doubt' over a wrongdoing than they will for an unattractive person (Aronson, 2011).

The actual pattern of someone's facial features can also affect the first impression. For example, studies have found that adult males with 'baby-faced' features — large, round eyes, a large forehead, high eyebrows and a rounded, relatively small chin — tend to be perceived as more naïve, honest and kind compared to adult males with a more mature facial appearance. In addition, because of these perceptions, they also tend to be judged as being weak and submissive, so are less likely to be recommended for jobs that require characteristics found in a 'mature' person, such as leadership skills and wisdom (Alaei & Rule, 2016; Gilovich, et al., 2013; Smith & Mackie, 2000).

Figure 9.3 The halo effect would lead you to assume a good looking person will also have good personal qualities.

eBook*plus*

Weblink
Take an online face perception text

eGuide*plus*

Weblinks
- Mini documentary on the halo effect and attraction 11 m 33 s
- Ted Talk: Looks aren't everything — believe me, I'm a model 9 m 37 s
- *New Scientist* research: How looks betray your personality

Impressions from non-verbal communication

Our impression of people is also influenced by the information they convey through the silent language of non-verbal communication. For example, we often communicate inner aspects of ourselves through facial expressions, eye gaze, posture, gestures and other bodily movements — what is commonly called **body language**.

A person's body language is an expression of behaviour that enables us to make quick and often accurate judgments about them. There are also shared understandings of what many of these expressive behaviours mean. For example, in Australia and other Western cultures, tapping our fingers when waiting shows impatience, winking an eye at someone demonstrates familiarity, raising an eyebrow indicates disbelief or concern and scratching our head suggests we are puzzled.

Specific actions are also combined to form an overall pattern from which we form impressions. For example, we tend to form a positive impression of someone who orients their body towards us — when they are facing us directly, leaning towards us and nodding while we speak. In addition, we are likely to judge the person who adopts this type of posture as likeable and to perceive their actions as evidence that they like us.

Some people, however, are better at interpreting ('reading') body language than others and there are cultural differences. For example, holding up a raised thumb can be a greeting in one culture and an insult in another culture. Similarly, in many Middle Eastern cultures the left hand is reserved for bodily hygiene and is therefore not used for a handshake greeting as is done in Western cultures.

Eye contact

Eye contact is one of the most influential forms of non-verbal communication. People from Western cultures tend to seek eye contact when they speak to someone. They will often follow a person's gaze as they move their eyes in various directions. If the other person establishes eye contact it will tend to be perceived as a sign of interest and attention, just as breaking eye contact and looking somewhere else is an indication that you are not interested in what is being said. If the person avoids eye contact it may be judged that they are unfriendly, shy, embarrassed, ashamed, shifty or lying.

If eye contact is maintained most of the time, it will tend to be perceived that a person is honest, straightforward, friendly and likeable. Too much eye contact, such as when staring, can be perceived as uncomfortable or unpleasant. In addition, it is often interpreted as communicating threat, anger, hostility or being unapproachable. For example, if a person is threatening another they will tend to stare directly at them and maintain the contact. Teachers sometimes use this technique when reprimanding students. Students in a bullying situation who are threatening others often stare. Therefore, making eye contact can show both friendship or a threat, depending upon the context in which it is used and other verbal and non-verbal cues that happen at the same time.

In some Asian cultures, making direct eye contact may be considered rude and confrontational. Eye contact can also be disrespectful within American indigenous cultures, especially if a child makes eye contact with an elderly person. In Muslim cultures, women may especially avoid eye contact with men because it can be perceived as a sign of sexual interest (Akechi, et al., 2013; Kassin, et al., 2008; Swami & Furnham, 2008).

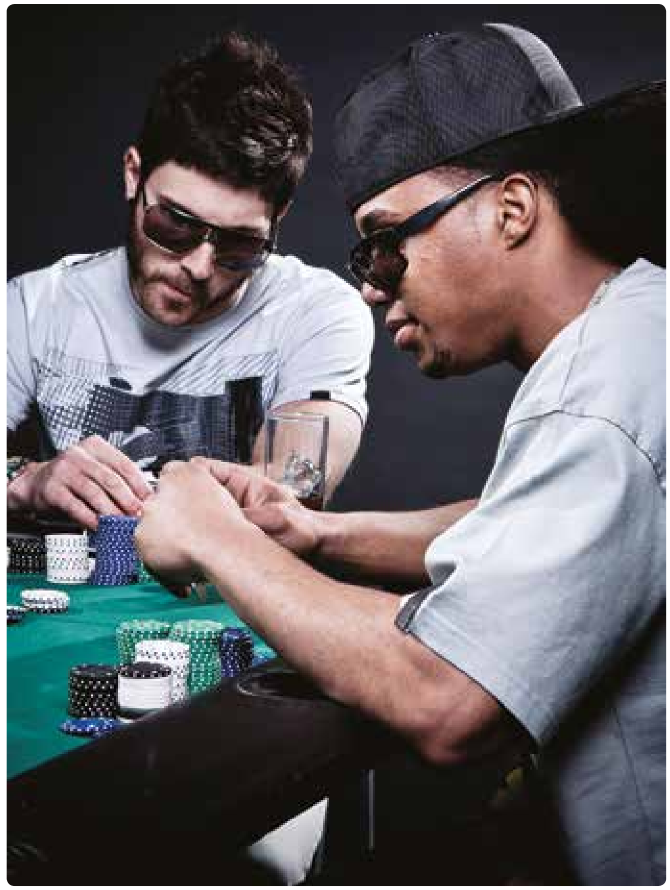

Figure 9.4 Some professional poker players cover their eyes with sunglasses to hide involuntary cues ('tells') about their hand that may be communicated to opponents.

eGuide*plus*

Weblink
TED talk on body language 20 m 55 s

Facial expressions

Some facial expressions seem to be communicated and perceived in similar ways across many different cultures throughout the world, particularly facial expressions of emotion. Therefore, facial expressions may be part of the information we consider when forming a first impression. American psychologist Paul Ekman has been the most prominent researcher in this area.

Ekman used cross-cultural studies to investigate whether facial expressions associated with certain emotions are common among all people, regardless of their cultural backgrounds. After many studies, Ekman (1980) concluded that 'all people speak and understand the same facial language'.

In one of his best-known studies, facial expressions of disgust, fear, happiness, anger, sadness and surprise were displayed in standardised photographs and shown to people from Brazil, Chile, Japan, Argentina and the United States. The participants were asked to say what the person in each photograph was feeling. The results are shown in Table 9.1 below. Regardless of cultural background, the great majority of participants were able to identify the facial expressions associated with these emotions (Ekman & Friesen, 1969). However, there was a potential confounding variable — participants in the study who were from non-Western cultures may have had some exposure to Western people (e.g. through personal contact or the media) and may therefore have learned to 'read' Western facial expressions.

In order to control this variable, Ekman and Friesen (1971) conducted a second cross-cultural study using participants from a remote part of New Guinea. These participants were from a tribe called the Fore. They were illiterate and many other aspects of their culture were comparable to life in the Stone Age. Importantly, they had almost no exposure to Westerners or to Western culture prior to the study.

The Fore participants were shown photographs of faces of Westerners like those in the photos for the previous study (see Table 9.1). They were required to respond by referring to situations in which they had experienced the same emotion. For example, the photo of a facial expression of fear suggested 'being chased by a wild boar when you did not have a spear' and the photo of sadness suggested that 'your child had died'.

The Fore participants accurately identified the emotions being expressed but they experienced considerable difficulty and were generally unsuccessful in distinguising fear from surprise. This may be because Fore people are usually fearful when taken by surprise, hence their difficulty in distinguishing between two emotions which are closely associated in their life experience.

Another group of Fore people who had not participated in the study were then asked to demonstrate the facial expressions they used to communicate the emotions of anger, disgust, fear, happiness, sadness and surprise. These were videotaped and shown to a group of American university students. The students were able to identify emotions from the facial expressions of Fore people with considerable accuracy but, like their Fore counterparts, often confused the expressions of fear and surprise (Ekman & Friesen, 1975).

Ekman's research indicates that facial expressions of certain basic emotions are recognised by people of different cultures. This universal recognition suggests that certain basic facial expressions may be part of our biological inheritance.

Studies of children who are both blind and deaf at birth support this view. Children with these disabilities could not have learned how to communicate emotions by observing other people or hearing descriptions of facial expressions. However, their expression of basic emotions is like that of children who do not have a visual or hearing impairment. For example, happiness consists of raised mouth corners (a smile) and tightened lower eyelids, and anger is expressed with clenched fists and teeth (Goodenough, 1932). More recent studies which compared facial expressions of blind and normally sighted children have found similar results (Izard, 1971; Woodworth & Schlosberg, 1954).

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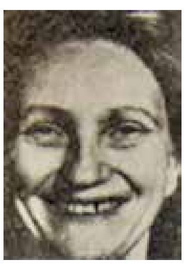
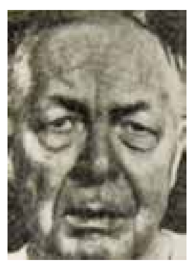
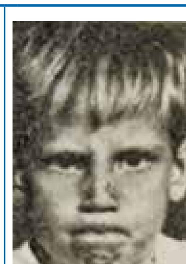
Ekman's online test

Table 9.1 **Results of the Ekman and Friesen (1968) study show that the great majority of participants were able to identify the expressions associated with the emotions, regardless of their respective cultural backgrounds.**

Photograph judged:						
Judgment:	Happiness	Disgust	Surprise	Sadness	Anger	Fear
Culture	**Per cent who agreed with judgment**					
99 Americans	97	92	95	84	67	85
40 Brazilians	95	97	87	59	90	67
119 Chileans	95	92	93	88	94	68
168 Argentinians	98	92	95	78	90	54
29 Japanese	100	90	100	62	90	66

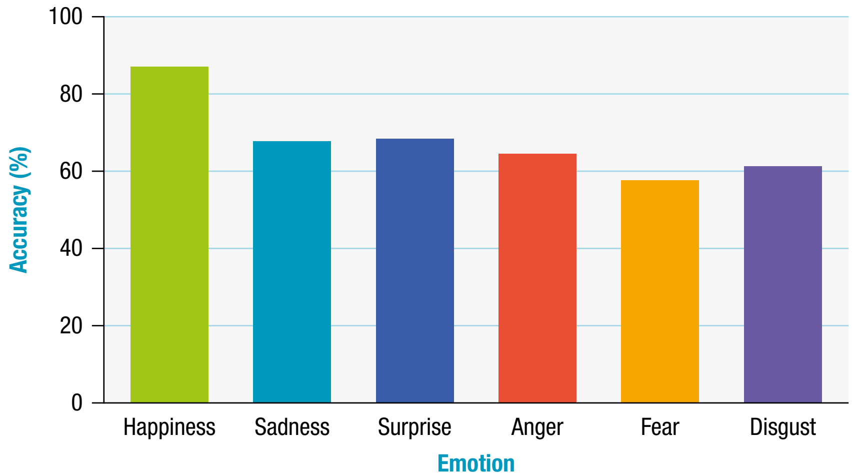


Figure 9.5 Results of a meta analysis of research studies on facial recognition of emotions within and across cultures. There were 22 148 participants from 42 countries.

Source: Based on data in Elfenbein, H.A., & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin, 128*(2). 203–235.

BOX 9.1 Personal space

Personal space refers to a small, 'invisible', physical area immediately surrounding our body that is regarded as our personal territory. The size of our personal space varies according to factors such as our cultural background, mood, who we are with, what we are doing and where we are. Our perceptions of others can be indicated by our physical proximity to (distance from) them.

When communicating or interacting with another person(s), the distance or space we maintain between ourself and the other person(s) is called *interpersonal distance* or *interpersonal space.*

Research on interpersonal distance was first conducted by American anthropologist Edward Hall (1966). He called this area of research *proxemics*. Hall observed people from different cultures throughout the world, then identified four main zones of interpersonal distance people tend to prefer in different situations. He suggested these zones indicate the types of relationships and interactions which we have with others.

As shown in Table 9.2 on the next page, *intimate* distance is 0–0.5 metres — the zone in which we allow only those people with whom we feel extremely close (for example, parents and close friends), *personal* distance is a zone of 0.5–1.5 metres — the space within which we allow friends and acquaintances and *social* distance is 1.5–3.5 metres — the distance at which we interact with strangers or people we do not know. The *public* zone beyond 3.5 metres applies to situations in which an individual interacts in large groups, such as during a school assembly or a rock concert.

Figure 9.6 Some people are allowed to enter the intimate zone of personal space because they have power or authority to do so.

(continued)

(continued from previous page)

To observe the effect of intruding on someone's personal space, you could stand or sit about half a metre from a friend and strike up a conversation (but not in a situation when it is normal to sit or stand at this distance). Does the person fidget, look away, back off or show other signs of discomfort? An example of the effects of personal space was demonstrated in an unusual field experiment which found that males require more time to begin urination and less time to complete the act when another male is standing at an adjacent urinal (Middlemist, Knowles & Matter, 1976).

Table 9.2 Hall's (1966) interpersonal distance classifications

Zone	Distance	Interaction activity	People allowed into zone
Intimate	0–0.5 metres	Informal talking and physical contact in private or public with someone you feel close to	Close family, girlfriend/boyfriend, close friends
Personal	0.5–1.5 metres	Informal talking and socialising in the school grounds or at a party	Friends, work mates and acquaintances
Social	1.5–3.5 metres	Formal or informal work or business-related activity	Strangers or people we do not know well or do not know at all
Public	3.5 metres and over	Formal presentation (for example, a lecture, speech) to a large group, such as at a school assembly or concert	Anyone

BOX 9.2 How lasting are first impressions?

Canadian psychologist Bertram Gawronski and his colleagues (2010) investigated the persistence of first impressions and conditions under which they might change.

The participants were 164 university students (118 women, 46 men). They were shown either positive or negative information about an unknown individual on a computer screen. Then, participants were presented with new information about the same individual, which was inconsistent with the initial information. To study the influence of contexts, the researchers subtly changed the background colour of the computer screen while participants formed an impression of the target person.

When the researchers subsequently measured participants' spontaneous reactions to an image of the target person, they found the new information influenced participants' reactions only when the person was presented against the background in which the new information had been learned. Otherwise, participants' reactions were still dominated by the first lot of information when the target person was presented against other backgrounds.

The researchers concluded that their results support the common observation that first impressions are persistent, but they can sometimes be changed.

According to Gawronski, 'What is necessary is for the first impression to be challenged in multiple different contexts. In that case, new experiences become decontextualized and the first impression will slowly lose its power. But, as long as a first impression is challenged only within the same context, you can do whatever you want. The first impression will dominate regardless of how often it is contradicted by new experiences.'

In addition, the researchers concluded that their results have important implications for the treatment of mental disorders. 'If someone with phobic reactions to spiders is seeking help from a psychologist, the therapy will be much more successful if it occurs in multiple different contexts rather than just in the psychologist's office.'

Source: Gawronski, B., Rydell, R. J., Vervliet, B., & De Houwer, J. (2010). Generalization versus contextualization in automatic evaluation. *Journal of Experimental Psychology: General., 139*(4), 683–701 and University of Western Ontario (Press Release).

LEARNING ACTIVITY 9.1

Review questions

1. Describe the relationship between person perception and social cognition.

2. Explain why person perception is considered to be a vital part of everyday life with reference to two relevant examples.

3. (a) Explain the meaning of perceptual set in relation to person perception.
(b) Give an example of how perceptual set could distort person perception.

4. (a) Formulate a definition for 'first impression' in relation to person perception.
(b) Explain how each of the following factors influence first impressions, with reference to a relevant example for each factor:
(i) physical appearance
(ii) halo effect
(iii) eye contact
(iv) facial expressions.

5. Explain how the situation (context) in which any of the factors listed in 4(b) are expressed can influence impression formation.

6. Give examples of three common gestures and describe the first impression that could be conveyed by each one. For each gesture, specify the context in which it is used.

7. (a) What first impression might you form of the prominent individual in each photo on the right? List three judgments for each person.
(b) What factors influenced your judgments?
(c) Are any of these factors different from those discussed in the text? Explain.
(d) What difficulties did you have in making your judgments?

8. (a) Explain how you could manipulate the impression you present in a job interview to convey a positive impression.
(b) Give three examples of behavioural or physical characteristics that could contribute to a negative impression.

9. Give an example of an advertisement in which a person is prominent and explain the nature of the person perception the advertisement is attempting to convey. Ensure you describe or include a copy of (or link to) the advertisement.

LEARNING ACTIVITY 9.2

Reflection

Physically attractive people tend to be initially perceived in a positive way. They also benefit from the halo effect.

Taking account of person perception research findings, comment on whether very attractive people are more advantaged in one or more aspects of everyday life than unattractive people.

LEARNING ACTIVITY 9.3

Analysis of research by Ekman and Friesen on facial expressions of emotion

Consider the research on facial expressions of emotion conducted by Ekman and Friesen.

Analyse the research by answering the following questions.

1. (a) What is a cross-cultural study?
   (b) Why did the researchers conduct cross-cultural studies to investigate facial expressions?
2. The left column (Culture) in Table 9.1 on page 446 shows a different number of participants for each cultural group in the sample. Does this bias the results in any way?
3. Suggest a relevant research hypothesis for the study.
4. Identify the operationalised independent and dependent variables.
5. Why were the researchers concerned about the presence of a possible confounding variable?
6. How was this variable controlled in the next study?
7. (a) What descriptive statistic procedure could be used to support comparison of the results with those of the meta analysis results in Figure 9.5 on page 447?
   (b) Comment on the similarities and/or differences between the results shown in Table 9.1 and Figure 9.5.
8. What evidence suggests that facial expressions of emotion have a significant genetic component?
9. What is a potential limitation of Ekman and Friesen's research?

ATTRIBUTION — EXPLAINING BEHAVIOUR

Why do we fall in love with some people but not others? Why did that girl get so drunk at the party? Why was that boy so rude to the bus driver this morning? Why do some people succeed and others fail? Why do some people laugh when others cry? Why do some people help or hurt others?

To make sense of our social world, we try to understand the causes of other people's behaviour. We look for reasons and explanations to help our understanding. But what kinds of explanations do we make and how do we come up with them?

Attribution is the process by which people explain the causes of their own and other people's behaviour. The term is also used to refer to the explanation we come up with. Our explanations can be grouped into two categories — personal and situational.

A **personal attribution**, sometimes called *dispositional*, is an explanation due to the characteristics of the person involved, such as their personality, ability, attitude, motivation, mood or effort. These are *internal* factors that are sourced within the person. If we attribute behaviour to internal factors, we tend to blame the person for causing the behaviour. For example, if we hear that Mario has lost his job because he failed to let his team leader know that he was not going to work for a week, we may think it was typical as he was always unreliable and irresponsible.

We are attributing his behaviour to personal factors. If, however, we learn that Mario's behaviour occurred because his mother was seriously ill in hospital and he was therefore too preoccupied with her wellbeing and feeling too stressed, we are giving a situational attribution. A **situational attribution** is an explanation due to factors external to the person involved, such as the actions of another person, some aspect of the environment, the task, luck and fate.

Our explanations are often reasonable and accurate, but we are vulnerable to bias. Researchers have identified three general biases that often affect our attributions: the fundamental attribution error, actor–observer bias and self-serving bias.

Figure 9.7 Some spectators will attribute this player's injury to courage (a personal attribution); others attribute it to some aspect of the sport or match (a situational attribution).

The fundamental attribution error

If you see a new student arguing with a teacher in the school yard at lunchtime, you might conclude that the student is rebellious, argumentative and/or rude. You might not consider that something in the situation, such as being blamed for rubbish that someone else dropped, caused the behaviour. When explaining the behaviour of others, we tend to focus on the role of factors associated with the person and underestimate the influence of the situation. This bias is so common that it is called the fundamental attribution error.

The **fundamental attribution error** is the tendency to overestimate the influence of personal factors and underestimate the impact of situational factors on other people's behaviour. When we do this, we attribute a person's behaviour to internal rather than external factors.

One explanation of why we make this error is that the person's behaviour tends to be more conspicuous and therefore noticeable ('salient') than the situation in which it is occurring. This is called *saliency bias*, a type of bias that works like figure–ground in visual perception — the person is standing out in the foreground as the figure of your attention and the situation is barely noticeable in the background.

When we focus on the person, we tend to do so with a perspective that the world is a just and fair place. The *just world belief* (also called *just-world hypothesis* and *just-world fallacy*) refers to the belief that the world is a just place in which people generally get what they deserve and deserve what they get. This belief allows us to better understand and feel safer in a world where we do not always have control over our circumstances and can therefore be exposed to cruel twists of fate. According to the just world view, the individual believes that bad things happen to bad people and good things happen to good people (Lerner, 1980).

This just world belief influences our perceptions of others, often in a way that leads us to blame people for their misfortunes. When something bad happens to someone, we tend to believe the victim must have done something to deserve their fate rather than believe situational factors were responsible for it. Examples include beliefs that crime victims are careless, victims of family violence provoke their attackers, people on the dole are lazy bludgers, homeless people are unmotivated, Aborigines deserved to be treated badly by the British colonisers, and that people whose houses are inundated by flood water deserve it for choosing to live in a flood-prone area.

In contrast, we may explain good things that happen to ourselves or others because we deserve them because of the decisions we make about life, not because of good luck, fate or having been in the right place, at the right time.

Figure 9.8 According to the just world belief, this person deserves to be obese because she is somehow responsible for her obesity.

Actor–observer bias

One exception to the fundamental attribution error occurs when it comes to explaining our own behaviour. Instead of blaming the person, we blame the situation. **Actor–observer bias** refers to our tendency to attribute our own behaviour to external or situational causes, yet attribute others' behaviour to internal factors (Jones & Nisbett, 1971). For example, if you fail an exam you may blame your failure on an overly difficult paper, but you might say Maria failed because she did not study enough. Similarly, when someone cuts you off when driving it is attributed to their careless and reckless driving, but when you cut someone off it is because your view was blocked. And a government minister who makes the same mistake as a member of the opposition party did when in government is likely to say the blunder was unavoidable under the circumstances, rather than being due to their lack of planning or wisdom.

Actor–observer bias is sometimes called the *actor–observer discrepancy* because there is a mismatch between the attribution that is made when the individual is the 'actor' in a given situation and the attribution that is made when the same person is the 'observer' of someone else's behaviour in the same situation.

Self-serving bias

Self-serving bias is evident when the teacher hands back a test and a student attributes a good result to their ability and hard work, or a bad result to situational factors such as unfair questions, the teacher marking too hard or a sick student who coughed throughout the test. It is also evident when a gambler attributes a win to skill and a loss to bad luck and when someone believes they are personally responsible for a group's success but assigns the blame for a bad performance to the other group members.

When judging ourselves we tend to take the credit for our successes and attribute failures to situational factors. This is called **self-serving bias**. One explanation of this bias is that we are motivated by a desire to protect our self-esteem so we distance ourselves from failure. It has also been suggested that we may have a need to maintain a positive public image and therefore strive to look good to other people (Miller & Ross, 1975).

Figure 9.9 Self-serving bias means that this person is probably explaining his accident by listing situational factors (such as sunlight glare or the other driver braking too quickly) rather than personal factors (such as carelessness or inattention).

Culture and attribution

People all over the world do not explain other people's behaviour in the same way. Researchers have found differences between people in individualistic cultures (such as in Australia, North America and Western Europe) and collectivist cultures (such as in many Asian countries).

In an **individualist culture**, being an individual and independent is valued and encouraged, and achieving personal goals is considered to be more important than achieving group goals. In these cultures, it is also considered acceptable for the individual to place achievement of personal goals ahead of achieving group goals. In a **collectivist culture**, achieving group goals is considered to be more important than the achievement of individual goals, and individuals are encouraged, and sometimes expected, to place group goals ahead of their personal goals.

Members of collectivist cultures tend to be less likely to make the fundamental attribution error. They are more likely than members of individualistic cultures to attribute the causes of another person's behaviour to external, situational factors, rather than to internal, personal factors. This is the exact opposite of the attributional bias that is demonstrated in individualistic cultures. In many Asian cultures, people tend to be more sensitive to and focus on the influence of the situation rather than the individual. This means they are less likely to overlook or minimise the role of the situation (Choi, Nisbett & Norenzayen, 1999).

Figure 9.10 Many Asian countries have a collectivist culture and people tend to be more sensitive to and focus on the influence of the situation rather than the individual.

In one of the best-known studies on this topic, American psychologist Joan Miller (1984) asked Hindu Indians and North Americans of varying ages to explain the cause of positive and negative everyday behaviours in terms of personal and situational factors. As shown in Figure 9.11 below, there were no cultural differences among the 8–15-year-old children in the sample. However, with increasing age, Americans were much more inclined to explain the behaviours in terms of personal attributions and Indians made more situational attributions.

The self-serving bias is also much less common in collectivist cultures. In Japan, for example, the ideal person tends to be someone who is aware of their shortcomings and continually works to overcome them. It is not someone who thinks highly of themself. Generally, in many Asian cultures, people tend to not define themselves predominantly in terms of their individual accomplishments, as tends to be common in Western cultures. In addition, self-esteem is not tied too much to doing better than others, and fitting in rather than standing out from the crowd is emphasised (Huffman, 2012).

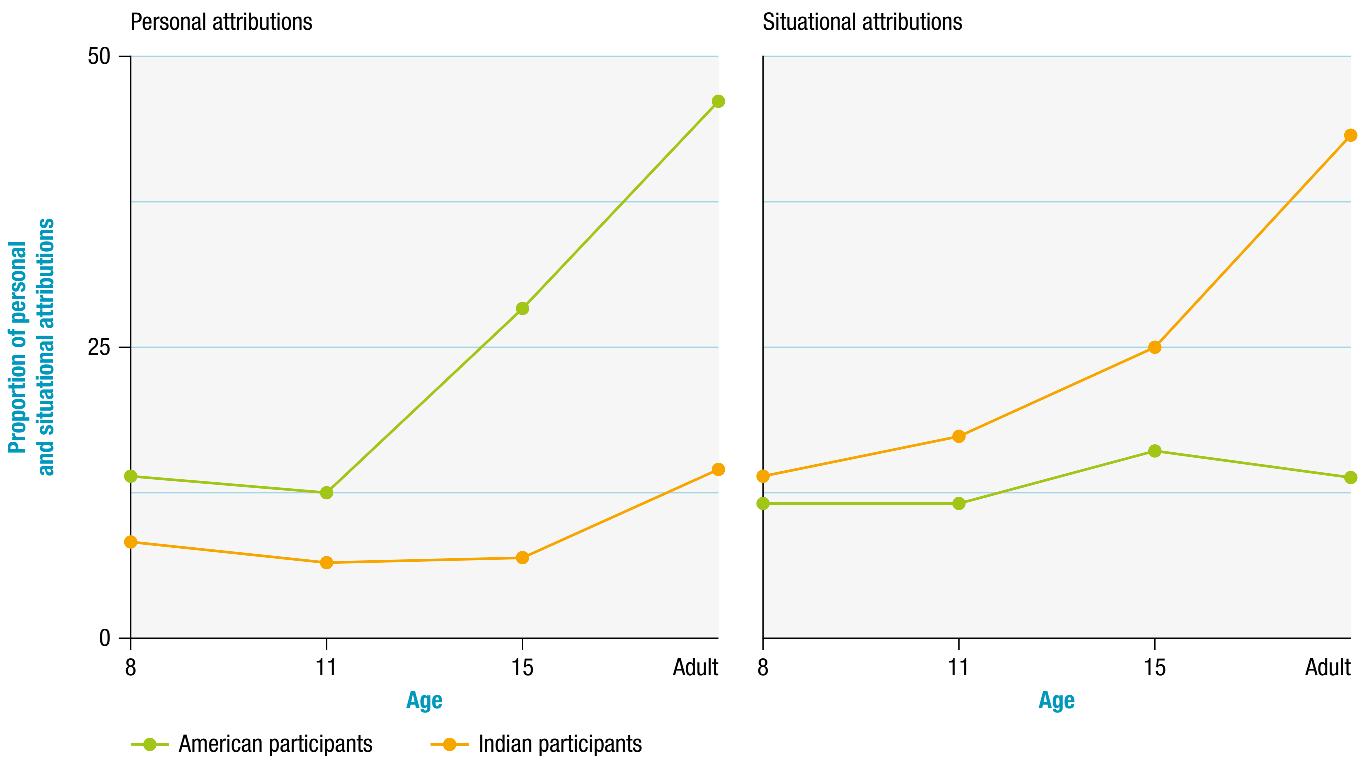


Figure 9.11 Results from Miller's (1984) study on cultural differences in attribution

Source: Miller, J. G. (1984). Culture and the development of everyday social explanation. *Journal of Personality and Social Psychology, 46*(5), 961–978.

LEARNING ACTIVITY 9.4

Review questions

1. Explain the meaning of attribution.
2. In what way is attribution a social cognition process?
3. Distinguish between personal and situational attributions with reference to your own example(s).
4. Name and describe three types of error or bias that can influence attribution. Give an example of each type, preferably from your own experience.
5. What is the relevance of the just world belief to attribution?
6. To what extent is the type of attribution made influenced by culture? Explain with reference to an example.
7. Identify the type of attribution, attribution error or bias that is most likely to have occurred in each of the following examples:
   (a) The P-plater blames his minor accident on a misaligned mirror rather than his inexperience or carelessness.
   (b) Jake and Trinh work as casual waiters. Jake thinks Trinh is clumsy when Trinh accidently drops a glass. When Jake does the same later on he blames it on the slippery glass.
   (c) Ally said that the new student in psychology impressed her as somewhat cold and 'stuck up' when she first saw her, but she turned out to be a really nice person when Ally met her at a party.
   (d) Sienna thinks that the person is begging because he's too lazy to get a job.
   (e) Sam blames the loss of a close basketball game on bad umpiring decisions.
   (f) Sophia did not study much and blames her poor result for a class test on 'too many trick questions'.

ATTITUDES

Is the Eureka Tower an eyesore? Should poker machines be banned? Should VCE students be allowed to leave the school grounds when they are not required to be in class? Is a one-year 'gap' break between VCE and tertiary studies worthwhile? Should there be an age limit to open a Facebook account? Should politicians be legally obligated to tell the truth? Do you enjoy heavy metal music? What is the best age at which to get married? Are there better ways of spending the money used to stage the opening and closing ceremonies at the Olympic Games? Should public transport be free? Should we change refugee and asylum seeker policies?

Your reactions to these questions reflect your likes and dislikes about objects, people, groups, events and issues. These reactions are what psychologists generally call attitudes.

We have intense feelings about some of our attitudes, but others are less important to us. Although some of our attitudes are not as strong as others, the attitudes we form tend to last.

Our attitudes are learned through experience. They reflect our unique experiences as individuals, as well as our socio-cultural background. As we interact with different individuals and groups, and as we are exposed to various kinds of media and life in general, we form attitudes, are influenced by them, display them to others, argue about them and sometimes change them. We are aware of many of our attitudes, but there are some of which we are unaware until we need to express them.

Attitudes can be viewed as ideas that we hold about ourselves, others, objects and experiences. A commonly used definition describes an **attitude** as an evaluation a person makes about an object, person, group, event or issue. This definition indicates that we can form attitudes towards anything; for example, ferris wheels and iPads (objects); ourselves and politicians (people); our friendship group and Greenpeace (groups); Easter and elections (events); and euthanasia and climate change (issues).

In defining an attitude, the term *evaluation* refers to a judgment being made, either positive, negative or neutral, about some specific aspect of our lives and the world in which we live. This means that attitudes involve reactions — likes and dislikes, feelings for and against, preferences and aversions, or non-involvement (where an actual response is not necessary). However, the judgment must be relatively consistent and lasting for it to be called an attitude.

Figure 9.12 We form attitudes towards all kinds of objects, people, groups, events and issues. A key characteristic of an attitude is that it involves a judgment which may be positive, negative or neutral.

Tri-component model of attitudes

Psychologists have proposed various theories and models to describe and/or explain what attitudes are, how they are formed and the circumstances under which they may change. The most influential and widely used model is called the tri-component, or multi-component, model. The **tri-component model of attitudes** proposes that any attitude has three related components — the affective, behavioural and cognitive components — which are sometimes called the 'ABCs of attitudes'.

Affective component

The **affective component of an attitude** refers to the emotional reactions or feelings an individual has towards an object, person, group, event or issue. Thus, it is based on a judgment which results in a positive response (such as liking or favouring), a negative response (such as disliking or hating) or a neutral response (such as lack of interest or concern). The affective component is reflected by expressions such as 'I enjoy chatting with friends on Skype' (positive), 'I hate country music' (negative) and 'I'm not interested in politics' (neutral).

Behavioural component

The **behavioural component of an attitude** refers to the way in which an attitude is expressed through our actions (or how we might behave should the opportunity arise). For example, running to keep fit or protesting about an increase in tertiary HECS (fee) payments are actions that reflect the behavioural component of your attitudes towards fitness and the requirement to pay higher fees for university studies.

Cognitive component

The **cognitive component of an attitude** refers to the beliefs we have about an object, person, group, event or issue. Our beliefs are linked to what we know about the world. They develop as a result of our experience throughout the course of our lives.

Some beliefs are based on fact. For example, the belief that AIDS can be transmitted by heterosexuals as well as homosexuals is true. Other beliefs may be false. For example, it is not true that all psychologists do the same kind of work. Furthermore, some beliefs can be verified and others cannot be proven. For example, we can verify the belief about heterosexual transmission of AIDS by asking a doctor or by checking a reliable website on AIDS. However, we cannot verify the belief that there is intelligent life in another galaxy. An attitude involving a verifiable belief is more easily changed than an attitude involving an unverifiable belief.

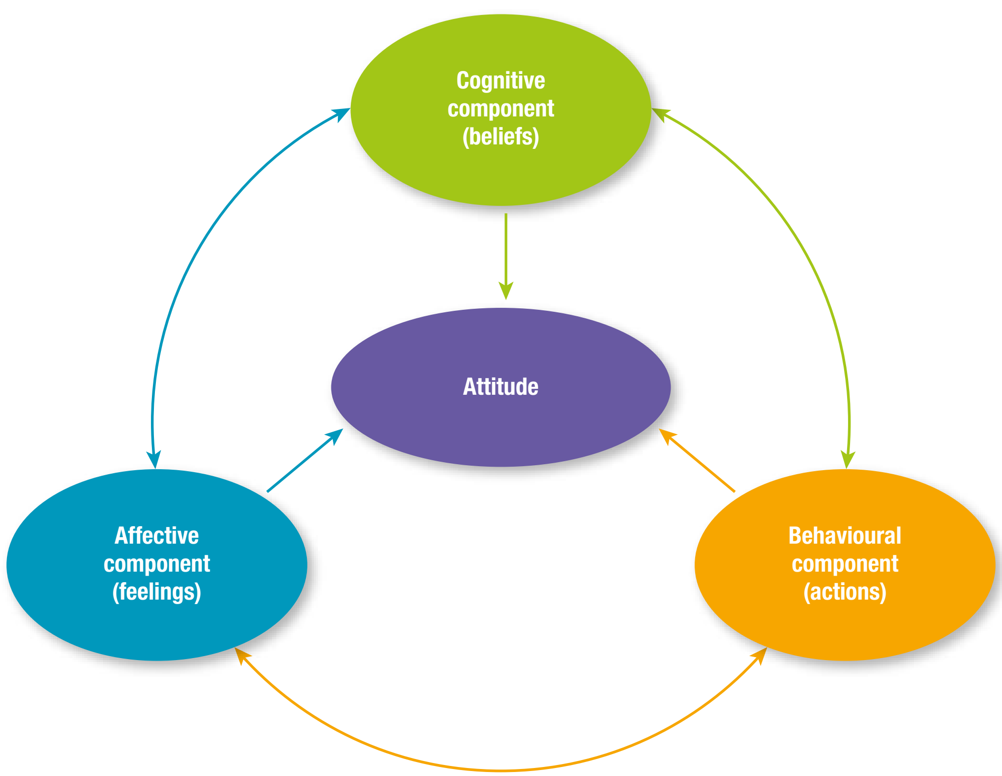


Figure 9.13 The tri-component model of attitudes proposes that all attitudes have three related components.

Consistency between the components

Although the affective, cognitive and behavioural components of an attitude have been described separately, the tri-component model proposes that all three components must be present before it can be said that an attitude exists.

In many cases, the affective, cognitive and behavioural components are consistent. For example, you might feel good about going to school (affective component) and work hard in and out of class (behavioural component) because you believe that good grades are required to get into the tertiary course of most interest to you (cognitive component). Similarly, you might avoid a spider (behavioural component) because you are scared of spiders (affective component) and believe spiders can harm you (cognitive component).

Inconsistency between the components

Some psychologists believe that there are possibly only affective and cognitive components of attitudes because a person's behaviour does not always reflect the attitude they hold; that is, the behavioural component is often inconsistent, or 'out of sync', with the affective and cognitive components of the attitude.

For example, a person may dislike watching test cricket (affective component) because they believe it takes too long for a result (cognitive component), but they may choose to attend a match because their friends are going (behavioural component). Furthermore, a person may know that dental hygiene is important and agrees that six-monthly dental visits are vital (cognitive component), but refuses to go to the dentist (behavioural component) because the sound of a dental drill makes them feel anxious (affective component).

There are also times when the behavioural component is consistent with one other component, but these two components are inconsistent with the third component. This often results from one or more of the components being stronger, or more intense, than the other(s).

For example, a person may be in love with their partner (affective component), have doubts about the future of the relationship (cognitive component), but continue in the relationship (behavioural component). In this example, the affective and behavioural components do not correspond with the cognitive component, and the 'heart has ruled the head'. Consider also the example of a person who hates pumpkin soup (affective component) but eats it when staying at a friend's place (behavioural component) because the person believes it is the polite thing to do (cognitive component). In this case, the 'head has ruled the heart'.

Figure 9.14 A person may be in love with their partner (affective component), have doubts about the future of the relationship (cognitive component), but continue in the relationship (behavioural component), so the affective and behavioural components do not correspond with the cognitive component, and the 'heart has ruled the head'.

BOX 9.3 Analysis of gender prejudice using the tri-component model of attitudes

Prejudice can be directed towards young people, the elderly, females, males, the physically and intellectually disabled, people with different religious or ethnic backgrounds, people who are more or less wealthy than others and so on.

The example at right uses gender prejudice to illustrate the tri-component model of attitudes. In this example, the affective, behavioural and cognitive components of a prejudiced attitude are consistent with one another.

Components of an attitude	Components of gender prejudice towards females
Cognitive (belief)	Believes females are inferior (negative stereotype of females)
Affective (feeling)	Dislikes females (negative feelings about females)
Behavioural (action)	Discriminates against females (negative actions toward females)

BOX 9.4 Distinguishing between attitudes, beliefs, values and opinions

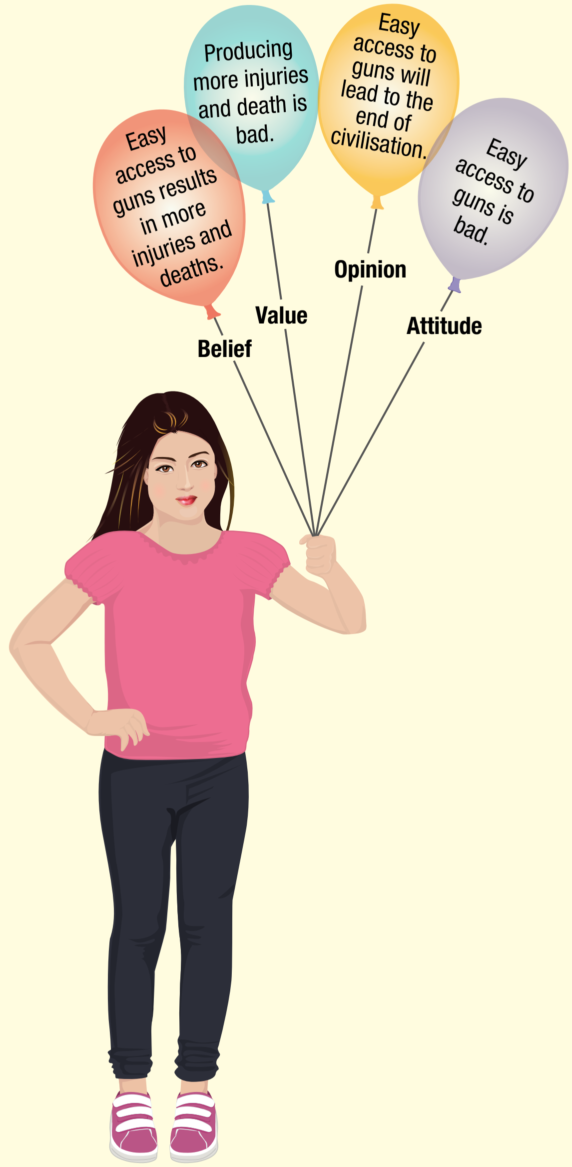
Many people use the terms value, belief and opinion interchangeably with the term attitude. There is some similarity between these terms, but there are also important differences.

Values are our personal judgments about how desirable, worthwhile, useful or important something is. Because values involve an evaluation of the 'goodness' or 'badness' of something, they are similar to the affective component of an attitude. For a value to develop, an individual needs to have a strong conviction about the focus of the value. However, some of our attitudes do not involve such deep commitment. Justice, sincerity, compassion, bravery, loyalty and beauty are examples of values. Values generally serve as standards for decision-making through which we develop attitudes. For example, a person may hold the value of justice as being 'an eye for an eye and tooth for a tooth' and this value may be the standard for the person's strong attitude towards capital punishment for murder.

We may have hundreds of attitudes when we are adults, but we will have fewer values. Furthermore, we tend to prioritise values according to their importance to us. For example, one person may regard loyalty and truth as most important, and cleanliness and thrift (being careful with money) as least important. For another person, the order may be reversed.

Beliefs are what we think to be true about ourselves, others, objects, issues and events. A belief does not necessarily have to be based on fact. It is necessary only that the individual believes something to be true; for example, a belief that astrology provides accurate descriptions of personality. Unlike a value, a belief does not involve a judgment as to whether something is good or bad. For example, an individual may hold the belief that it is not dangerous to exceed the speed limit on a freeway.

Opinions are points of view based on known facts, but they are disputable. Like attitudes, opinions involve a judgment, but they involve less emotional commitment than does a value or an attitude. Furthermore, opinions are more open to change than attitudes, beliefs and values, because they are not as deeply based and irrefutable evidence can lead an individual to change an opinion. For example, if someone holds the opinion that eight-year-old girls are taller than boys of the same age in Australia, then statistical evidence can be produced to show that this opinion is incorrect. However, because of their affective component, attitudes are much more difficult to change.



LEARNING ACTIVITY 9.5

Review questions

1. (a) Give a psychological definition of the term attitude.
(b) Suggest a simpler definition without compromising accuracy.

2. How can an attitude be distinguished from a 'passing thought' about someone or something?

3. (a) Outline what the tri-component model of attitudes is, ensuring you refer to its key assumptions.
(b) Give a brief description of each component, with reference to an example of each component different from those used in the text.
(c) Give an example that illustrates when the three components are consistent and an example of when they are inconsistent. Use examples different from those used in the text.

4. Prepare a graphic organiser to summarise an attitude based on the model shown in Figure 9.13 on page 455. Use an example of an attitude that is of interest to you.

LEARNING ACTIVITY 9.6

Analysing attitudes

Consider the following attitude statements and identify the affective, behavioural and cognitive components that may form the attitude of each statement.

1. 'VCE students are young adults and therefore should not have to bring a note when absent from school. I resent being treated like a child.'
2. 'I don't care if someone doesn't get a job if they don't dress appropriately for the job interview. They don't deserve the job.'
3. 'I'd rather play basketball than netball because it's much more exciting and you are less likely to be injured.'
4. 'I'm not particularly interested in Australian Rules football and I don't know much about it so there's no way I would go to a match.'
5. 'There should be harsher penalties for drink-driving. It was devastating when my friend was seriously injured as a result of a drink driver's recklessness. I'll never drink when I'm responsible for driving.'

Limitations of the tri-component model

The inconsistency which can occur between the three different components of an attitude appears to the observer as an inconsistency usually between a person's *attitude* and their actual *behaviour*. Attitudes and behaviour are also frequently linked because it is widely believed that attitudes play a significant role in influencing or even directing behaviour. Therefore, it is sometimes assumed that understanding a person's attitude enables us to predict their behaviour with considerable accuracy. However, this assumption has been challenged by research findings.

One of the first and best-known research studies on the relationship between attitudes and behaviour was conducted by American sociologist Richard LaPiere (1934). LaPiere was interested in finding out whether there was a consistency between a person's attitudes towards others with different racial backgrounds and their behaviour towards such people, as demonstrated by discrimination (treating them differently).

Over a two-year period, beginning in 1930, LaPiere travelled 16 000 km around the United States with a Chinese couple. They stayed in 66 hotels, motels or caravan parks, and dined in 184 different restaurants. LaPiere expected that he and his Chinese companions would experience considerable discrimination, because there was widespread prejudice against Asians in America at that time. However, they were actually refused service on only one occasion. LaPiere also found that their treatment overall was 'good' in nearly 50% of the places they visited.

Six months later, he sent a questionnaire and accompanying letter to the manager of each restaurant and the places at which they had stayed. In the letter he asked the question, 'Will you accept members of the Chinese race as guests in your establishment?' LaPiere received replies from about 50% of the places they had visited. In these replies, only one response stated that they *would* accept Chinese visitors as guests. As indicated by their responses, their attitudes clearly differed from their actual behaviour towards the Chinese couple.

LaPiere concluded that attitudes do not reliably predict behaviour. However, a number of criticisms have been made about LaPiere's research method which may have led to a conclusion that was not valid. For example, LaPiere's presence with the Chinese couple may have encouraged a different response from that which the Chinese couple may have received had they visited alone. Furthermore, while the group received good customer service face-to-face, the responses to the letters may have been completed by different employees from those who actually attended to them when they visited (Wicker, 1969).

Figure 9.15 Our attitudes and behaviour are not always consistent, nor does the expression of an attitude or behaviour accurately reflect the expression of the other.

Despite these criticisms, later studies have also found inconsistency between attitudes and behaviour. Most psychologists now believe that a person's attitudes and behaviour are not always consistent and sometimes a person's attitudes and observable behaviour will be unrelated or only slightly related (Aronson, 2011; Gilovich, et al., 2013).

Because our actual behaviours may not always reflect our true feelings and beliefs, some psychologists do not support the tri-component model of attitudes. Instead, they suggest that an attitude has only affective and cognitive components, and that there is no behavioural component.

However, most psychologists still support the tri-component model of attitudes but accept that it is unrealistic to expect attitudes to always correspond perfectly with behaviour because it seems that behaviour is rarely the product of a single influence — there are many influences on our behaviour besides our attitudes. But this does not mean that attitudes and behaviour are *never* closely related. Under certain conditions, attitudes and behaviour are more likely to match.

BOX 9.5 Cognitive dissonance

If we are aware of inconsistencies in our various attitudes, or when the way we actually behave is different from the way we believe we should behave, we can experience psychological tension or discomfort. This experience is called *cognitive dissonance*. For example, dissonance is likely to occur for people who continue to smoke even though they are aware that smoking is harmful to their health. When people experience dissonance, they try to reduce the discomfort they feel so they may change their attitudes or their behaviour.

American psychologist Leon Festinger (1957), who developed cognitive dissonance theory, believed that the experience of dissonance is psychologically unpleasant and people are not only motivated to avoid it, but will actively work at reducing or abolishing it.

According to Festinger, this can be done in several ways. One way is to change your attitude. You might absolutely adore your boyfriend or girlfriend but if they leave you for someone else, dissonance may occur. To reduce or avoid psychological discomfort you might say that it was only a crush and you are glad it is over. Similarly, if you miss out on a job for which you were interviewed you may conclude that the job was not what you really wanted anyway. In this way we avoid the unpleasant feelings of cognitive dissonance by changing our attitude.

Another way of reducing dissonance described by Festinger involves changing the behaviour to suit the attitude. For example, if you hold the attitude that sport is necessary to maintain good health yet do not play any sport, you could reduce dissonance by taking up basketball, hockey or some other sport.

Festinger also suggested that we can avoid dissonance by reducing the importance we give to our attitudes and behaviour. Using the sport example, you might say, 'playing strenuous sport is not such a good idea and I probably get enough exercise in daily activities anyway'.

We can also add new elements to the situation to support our belief in the attitude or behaviour. Using the sport example again, you might say, 'I don't play sport because I have a bad knee'.

Festinger believes that people will choose the easiest course of action to reduce or avoid dissonance. This can often mean changing our attitudes.

Sometimes, however, people make no attempt to reduce or avoid dissonance. This may occur because they can tolerate some level of dissonance, particularly if the conflict is not too strong.

Figure 9.16 If you are on a diet but feel like eating pizza, reading the label on the supermarket packet may provide some information about nutritional content which is comforting and thereby reduces dissonance.

LEARNING ACTIVITY 9.7

Analysis of research by LaPiere (1934) on attitudes and behaviour

Analyse the experiment on attitudes and behaviour by LaPiere (1934). Your analysis should include responses to the following:

1. State a possible aim for the experiment.
2. Formulate a possible research hypothesis for the experiment.
3. Identify the operationalised independent and dependent variables in the experiment.
4. Identify the participants and how they were selected.
5. Briefly state the main results obtained.
6. Briefly state the conclusion that was drawn from these results.
7. Identify two possible limitations of the research method.
8. Identify a key ethical issue relevant to the research.

ATTITUDES AND BEHAVIOUR

There are many factors that influence whether attitudes and behaviour will be consistent. Research findings have identified a number of conditions when it is more likely that attitudes and behaviour will match. Some of the more important conditions involve how strongly we hold the attitude, how easily the attitude comes to mind, the situation we are in, and our personal belief that we can actually perform the behaviour associated with an attitude.

Strength of the attitude

A strong attitude is an attitude that is usually thought about, well-known and easily accessible. It also tends to be personally relevant and have a strong underlying emotional component. The stronger the attitude, the more likely it is that it will be stable and consistent over time, be resistant to change, and influence behaviour. Stronger attitudes are more likely to predict behaviour than weaker attitudes.

American psychologist Stephen Kraus (1995) analysed the results of more than 100 research studies on attitudes and behaviour. On the basis of this 'meta analysis', Kraus concluded that an attitude tends to be closely linked to behaviour and can be used to predict behaviour when the attitude is strongly held. He also found that people with a strong attitude towards something tend to hold that attitude with a lot of confidence and certainty that it is the 'right' attitude. This means that the person who has long believed with great confidence that 'boat people' should be allowed to arrive on Australian shores is more likely to do something that demonstrates their attitude, such as attending a protest meeting or writing a letter to a newspaper or their parliamentary representative in support of a policy change.

Figure 9.17 Someone with a strong attitude towards refugees is more likely to do something that demonstrates their attitude.

Accessibility of the attitude

Prominent American social psychologist Elliot Aronson has proposed that attitudes and behaviour are more likely to be consistent when the attitude is accessible to the person who holds the attitude. According to Aronson (2008), an accessible attitude is a strong attitude that easily comes to mind — it has been thought about, is well known and has been stored in memory ready for use.

For example, if asked to respond to the word 'snake', most people will be able to readily answer in a way that reflects their attitude. Words such as 'scary' or 'dangerous' may come to mind. Similarly, our attitudes towards people we know are usually accessible. For example, most of us know someone about whom we immediately think 'creep' or 'wicked' when we see or think about them. Aronson believes that, in some cases, accessible attitudes are so closely related to behaviour that they can guide or even predict behaviour.

Social context of the attitude

American social psychologists Martin Fishbein and Icek Ajzen (1975) have proposed that whether an attitude leads to actual behaviour may be dependent on the specific situation in which a person finds themselves. In some cases, the situation may dominate, or 'overpower', the affective and cognitive components of an attitude someone holds.

This can be illustrated by the situation in which a student has strong, unfavourable and almost entirely negative beliefs and feelings about a teacher, and expresses these openly to friends in the school grounds during recess. However, when encountering that teacher in the classroom, the student smiles and speaks respectfully and politely to the teacher. Consequently, when the relationship between attitudes and behaviour is being considered, the circumstances in which those attitudes are expressed must also be considered (Smith & Mackie, 2000).

Perceived control over the behaviour

Attitudes and behaviour are also more likely to match when people perceive that they have control over the behaviour that may be triggered by their attitude. **Perceived control** is the belief an individual has that they are free to perform or not perform behaviour linked to an attitude *and* a belief that they can actually perform that behaviour (Ajzen & Fishbein, 2002).

This means that someone who believes drink driving is dangerous and gets upset by media reports of alcohol-related road deaths, is likely to do something about it only if they believe that they *can* actually do something about it and there is nothing really stopping them from doing so. If they do not hold both of these beliefs, then they are unlikely to even try.

Figure 9.18 The social situation a person is in may lead them to smoke, even though they hold an attitude that smoking is bad for your health. However, this may be overridden by perceived control. Can you explain how?

LEARNING ACTIVITY 9.8

Review questions

1. (a) Can someone's attitude be used to reliably predict their behaviour? Explain your answer.
(b) Name and briefly describe each of the key factors that may influence attitude–behaviour consistency.
(c) Rank each of the factors that influences attitude strength and explain your rankings for the highest and lowest ranked factors.
(d) Suggest a factor which you believe influences attitude strength but has not been described in the text. Explain your choice.

2. There are many instances in everyday life when a person's behaviour does not reflect their attitude. For example:
(a) someone who criticises her friend for being unfaithful to her boyfriend, because the boyfriend is her brother, but who does the same thing herself and claims 'it is different'
(b) someone who claims that Australia should not accept migrants, but who enjoys eating at Vietnamese and Middle Eastern restaurants.

From your experiences, describe two examples of a mismatch between an attitude which has been expressed and the behaviour which took place.

LEARNING ACTIVITY 9.9

Diagram of the relationship between an attitude and behaviour

Using an example of one of your attitudes, prepare a concept map or another diagram which shows the relationship between this attitude and behaviour, and different factors which can influence the relationship.

LEARNING ACTIVITY 9.10

Media analysis/response — a publicly expressed attitude

Select an item with a publicly expressed attitude on a topic of interest to you in the print or electronic media; for example, a letter to the editor in a daily or local newspaper, a blog item or a Facebook post.

Make a copy of the item (or provide the weblink or source) and answer the following questions.

1. Identify and briefly explain four possible factors that may have resulted in the author expressing the attitude in the media.

2. On the basis of your answer to question 1, to what extent was the author's behaviour of writing the item predictable? Explain your answer.

FACTORS INFLUENCING ATTITUDE FORMATION

We are not born with particular attitudes towards school, studying, sport, drugs, religion, climate change, personal relationships, same sex marriage, surrogate children, refugees, asylum seekers, political parties, aliens, dirty jokes and so on. Attitudes are formed, usually over a long period of time, through the process of learning.

Psychologists have described three different types of learning which influence attitude formation: classical conditioning, operant conditioning and social learning. The process of forming an attitude through each of these types of learning is different, but each type does not necessarily occur in isolation of the others.

Classical conditioning

Classical conditioning is a simple form of learning which occurs through repeated association of two different stimuli, or 'events'.

Advertisers often use classical conditioning in an attempt to get consumers to associate a product or service with a particular person, object or event. For example, soft drink or fast food advertisements which show young, attractive people having fun use a neutral object (the drink or food item) and try to create positive associations with it. The intention is that consumers will learn to associate the product with good times and consequently buy the product.

Another example of classical conditioning used by advertisers to influence our attitudes to products is the contracting of celebrities or well-known sporting identities to endorse products. For example, many professional sportspeople wear brand-name logos on their sports gear. Again, the intention is that the manufacturers want consumers to learn to associate their product with the skills and success of the athlete endorsing the product.

While these are examples of the formation of positive attitudes, negative attitudes can also be acquired through classical conditioning in the same way. In classical conditioning, it is the pairing and consequent association of two stimuli that is essential for learning to occur.

Figure 9.19 By repeatedly pairing a product with images and ideals that targeted consumers are likely to feel positive about, the advertiser is using classical conditioning to make people learn to associate positive feelings with the product.

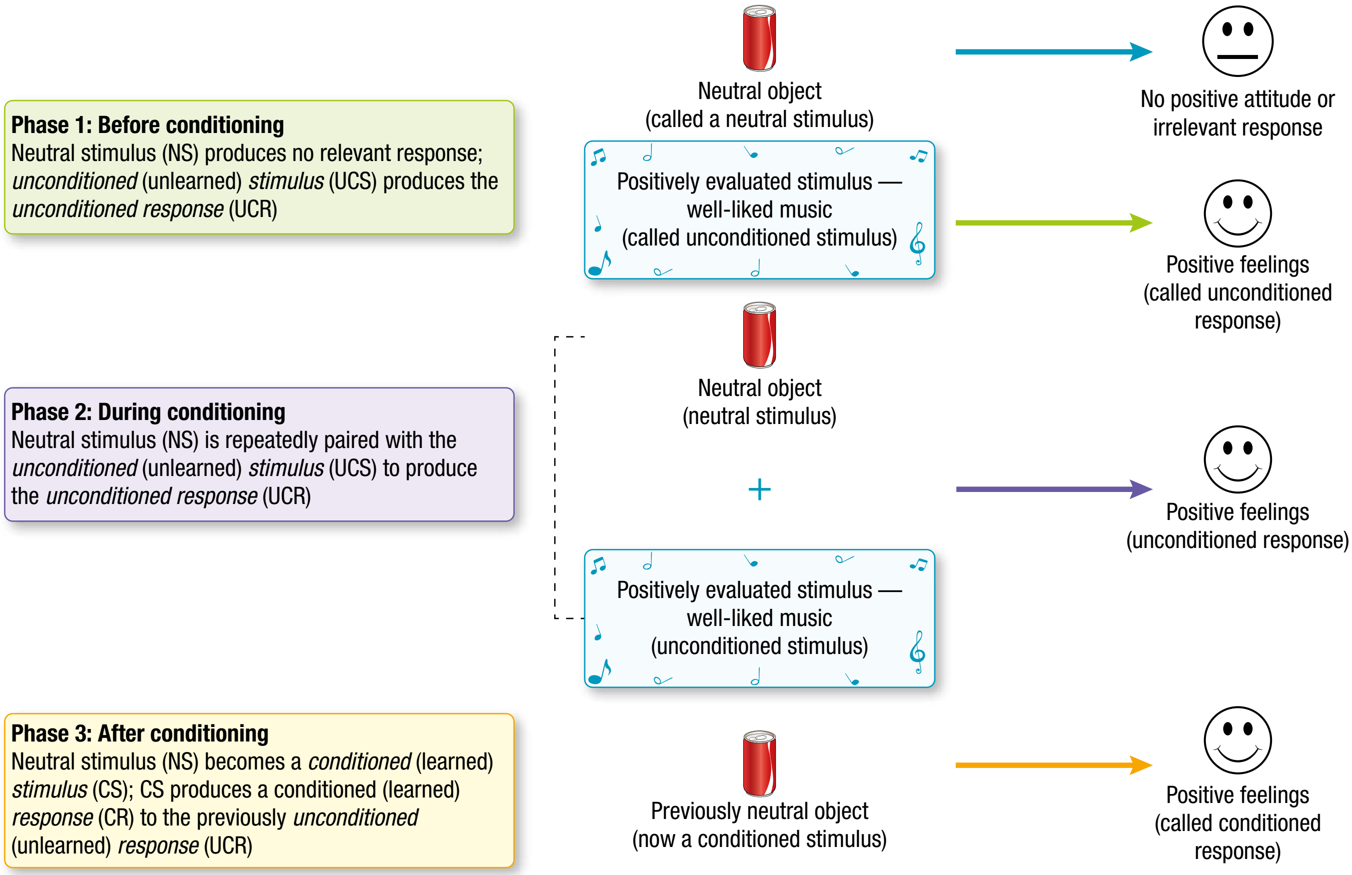


Figure 9.20 An example of attitude formation through classical conditioning

Operant conditioning

Operant conditioning is a kind of learning through which we tend to repeat behaviour that has a desirable consequence (such as a reward), and tend not to repeat behaviour that has an undesirable consequence (such as punishment). The concept of reinforcement is very important in operant conditioning. Reinforcement is any event which strengthens ('reinforces') a response or increases the likelihood of a particular response occurring again.

Reinforcement works by providing a pleasant or satisfying consequence for that response. For example, a reward such as praise, a gift or money can strengthen a response made by a person. When an appropriate reward is consistently given for a behaviour it is likely that the behaviour will occur more frequently in the future. Similarly, if we are rewarded for demonstrating an inclination towards a certain attitude, or for expressing a particular attitude, the reward will reinforce the attitude, making us more likely to express the attitude in the future.

For example, if you stated an attitude which is held by your parents they may compliment your good judgment. The attitude might relate to your saying that one political party is better than another, or that getting a good job is important to success in

Figure 9.21 This child's attitude towards the Sydney Swans football club may have formed through reinforcement by her parents.

life. Reinforcement of this attitude by your parents' compliment is likely to strengthen the attitude, making you more likely to express it again in the future. Each time the attitude is reinforced, the stronger it is likely to become.

Punishment can influence the formation of our attitudes in a similar way to reinforcement, but it works in reverse. If punishment follows the expression of some comment or action indicating a specific attitude, then it may weaken the attitude, or suppress it (hold it back). For example, if you told one of your parents that you missed the last bus on Saturday night so you hitch-hiked home instead of ringing them, and you were grounded as a consequence of having hitch-hiked, then your attitude towards hitch-hiking would be more likely to weaken, or alternatively be withheld from your parents in the future.

Social learning

Social learning theory emphasises the importance of the social environment in which learning occurs as we watch others and also see the consequences of how they think, feel and behave. According to this theory, we often modify or adopt attitudes by observing other people, particularly people close to us and people who we respect and admire. This type of social learning is called *observational learning* or *modelling* (Bandura, 1977).

In social learning theory, the person being observed is referred to as a *model*. For example, if you observe your parents regularly conserving water at home and purchasing water-saving products such as a water-saving shower head or a water tank, it is likely you will adopt a similar attitude to water conservation.

We are more influenced by 'models' when we observe their actions being rewarded rather than criticised. Using the same example, if friends compliment your parents on their water conservation efforts, this will probably increase the likelihood that you will adopt a similar attitude, or strengthen (reinforce) an existing attitude about the importance of water conservation.

The media also reinforces particular attitudes. For example, television programs and advertisements often show males in leadership roles and females in roles not involving leadership. Children observe and sometimes reproduce what they see in the media with the result that their attitudes can be significantly influenced by media exposure.

We can also form attitudes through social learning processes without being consciously aware of it. For example, a child who initially has neither a positive nor a negative reaction to people of a particular social group may see one of their parents displaying negative body language towards members of that group. Consequently, the child may start to imitate such negative reactions towards that particular group and thus show early signs of prejudice.

Figure 9.22 This child may form a positive attitude towards the use of guns by observing and modelling their parents' behaviour.

Repeated exposure

Attitudes can also form through **repeated exposure** — by simply being exposed to an object, person, group, event or issue repeatedly. Forming an attitude through repeated exposure also involves learning processes but the learning that has occurred is not immediately apparent. In all cases of attitude formation, however, some kind of personal experience is required (and experience is the basis of all learning). Experience may be either direct personal experience (e.g. going bungy jumping) or indirect personal experience (e.g. hearing about bungy jumping).

Research findings indicate that if we are exposed to an object, person, group, event or issue repeatedly, we can develop a positive attitude towards it. Furthermore, it has been proposed that the positive attitude develops regardless of whether or not there is a reward, motive or any sort of reason for doing so. Simple repeated encounters, which are neutral and don't affect us in any way, are all that is needed to produce a positive attitude. This phenomenon is called the mere exposure effect.

The **mere exposure effect** describes the increase in liking for an attitude, object, person, group, event or issue as a result of being repeatedly exposed to it. The influence of repeated exposure on attitude formation was identified by Polish-born American psychologist Robert Zajonc (pronounced zy-ence).

In one experiment, Zajonc (1968) repeatedly exposed participants to various items that they were unlikely to have seen before, such as Chinese characters, nonsense words and photographs of faces. It was assumed that because the participants were extremely unfamiliar with these items, they had no attitude towards them before the experiment. Furthermore, it was assumed that the items were sufficiently 'neutral' to not influence the participants' attitudes towards them. The participants were shown some of the items 25 times, and others 10 times, five times, or only once. The participants were then shown the entire group of items and asked how much they liked each one. Included with these items were other similar items which the participants had never seen before.

The results indicated that the more often the participants had seen the items presented in the experiment, the better they liked them, and the unfamiliar items were liked least. Figure 9.23 on the right shows the results obtained following exposure to the Chinese characters at different frequencies (i.e. number of times shown).

Research also indicates that negative attitudes do not arise from repeated exposure unless there is a negative experience (such as dislike, pain, fear, disgust) associated with the exposure. If a negative experience is associated with the exposure, we may form a connection between the negative experience and the focus of the attitude. In many cases we need only one negative experience to form a negative attitude. For example, a single unexpected close encounter with a live snake in the bush can be enough to form a negative attitude towards snakes.

Many advertisers are aware of the repeated exposure effect and use it to try to influence formation of our attitude towards a product. The assumption is that, through repeated exposure, we will gradually start to like the advertised product without ever having tried it. However, it is also possible to start disliking a product after viewing endlessly repeated ads, which is why advertisers regularly change their ads (Aronson, Wilson & Akert, 2002).

Although there is considerable research evidence indicating that repeated exposure can lead to the formation of a positive attitude, not all psychologists agree on how this occurs. Most believe that repeated exposure involves learning processes such as reinforcement. For example, people like familiar items better because they recognise them, and the feeling of recognition is pleasant. This in turn acts as a reinforcer (Fazio, 1990). Some have proposed that familiarity or recognition underlies the formation of a true attitude. Their view is based on research evidence which suggests that people like things they have seen, even when they cannot recognise the items, and even when they are unaware that they have ever seen them (Bootzin et al., 1986).

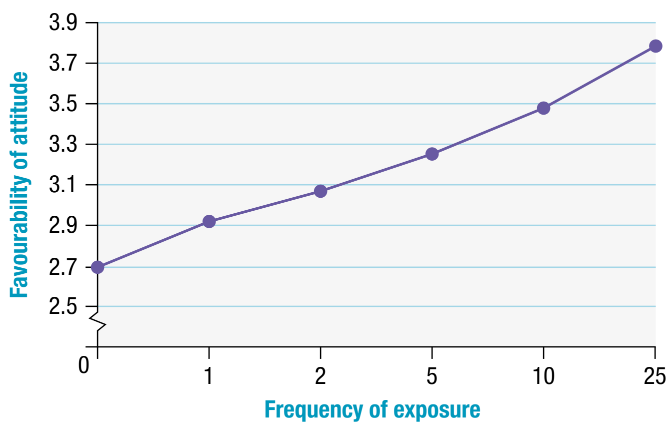


Figure 9.23 Results from Zajonc's (1968) experiment on the influence of repeated exposure on attitude formation

BOX 9.6 Repeated exposure to yourself

If you are shown a photograph of yourself (the true image), then shown a reverse image of that photograph (the image you see every day in the mirror), you would probably prefer the reverse image because it is the one you are frequently exposed to and are therefore more familiar with. When we are given the same choice with a picture of family or friends, we tend to choose the true image (Mita, Dermer & Knight, 1977).

LEARNING ACTIVITY 9.11

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Word copy of table

Review questions

1. Briefly describe each of the learning processes which influence attitude formation. For each learning process give an example of how an attitude may form, using examples different from those in the text.
2. Use the table below to summarise influences on attitude formation. In the left column of the table, list five attitudes that you hold. In the middle column, briefly outline a significant personal experience which may have influenced formation of the attitude. In the appropriate column(s) at the right, indicate which factor(s) best describes the way in which you formed the attitude.
3. Consider Figure 9.20 on page 463 showing the use of classical conditioning by an advertiser to influence attitudes towards their product. Draw a diagram to show how classical conditioning, operant conditioning or social learning may have influenced formation (or change) of one of your attitudes.
4. Consider the results of the Zajonc (1968) experiment in Figure 9.23 on page 465. Briefly state the relationship between the two variables that have been graphed.

		Factor			
Attitude	Personal experience	Classical conditioning	Operant conditioning	Social learning	Repeated exposure
1.					
2.					
3.					
4.					
5.					

LEARNING ACTIVITY 9.12

Reflection

Comment on whether terrorism is an effective way of changing political attitudes and decision making.

STEREOTYPES, PREJUDICE AND DISCRIMINATION

When we meet someone for the first time, we typically judge them on how they look and behave, including their physical appearance, facial expressions and gestures. We also take account of what they say and how they say it. After our first impression and/or to help fill in gaps, we may ask for information about their age, where they live, which school they go to, the type of music they like and so on. We build up a view about them that can help guide the way in which we will interact with them.

Our initial evaluation of people is conducted very quickly and the first impressions that we develop tend to be lasting ones. This is called the *primacy effect*, whereby the initial impression we form of a person is more influential than any later information obtained. This is why psychologists suggest we should look our best for a job interview. The interviewer(s) will tend to make a judgment about our suitability for a position based on the first impression we give. Even though the first impression may not be accurate, it can still have a lasting influence.

Figure 9.24 The first impression can be a lasting impression, which is why psychologists suggest we should look our best for a job interview.

Stereotypes

When we evaluate people, we tend to do so by trying to fit them into a category based on our knowledge of people and the world. For example, a person may be judged as being a member of a social group (such as male or female, young or old) and/or a member of a cultural or religious group (such as Australian or Vietnamese, Muslim or non-Muslim).

This process of grouping or 'fitting' people into a category based on what we know about them is called stereotyping. Being stereotyped as belonging to a particular social or cultural group carries with it the belief by people who form the stereotype that all individuals in the group have the same characteristics.

A **stereotype** is a collection of beliefs that we have about the people who belong to a certain group, regardless of individual differences among members of that group. For example, a stereotype of a doctor might be: male, wealthy, drives an expensive car, lives in a big house, works long hours and is conservative. Stereotypes help us to make sense of our world by giving it order. They provide us with a general system which guides our interactions with others.

Because it is not possible for us to intimately know everyone we meet, we use stereotypes to assist us in knowing how we should react to new people we meet. For example, if you are at a party, meet an attractive person, then discover that the person is a police officer, your behaviour towards them may be influenced by the stereotypical view of police as being always 'on the job'.

Figure 9.25 This nun's public behaviour may not fit the stereotype many people have about nuns.

One problem with stereotyping is that stereotypes can be inaccurate. Stereotypes are often based on incorrect or inadequate information. Consequently, many social and cultural stereotypes are formed on the basis of little or no empirical evidence.

When we stereotype a person as belonging to a particular group, we ignore their individuality. In particular, we tend to disregard information about the individual that does not fit the stereotype we have of them. We are more inclined to pay attention to information that is consistent with a stereotype and ignore information that is not consistent with it. We often presume things about people because of the way in which they have been stereotyped. By doing this, we can bring some order and structure to the impressions we have of people (Aronson, 2011).

Another problem with stereotyping is that it can lead to social stigma — negative labels associated with disapproval or rejection by others who are not labelled in that way. As with individuals who suffer from mental disorders, when an entire social or cultural group is stigmatised, or negatively evaluated, then members of that group can feel like outcasts who are devalued, ignored and rejected by others, simply because they are members of the stigmatised group. In turn, this can lead to feelings such as shame, disgrace, lower self-esteem, loss of self-confidence and restricted ambitions in life. Again, as with stigmatised individuals who have a mental disorder, social stigma can also have harmful effects on overall psychological wellbeing, particularly when membership of the stigmatised group is an important part of the individual's self-concept or self-image (Crocker, Major & Steele, 1998).

Finally, stereotyping can also lead to prejudice. Research studies have found that when stereotypes involve an 'us and them' type belief, this can provide a foundation from which prejudice develops. 'Us and them' is evident when we categorise ourselves and others into 'ingroups' and 'outgroups'.

Ingroups and outgroups

American psychologist Gordon Allport (1954) proposed that people tend to categorise themselves and others into 'ingroups' and 'outgroups' which can in turn influence their attitudes towards the members of those groups.

Allport described any group that you belong to or identify with as an **ingroup**. For example, your friendship groups, peer group, family, school, religion, sex, race, culture, the country in which you live and even the AFL team you barrack for would be called your ingroups. An **outgroup** is any group you do not belong to or identify with.

When we categorise our social world in this way, we tend to believe that people belonging to our ingroups have individual differences but are generally more like us. Consequently, we tend to view them positively and more easily develop loyalty to them due to common membership of the same group. However, we tend to consider people belonging to an outgroup to be less like us and more like each other. We therefore are more likely to view them negatively.

Allport argued that this type of categorisation and stereotyping of members of ingroups and outgroups can lead to prejudice towards members of outgroups. Futhermore, we are more likely to give preferential treatment to, or discriminate in favour of, members of our ingroup when the opportunity arises. Research studies have provided evidence of this type of attitude and behaviour in both children and adults (Aboud, 2003; Hewstone, Rubin & Willis, 2002).

Jane Elliot's classroom activity

The impact of distinguishing members of ingroups and outgroups on the basis of stereotyping was demonstrated in a controversial classroom activity by American primary school teacher Jane Elliot in 1968.

One Monday, Elliot announced to her year 3 class of 28 children in a small, all-white, rural community that those with brown eyes were superior and those with blue eyes were inferior. To make it more realistic, the brown-eyed children were given extra privileges such as more playtime and access to new play equipment. They were also constantly told that they were better than the blue-eyed children; for example, more intelligent and harder working. The blue-eyed children were repeatedly told that they were inferior and made to wear armbands to distinguish them in a more obvious way. They were also not allowed to drink from the same water taps used by the brown-eyed children.

Soon, the brown-eyed children refused to play with their blue-eyed classmates. They became arrogant and bossy, often treating them in nasty ways. The academic results of the brown-eyed children also improved, with some doing much better than ever before. The blue-eyed children became increasingly timid and began to complete their schoolwork poorly.

The following Monday, Elliott reversed the exercise. This time the blue-eyed children were told that they were superior and the brown-eyed children were told that they were dumb and lazy. Although the blue-eyed children started to behave as the brown-eyed children had in the previous week, their behaviour was not as intense, probably because they knew what it was like being in their position. Later that day, Elliot ended the activity.

Figure 9.26 Jane Elliot (1933–)

LEARNING ACTIVITY 9.13

Analysis of Elliot's (1968) classroom activity

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Documentary on Jane Elliot's 'experiment' 20 m 18 s

1. Jane Elliot's classroom activity is often described as an 'experiment'.
   (a) Explain why it is not a true psychological experiment.
   (b) Explain whether her activity is best described as a case study.
2. In point form or using a flow chart, outline what Elliot did.
3. What results did Elliot obtain?
4. In what way does Elliot's activity illustrate how ingroups and outgroups can contribute to the development of prejudice and discrimination?
5. Identify three ethical issues that may be relevant to Elliot's activity.
6. Elliot's activity attracted nationwide attention and proved to be controversial. Suggest a reason for the controversy, other than ethics.
7. Give an example of how an Elliot-type activity involving ingroups and outgroups could be used to reduce prejudice and discrimination in the workplace.

BOX 9.7 Gender stereotypes in other societies

Anthropologist Margaret Mead (1935) studied many cultures in the Pacific region. Her findings on three New Guinea tribes illustrate the way in which gender role stereotypes can vary in different societies. While living in the same geographical region, the three tribes showed significant differences in the roles assumed by each gender.

The Tchambuli tribe possessed clearly defined gender roles, but these were nearly opposite to those assigned in Western society. Women were assertive, impersonal and the dominant gender. They also took the initiative in 'courtship'. Males on the other hand were passive, dependent upon the females and concerned about personal appearance. While men gossiped and were homemakers, females were the head of the family.

In the neighbouring Arapesh tribe, the females and males displayed behaviour that has traditionally been considered feminine in Western society. Both genders were cooperative and passive, and were encouraged to be responsive to the needs of others. Both genders were responsible for childcare. In courtship, neither gender took an aggressive role.

In the Mundugumor tribe, both females and males tended to be highly aggressive and competitive. Cruelty, ruthlessness and violence were characteristics that were encouraged in both genders. In addition, gentle and caring behaviour by males or females was rarely observed.

Figure 9.27 Margaret Mead provided some of the earliest empirical research evidence for cultural differences in gender role stereotypes.

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Practical activity — gender role stereotypes

BOX 9.8 Stereotypes about older people in Australian society

According to the Australian Bureau of Statistics (ABS, 2016), Australia is fast becoming an ageing society, primarily as a result of sustained low fertility and increasing life expectancy. This has resulted in proportionally fewer children (under 15 years of age) in the population and a proportionally larger increase in those aged 65 and over.

Between 1996 and 2016, the proportion of Australia's population aged 15–64 years remained fairly stable, decreasing from 66.6% to 65.9% of the total population. During the same period, the proportion of people aged 65 years and over increased from 12.0% to 15.3% and the proportion of people aged 85 years and over almost doubled from 1.1% of the total population in 1996 to 2.0% in 2016. Conversely, the proportion aged under 15 years decreased from 21.4% to 18.8%.

Based on current trends, it is expected that the proportion of people aged 65 years and over will continue to increase more rapidly over the next decade, as more and more baby boomers (those born between the years 1946 and 1964) turn 65. The proportion of people aged 85 years and over will also continue to increase.

The ABS (2016) also estimates that at around 2060, our population will be about 42 million. The proportion of people aged 65 and over will be about 23%, while 17% will be aged under 15. The proportion of people aged 85 and over will be 5%, which is more than double from its 2013 level. The number of people aged 65 years and over is expected to exceed the number of children aged 0–14 years at around the year 2030.

Life expectancy is currently about 79.9 years for men and 84.3 years for women — a two and three year increase respectively since 1994 — and life expectancy is expected to increase further as the 21st century progresses. This means that for many people about a quarter or more of their lives will be spent in retirement.

While the number of over 65s is increasing, Australia has relatively low levels of mature age employment when compared to many other OECD countries, including the USA, UK, Canada and New Zealand. This is despite their leading longer, healthier lives and being urged by economists and politicians to work longer. Mature age workers face significant barriers in regard to staying in and re-entering the workforce. Age discrimination in particular is an ongoing problem (National Seniors Australia, 2017).

According to the Australian Human Rights Commission (2017), negative stereotypes and assumptions of a 'use by date' are significant barriers that older Australians face when they look for meaningful work.

Many employers stereotype older people as less adaptable to change, less productive, hard to train, inflexible, less motivated, a risky investment and as having potential poor health. This stereotype is based on myths about the needs, interests and capabilities of older people rather than on facts. Following are some myths and facts about older people.

(continued)

(continued from previous page)

Myth: *Older people are less productive than younger people.*

Fact: Under actual working conditions, mature age workers perform as well as, if not better than, younger workers. When speed of reaction is important, mature age workers sometimes produce at a lower rate, but they are at least as accurate, have fewer workplace accidents, less absenteeism and lower rates of job turnover than younger workers.

Myth: *Older people are set in their ways and unable to change.*

Fact: Older people do change and adapt to the major events that occur in their lives, such as retirement, children leaving the family home, loss of a partner, moving and illness. Research findings also indicate that older people (aged 61–95 years) changed their attitudes as much or more than younger adults (aged 21–60 years) in response to personal experiences.

Myth: *Older people can't learn new things.*

Fact: Older people usually take longer to learn something new. Differences with younger people tend to be due to variables such as lack of practice, motivation and learning style rather than age. ABS data shows that Australians aged 55–64 years are the fastest growing users of information technology. International studies indicate that appropriate training provided in a supportive environment can greatly assist older workers to learn new technology systems.

Myth: *The majority of older people feel unhappy most of the time.*

Fact: Studies generally find no significant differences between older people and younger people. Most people over the age of 60 report that they are happy and have satisfactory family and social lives, although those with a limited income may be exposed to increased isolation.

Myth: *Older people are bad drivers.*

Fact: People aged over 65 years have significantly fewer car accidents than people younger than 65. People under the age of 30 years have the most accidents.

Myth: *Older people are poor and dependent on the government for 'handouts'.*

Fact: Although retirement leads to a decline in income and over 75% of people over 65 rely on a government pension as the primary source of income, the majority of older people do not have incomes below the poverty line. Over 75% of people over the age of 60 are owners or purchasers of their own homes.

Figure 9.28 Many older people still lead active and independent lives.

LEARNING ACTIVITY 9.14

Review questions

1. What is a stereotype?
2. How would you describe each of the following people? Use two or three key words for each person.
   (a) someone who drives a Ferrari
   (b) someone who has had considerable facial cosmetic surgery
   (c) someone who has a pitbull terrier as a pet
   (d) someone who belongs to a bikie gang
   (e) someone who is a union leader
   (f) someone who is a vegetarian
3. (a) Distinguish between an ingroup and an outgroup with reference to relevant examples from your own experience.
   (b) How can categorising people into ingroups and outgroups lead to prejudice?
   (c) Give a contemporary, real-life example of prejudice that has developed from intergroup conflict over resources and for which prejudice maintains conflict between the two groups.

Compare your responses with those of others in the class. In what way can stereotyped views influence how someone thinks, feels or behaves towards people whom they consider to fit the stereotype?

LEARNING ACTIVITY 9.15

Visual presentation on stereotypes

Prepare a PowerPoint or other type of display depicting a particular stereotype; for example, of football players, teachers, elderly people, adolescents, blondes or some other group. On the slides or images, identify the characteristics that collectively contribute to the stereotype.

LEARNING ACTIVITY 9.16

Reflection

Margaret Mead (1935) studied gender role stereotypes in other societies and found that they can vary in different societies or cultural groups (see Box 9.7 on page 469).

Write four or five words that you believe 'typically' describe an adolescent male and do the same for an adolescent female. Comment on whether your adjectives suggest a possible gender role stereotype in Australian society.

If you were to ask someone other than a close friend or family member to write the adjectives, what differences might there be in their description? Suggest a possible explanation.

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Practical activity — examining a stereotype

Prejudice

Stereotyping can lead to prejudice. The term prejudice literally means 'prejudgment'. Because prejudice involves a judgment, it is usually considered to be an attitude, but specifically one for which the focus is people. Like other attitudes, prejudice can be positive or negative. For example, someone may be prejudiced in favour of heavy metal musicians or against heavy metal musicians. This means that if you were to meet the lead singer of a famous heavy metal band, you will be inclined to either like or dislike them and to expect them to have certain personal characteristics based on your stereotypic view of 'famous musicians' or 'famous heavy metal bands'.

Psychology has focused on the study of prejudice as a negative attitude, mainly because of the mental health and social problems that prejudice towards other people can cause. Consequently, **prejudice** is often defined in psychology as holding a negative attitude towards the members of a group, based solely on their membership of that group.

Any group can be the focus of prejudice. The group may be small, big or span an entire culture or society. The group may be women, men, members of an ethnic group such as Chinese or Greeks, members of a particular religious group or political party, indigenous people such as Aborigines, elderly people, bikies, people with a mental disorder, people with a disability or with a particular sexual preference, certain occupations such as artists or truck drivers, or even people who behave in a particular way, such as bullies or shy people.

A person who is prejudiced against some group tends to evaluate its members negatively merely because they belong to that group. Their individual characteristics or behaviour are usually overlooked. It does not matter if the information about an individual or a group is faulty or incomplete. They are viewed in a negative way simply because they belong to the specific group.

Prejudice often involves members of a majority group holding negative attitudes towards the members of a minority group. Members of a majority group are greater in number and are sometimes described as the 'ingroup', whereas members of a minority group are fewer in number and are sometimes described as the 'outgroup'.

According to American psychologist Herbert Blumer (1961), there are four basic characteristics of prejudice which can often be observed among members of a majority social group who hold a prejudiced attitude towards members of a minority group:

1. they tend to believe that they are superior to the minority group to whom the prejudice is directed
2. the majority group tend to believe the minority group is different from them and that they 'do not belong'
3. the majority group tend to believe that they are more powerful and important than the minority group
4. a majority group that displays prejudiced attitudes is insecure, fearing the minority group may become more powerful and important than itself.

Old-fashioned and modern prejudice

Psychologists have distinguished between old-fashioned (or traditional) and modern forms of prejudice. Although a clear distinction can be made between old-fashioned and modern prejudice, these forms of prejudice tend to be closely related.

Australian psychologists Anne Pederson and Iain Walker (1997) describe **old-fashioned prejudice** as a form of prejudice in which members of the majority group openly reject minority group members and their views towards the minority group are obvious and recognisable to others. More specifically, the views of people with old-fashioned prejudice are much like those described by Blumer.

For example, old-fashioned racial prejudice typically involves a view that white people are biologically superior to black people and that the races should be segregated; that is, white people and black people should be separated or isolated from one another. People who are prejudiced in an old-fashioned way towards another race tend to believe that 'blacks' should be segregated from 'whites' in all aspects of life, such as employment, schooling, housing and the like. Many also believe and express strong racial stereotypes such as 'Blacks are lazy and dumb' and 'Blacks are alcoholics and rely on government handouts'.

Pederson and Walker describe **modern prejudice** as a form of prejudice which is more subtle, hidden and expressed in ways more likely to be accepted within the majority group. For example, modern racial prejudice includes the belief that black people have the right to opportunities available to all members of society, but they want more rights than anybody else and probably do not deserve these rights.

Someone with an attitude involving modern prejudice might publicly support an affirmative ('positive') action program to help overcome the disadvantages experienced by minority group members in obtaining employment or access to tertiary education. However, they may have reservations about the fairness of such a program to members of the majority group. They are also more likely to keep their real views private and not share them openly when it is believed that those views may be socially unacceptable and may reflect on them in an unfavourable way.

In Australian society, and most other Western societies, modern forms of prejudice are more common than old-fashioned forms. This is mainly because open expressions of prejudiced behaviour such as name-calling, abuse and discrimination are illegal and not socially acceptable. However, this does not mean that prejudiced attitudes towards people in certain social groups have dramatically reduced or do not exist. Prejudice may be still be widespread, but more difficult to observe than in previous times when it was more openly expressed (Aronson, 2008; Vaughan & Hogg, 2002).

More recently, psychologists have tended to distinguish between explicit and implicit prejudice to emphasise whether the prejudice is consciously or unconsciously held. **Explicit prejudice** is defined as prejudice that is consciously held and usually deliberately thought about. Like old-fashioned prejudice, it is typically openly reported by the person holding it and is within their control. In contrast, **implicit prejudice** is prejudice that is typically unconsciously held; that is, the person holding such prejudice is not usually aware that they do so. Implicit prejudices are not usually within the control of the person holding them (VicHealth, 2014).

Discrimination

Prejudice can also be expressed through behaviour. When this occurs, it is called discrimination. **Discrimination** refers to positive or negative behaviour that is directed towards a social group and its members. Of particular concern to psychologists (and to Australian society in general) is discrimination against an individual or specific group.

Discrimination against people can take many forms. For example, it may involve behaviour such

Figure 9.29 The Long Walk is held in Melbourne each year. It celebrates former AFL footballer Michael Long's 650-kilometre walk to get Indigenous issues back on the national agenda. It is a way for Indigenous and non-Indigenous people to express their support for Aboriginal culture.

as ignoring people, excluding people from places or positions, bullying, putting people down, or, in its extreme form, it may be expressed in physical violence against a particular group, or even genocide. Genocide involves the extermination of an entire group, such as Hitler's attempts to kill all Jewish people during World War II.

Direct and indirect discrimination

The Victorian Equal Opportunity and Human Rights Commission (2017) describes two forms of discrimination — direct and indirect discrimination. In Victoria, it is against the law for someone to discriminate, or propose to discriminate, against another person in an area of public life because of a personal characteristic they have or are assumed to have. Personal characteristics include age, sex, race, marital status, disability, physical features and political beliefs. Areas of public life include clubs, shops, schools and the workplace.

Direct discrimination occurs when a person treats, or proposes to treat, someone unfavourably because of a personal characteristic protected by the law. For example, direct discrimination would occur if someone was overlooked for a job specifically on the basis of their age, sex, marital status or some other relevant personal characteristic. Direct discrimination often happens because people make unfair assumptions about what people with certain personal characteristics can and cannot do. This would occur, for example, if an adolescent applied for casual work and was told by the employer that they missed out because 'teenagers are unreliable'.

Two other examples of direct discrimination given in the *Equal Opportunity Act 2010* (Vic) are:

1. An employer advises an employee that she will not be trained to work on new machinery because she is too old to learn new skills. The employer has discriminated against the employee by denying her training in her employment on the basis of her age.
2. A real estate agent refuses an African man's application for a lease. The real estate agent tells the man that the landlord would prefer an Australian tenant. The real estate agent has discriminated against the man by denying him accommodation on the basis of his race.

Indirect discrimination occurs when treating everybody the same way disadvantages someone because of a personal characteristic. For example, if an employer refuses to allow employees to wear any head covering in the workplace, this may be indirect discrimination against employees whose cultural or religious background requires that they wear a particular type of head covering.

Similarly, suppose that a factory requires all employees to start at 6 am. This might seem to

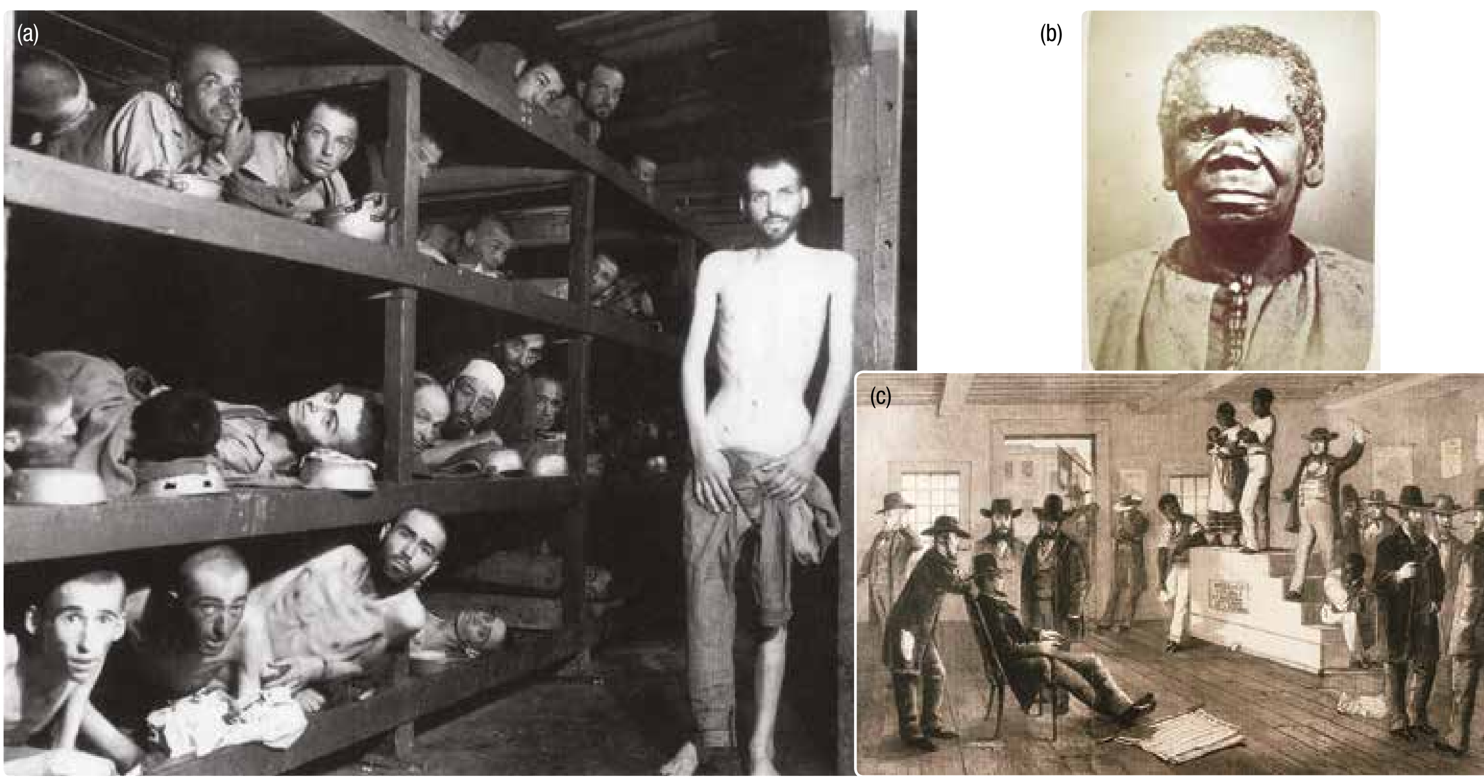

Figure 9.30 Prejudice has been the cause of many atrocities worldwide, including (a) the starvation and subsequent extermination of many Jews by the Nazis, the mass slaughter and dispossession of Aborigines, particularly in Tasmania, where Truganini (b) and many others were transported to a makeshift settlement and forced to adopt European culture, and (c) the auctioning of Africans as slaves in North America.

treat everyone equally, but it could disadvantage employees who need to care for children, who are usually women. If it is not a reasonable requirement, this will be indirect discrimination.

Two other examples of indirect discrimination given in the *Equal Opportunity Act 2010* (Vic) are:

1. A store requires customers to produce photographic identification in the form of a driver's licence before collecting an order. This may disadvantage a person with a visual disability who is not eligible to hold a driver's licence. The store's requirement may not be reasonable if the person with a visual disability can provide an alternative form of photographic identification.
2. An advertisement for a job as a cleaner requires an applicant to speak and read English fluently. This may disadvantage a person on the basis of his or her race. The requirement may not be reasonable if speaking and reading English fluently is not necessary to perform the job.

Distinguishing between prejudice and discrimination

The basic difference between prejudice and discrimination is that prejudice is an attitude and discrimination is behaviour arising from prejudice.

When prejudice and discrimination are directed at people who are members of a particular racial or ethnic group, for example, Aborigines, Somalians or Muslims, it is called *racism*. When directed at women or men because of their sex, it is called *sexism*. When directed at people because of their age, it is called *ageism*.

Generally, the attitudes and behaviour of a person who is racist, sexist or ageist are often affected by the person's belief that people of different races, sexes or ages have different personal characteristics and abilities. Furthermore, racism, sexism and ageism often result because a person (or group) feels superior to an individual or group in terms of race, gender or age, and regards them as being inferior or less able in one or more ways.

BOX 9.9 Sexual harassment, victimisation and vilification

It is against the law to sexually harass or victimise someone, or to vilify someone because of their race or religion.

Sexual harassment is unwelcome sexual behaviour, which could be expected to make a person feel offended, humiliated or intimidated. Sexual harassment can be physical, verbal or written. It can include:

- comments about a person's private life or the way they look
- sexually suggestive behaviour, such as leering or staring
- brushing up against someone, touching, fondling or hugging
- sexually suggestive comments or jokes
- displaying offensive screen savers, photos, calendars or objects
- repeated requests to go out
- requests for sex
- sexually explicit emails, text messages or posts on social networking sites.

A single incident is enough to constitute sexual harassment — it doesn't have to be repeated.

Victimisation is subjecting, or threatening to subject, someone to something detrimental because they have asserted their rights under equal opportunity law, made a complaint, helped someone else to make a complaint, or refused to do something because it would be discrimination, sexual harassment or victimisation; for example, if Donna's boss fires her after she complains that a colleague is sexually harassing her.

Vilification is behaviour that incites hatred, serious contempt for, or revulsion or severe ridicule of a person or group of people because of their race or religion. Behaviour that could be seen as vilification includes:

- speaking about a person's race or religion in a way that could make other people hate or ridicule them
- publishing claims that a racial or religious group is involved in serious crimes without any proof
- repeated and serious spoken or physical abuse about the race or religion of another person
- encouraging violence against people who belong to a particular race or religion, or damaging their property
- encouraging people to hate a racial or religious group using flyers, stickers, posters, a speech or publication, or using websites or email.

Behaviour that is not likely to be seen as vilification includes being critical of a religion or debating racial or religious ideas in a way that does not encourage others to hate racial or religious groups, and actions that offend people of a particular race or religion, but do not encourage others to hate, disrespect or abuse racial or religious groups.

Comments, jokes or other acts related to the race or religion of a person may not be seen as vilification, but they could still be the basis for a complaint of discrimination. For example, Ranjit complains that a local bus driver asked him where he was from, told him to sit at the back of the bus and sniffed loudly as he walked past. This is not racial or religious vilification but Ranjit might be able to make a complaint about racial discrimination to the Victorian Equal Opportunity and Human Rights Commission.

Source: Victorian Equal Opportunity and Human Rights Commission (2017). Retrieved from www.humanrightscommission.vic.gov.au

Victorian Equal Opportunity
& Human Rights Commission

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Weblinks

- Video on types of discrimination 3 m 42 s
- Victorian EO & HRC
- Data on prejudice and racism in Victoria

LEARNING ACTIVITY 9.17

Review questions

1. Define prejudice, with reference to an example.
2. (a) List Blumer's (1961) four characteristics of prejudice.
   (b) Apply these characteristics to analyse a prejudice you believe is held by a majority social group in Australian society towards a minority group. Which characteristics do you believe may or may not be true? Explain your answer.
3. (a) Explain the difference between old-fashioned (traditional) and modern prejudice.
   (b) In what way are explicit and implicit prejudice like and unlike old-fashioned and modern prejudice?
   (c) Which form of prejudice do you believe occurs most frequently in Australian society? Explain your answer with reference to an example(s).
4. Explain the difference between direct discrimination and indirect discrimination with reference to an example of each type of discrimination different from those used in the text.
5. (a) Describe the relationship between prejudice and discrimination.
   (b) What is the key difference between prejudice and discrimination?
6. (a) Explain the meanings of the terms racism, sexism and ageism.
   (b) How do 'racists', 'sexists' and 'ageists' tend to view someone of another race, sex or age?
   (c) Give an example of a racist, sexist or ageist comment.
7. (a) Explain the meanings of the terms domestic violence, hate crime and genocide.
   (b) Explain whether each of these involves prejudice, discrimination or both.

LEARNING ACTIVITY 9.18

Reflection

Give an example of a personal experience of discrimination at school or another social world setting. Suggest a possible way of preventing discrimination within this environment.

LEARNING ACTIVITY 9.19

Media response/analysis using a tri-component interpretation of prejudice

In Box 9.3 on page 456 an example of gender prejudice is analysed in terms of the tri-component model of attitudes.

1. Find and make a copy of a suitable image(s) in the print or electronic media about racial prejudice.
2. Analyse racial prejudice in the same way.
3. Choose another example of prejudice and analyse it in the same way, including specific examples of each component.

Methods that may reduce prejudice

Anti-discrimination laws have led to a significant reduction in the number of observable expressions of prejudice in Australian society. This legislation, which has been accompanied by education campaigns about social problems associated with prejudice and discrimination, has also led to increased opportunities for women and members of minority groups in our society.

The media has also played an important role in combating prejudice. For example, TV current affairs programs and investigative journalists have highlighted problems and issues faced by individuals and groups who are the targets of prejudice and discrimination. This not only informs us about the existence of continuing or new problems and issues around prejudice, but also creates public debate that increases our understanding of these problems and issues, and puts political pressure on governments to 'do something'.

However, changes in legislation and reporting by the media do not mean that prejudice and discrimination have ceased to be problems in Australia. For example, although the attitudes of many Australians towards Aboriginal people have improved in the past 20 years, the physical, material and spiritual struggle of the Aboriginal people has not. Similarly, although the stereotype of women is more positive than it was 20 years ago, women still experience inequality and discrimination in many important parts of their lives. At work, for example, women continue to face a gender 'pay gap' and barriers to leadership roles. They continue to find it difficult to gain access to leadership roles and positions of power in our society that have traditionally been held by men. Many encounter reduced employment opportunities because of the time they give to family and caring responsibilities (Australian Human Rights Commission, 2017).

Although legislation and education through the media (and in schools) have helped reduce prejudice and discrimination, changing laws and informing people about prejudice and discrimination does not necessarily mean that people will stop being prejudiced. Consequently, further reducing prejudice and discrimination in our society still remains a very important challenge and alternative strategies to tackle these issues need to be considered.

Findings from research studies conducted by psychologists indicate there are other methods that can also help reduce prejudice and discrimination. Generally, no one particular method will effectively eliminate prejudice and discrimination so a number of methods need to be used in combination. These must be directed at the individual as well as society.

One way of reducing prejudice is through *intergroup contact*. This involves increasing contact between groups who are prejudiced against each other. Ways of reducing prejudice through intergroup contact were the focus of many research studies throughout the 1950s and 1960s, particularly in America where prejudice towards African–Americans (negroes) created major social, political and economic problems. More recently, psychologists have focused on ways of reducing prejudice through *cognitive interventions*. This involves changing the way in which prejudiced people think about prejudice and people who are the victims of prejudice.

Intergroup contact

Prejudice can be reduced by increasing **intergroup contact**; that is, increasing direct contact between two groups who are prejudiced against each other. However, research findings indicate that the contact between the groups will reduce prejudice only under certain conditions. In particular, it is more likely that prejudice will be reduced if there is close and ongoing contact between the two groups, if the two groups have to rely on each other for some reason and if each group has equal status in the contact situation.

Sustained contact

Suppose that someone from a bikie gang regarded as being violent moves into your neighbourhood. Although you may have 'heard' about the gang, you have previously had nothing to do with any of its members. However, the information you have heard has led you to form a stereotype and develop a prejudicial attitude towards the gang and its members. When you first see your new neighbour, his rough, tough, tattooed appearance, his manner of dress and the fact he owns a motorbike reinforces your stereotype. You decide to have as little contact with him as possible. However, the fact that he lives in the house opposite yours makes this difficult. You see him often, sometimes even doing 'normal' things like taking the wheelie bin out for rubbish collection and mowing the lawn. In time, you start to briefly exchange pleasantries whenever you see him out in the street or at the local shops. In fact, as you get to know him better, he turns out to be quite friendly and pleasant. Although you believe that this person is different from you in too many ways to ever become your friend, your **sustained contact** with him — that is, ongoing contact either directly or indirectly over a period of time — has helped break down a stereotype that was substantially based on minimal information obtained from secondary sources.

Figure 9.31 A prejudiced attitude toward bikies might make you nervous if this man moved into your neighbourhood. However, sustained contact might help break down your stereotype and reduce your prejudice.

The contact hypothesis

Does it follow that direct contact between groups who are prejudiced towards one another will help break down stereotypes and reduce prejudice? The possibility was first raised by American psychologist Gordon Allport in 1954 and has come to be known as the contact hypothesis.

The **contact hypothesis** proposes that certain types of direct contact between members of different groups can reduce prejudice. The assumption is that close, prolonged contact of a fairly direct nature (one-on-one or face-to-face) leads to a re-evaluation of incorrect stereotypes about the other group and its members, thereby reducing intergroup stereotyping and prejudice. For example, if members of different groups are able to socialise, they will be able to exchange information and learn things about each other that challenge or break down the stereotypes behind the prejudice.

This suggests that direct intergroup contact over a period of time may be an effective means of eliminating, or at least reducing, prejudice. However, reality indicates otherwise. For example, consider the high level of contact between men and women, Europeans and Aboriginals, and younger and older people since Australia was first settled. Despite the ongoing and frequent contact, many men still hold prejudiced attitudes towards women, as do Europeans towards Aboriginals and younger people towards the elderly. Consider also the high level of contact between Palestinians and Israelis, Muslims and Christians, and black and white Americans. None of these situations of sustained contact has on its own been successful in significantly reducing or eliminating prejudice.

Mere contact over time is insufficient. According to the contact hypothesis, a number of specific conditions must be present for the sustained contact to be effective in reducing prejudice. One condition which must be present for contact to be effective is that the two different groups must have contact that makes them dependent on each other. This is called mutual interdependence.

Mutual interdependence

If two rival groups who dislike and are prejudiced against each other are placed in a contact situation in which they are mutually interdependent — that is, dependent on each other — there is a greater likelihood that the rivalry and negative stereotypes can be broken down, thereby reducing the prejudiced attitudes the groups hold about each other.

This contact condition was first demonstrated in a well-known experiment conducted by Turkish-born American psychologist Muzafer Sherif (1956). The experiment was conducted in three phases and has come to be known as the *Robber's Cave Experiment* because of its location at a place called Robber's Cave.

The Robber's Cave experiment

Sherif's Robber's Cave experiment involved two groups of children who developed negative attitudes towards each other, became bitter rivals and were constantly in conflict, a condition he and his colleagues created at a three-week summer vacation camp.

The participants were 22 white, middle-class, Protestant boys aged 11 to 12 with no record of school, psychological or behavioural problems. To confirm this information obtained from school records, the researchers observed the children's behaviour in the playground. The researchers also obtained the boys' informed consent in the presence of their parents. The experiment was described generally and relatively accurately, with the participants (and parents) being led to believe that the researchers were studying the formation of friendship groups and various aspects of group behaviour. According to one of the research assistants, 'both the parents and each boy enthusiastically gave their permission' (Harvey, 2004).

Phase 1

In the first phase of the experiment, the boys were randomly allocated to one of two groups. The two groups arrived at the campsite in separate buses and were kept apart in different areas of the camp so that they would be unaware of each other's presence. In this first phase, Sherif's aim was to promote the development of cohesion within each group; that is, a sense of belonging and 'togetherness'.

Group cohesion was achieved by organising activities that involved cooperation and required the members of each group to be highly interdependent on each other. For example, within each group, the boys cooperated in preparing meals, building a rope bridge, building a diving board for the swimming pool and so on.

These types of activities proved to be very effective in building group cohesion. The boys made up names for their respective groups (the 'Rattlers' and the 'Eagles'), they designed a flag and they developed certain types of behaviour and expressions that were unique to their group. Phase 1 lasted for one week, at the end of which the cohesiveness within each group was well established and the stage was set for conflict.

Phase 2

In the second phase, Sherif organised intergroup competitions to test a hypothesis that 'when two groups have conflicting aims, their members will become hostile to each other even though the groups are composed of normal, well-adjusted individuals'.

Sherif allowed the groups to discover that they were sharing the campsite. Seeing 'those guys' using 'our ball field' and 'our equipment' created tension and rivalry. According to data collected from questionnaires completed by the boys, each group had become so closely knit that the other group was viewed as 'outsiders'. The researchers stirred up the negative feelings between the groups by treating one group better than the other some of the time and by pitting the two groups against each other in a week-long tournament involving competitions with prizes awarded to the winners.

Hostilities escalated as the tournament progressed, culminating in a flag burning when one group won the tug-of-war competition. Furthermore, while the group that won the tournament was celebrating, the other group raided their cabins and stole the prizes. In one contact situation, name-calling started and fist fights broke out. As predicted by Sherif, the experiment had transformed 22 perfectly 'normal, well-adjusted boys' into two gangs of brawling troublemakers, full of hostility towards each other.

Figure 9.32 In Sherif's 1956 experiment, the tug-of-war competition increased the hostility and rivalry between the Rattlers and the Eagles.

Figure 9.33 Situations which required a joint effort from both groups of boys helped to reduce their prejudice against one another.

Phase 3

In the third phase, Sherif wanted to see if he could improve relations between the two groups by increasing contact through intergroup cooperation in non-competitive situations. So he arranged for them to share meal times and watch movies together. However, this failed as the boys in these groups had become enemies and continued to fight with each other. Once rivalry, bitter feelings and hostility between the groups had been aroused, simply eliminating the competition and bringing them together in situations involving casual, non-interactive contact did not eliminate the rivalry and associated negative attitudes and behaviour.

Sherif overcame the rivalry and negative attitudes by making the groups mutually interdependent on each other. This was achieved by creating and setting up three situations where the members of one group alone could not accomplish the required task.

The first situation involved damage to the water supply system. The only way the system could be repaired so that water once again became available was if all the boys worked together in order to repair it. The second situation required all the boys to pool their money to pay the rental fee of a movie they all wanted to see. In the third situation, while the boys were on an outing, the truck that was to go and pick up their food for the day stalled. In order to get the truck going again, it was necessary for the boys to pull it up and over a steep hill. This could be accomplished only if all of them pulled together, regardless of which group they belonged to.

Hostile feelings and negative attitudes were gradually reduced through these goal-focused cooperative activities. The boys made friendships across groups and began to get along better, and the barriers between the groups were broken down to such an extent that the boys essentially viewed themselves as belonging to one larger group of campers. Sherif reported that by the end of the camp the groups were 'actively seeking opportunities to mix, to entertain and to "treat" each other'. The boys made far fewer negative ratings of the opposing group and the prejudice and hostility seemed to have disappeared, as shown in Figure 9.34.

Sherif's Robber's Cave experiment revealed how mutual interdependence can reduce prejudice and conflict between groups. Mutual interdependence was created by setting the groups superordinate goals. This is another condition that is required if contact is to be effective in reducing prejudice.

Superordinate goals

After the two groups of boys had become bitter rivals, Sherif initially tried to improve their poor interpersonal relationships and reduce the prejudice and hostility between them by arranging for them to share meal times and watch movies together. This unstructured intergroup contact did not help reduce the tension. The boys in each group used it as an opportunity to tease and throw food at each other. When this simple form of contact failed to reduce the prejudice, Sherif presented the groups with superordinate goals and observed the effect of a superordinate goal on intergroup conflict.

A **superordinate goal** is a goal that cannot be achieved by any one group alone and overrides other existing goals which each group might have (Sherif, 1966). For example, the Paris Agreement (originally the Kyoto Protocol) is an international treaty on climate change with a superordinate goal for the reduction of greenhouse gases from the atmosphere to minimise global warming. This goal cannot be achieved unless many industrialised nations throughout the world cooperate by making a commitment to the Agreement and limiting their emissions of greenhouse gases by set amounts. Although almost all of the nations have signed up in support of the Agreement, America has its own goals for levels of greenhouses gases within its territorial boundaries and has withdrawn from the Agreement under President Trump's direction. Unless America fully commits, thereby agreeing to change its individual goals and bring them in line with the 'group' goals, the superordinate goals of the Paris Agreement cannot be achieved.

In Sherif's experiment, there were three situations involving superordinate goals. These were:

1. the camp's water system broke down, and both groups had to work together in order for it to be repaired;
2. a movie which both groups wanted to see could be shown only if they cooperated by pooling their money in order to obtain it; and
3. a truck which was to collect food for both groups stalled, and could be started only if both groups pulled it.

In order for these goals to be achieved, intergroup contact involving cooperation was required — a level of cooperation in which the two groups were mutually interdependent. Sherif believed this would eliminate negative attitudes and stereotypes held by both groups towards each other, thereby reducing future conflicts between them. Establishing superordinate goals did, in fact, have these effects.

Superordinate goals improved intergroup relationships, but not immediately. After repairing the water supply, the two groups mingled good-naturedly, but they ended the day with a food fight. They rented a movie with pooled resources, but the two groups sat on opposite sides of the dining hall to watch it.

After six days of cooperation, however, their hostilities were greatly decreased, as can be seen in Figure 9.34 below. In fact, when it was time to leave, they asked if they could travel home together on the same bus. As the boys took their seats, the camp staff noticed that a 'Rattler' was just as likely to sit next to an 'Eagle' as to another 'Rattler' (Smith & Mackie, 2000).

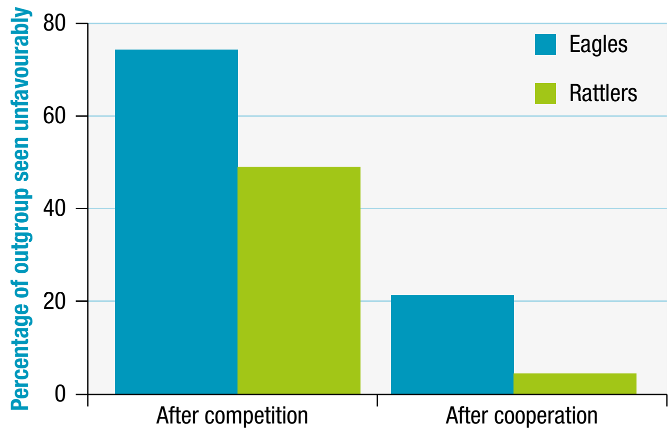

Figure 9.34 Results from the Robber's Cave experiment

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Practical activity — Prisoner's dilemma to test a superordinate goal

Equality of status

Another condition of the contact hypothesis is that for contact between two groups to reduce prejudice between the groups, then the groups must have equal status in the contact situation. The *status* of a group refers to the importance or 'standing' of the group when compared with another group, as perceived by members of the group(s) making the comparison.

If one group is perceived as being more important or better in some way that is valued by the other group, then the 'more important' group would be described as having a *higher status* than the 'less important' group. Conversely, the 'less important' group would be described as having a *lower status*. When the members of both groups perceive their own group and the other group as being equally important, they would be described as having an *equality of status*. Generally, the more status a group has, the more power and influence it usually has over another group with less status, and vice versa.

When status between two groups is not equal, the group members tend to view the other group members differently and may also treat them differently. For example, in Sherif's experiment, there was a lot of status attached to winning each of the competitive events in the four-day tournament. After the first event, the members of the winning group perceived themselves as better than the members of the other group, whereas the losing group members reported a higher level of resentment and other negative attitudes towards the winners.

Sherif took advantage of this by allowing the winning group into the dining room for the evening meal first, but with not enough food available for both groups. The winning group knew that the losing group would be arriving later but proceeded to select and eat the best food and leave only scraps for the other group. This made the winners feel even better but fuelled the resentment and hostile feelings of the losers. However, when the two groups were given equality of status and had to rely on each other to achieve the superordinate goals, the negative attitudes and behaviour towards each other gradually disappeared.

More recent experiments have also found that differences in perceived status between groups are an important factor that can maintain or increase prejudice, and perceived equality of status is a factor that can reduce prejudice.

All factors considered

In summation, contact between groups who are prejudiced towards each other may lead to a reduction in intergroup prejudice, but may also increase prejudice unless the contact occurs under certain conditions. Contact will be more likely to reduce intergroup prejudice if it occurs over a prolonged period of time, *and* if the groups are engaged in activities that require mutual interdependence, such as when working cooperatively to achieve a common, superordinate goal, *and* if the groups perceive each other as being equal in status in the contact situation.

However, many psychologists believe that it is important that the contact situation in which these conditions are present must *also* be supported by authorities, laws or customs that favour intergroup contact and promote equal and fair treatment of both groups (Pettigrew, 1998). For example, if prejudice is to be reduced in a contact situation, then the groups that are prejudiced against each other must believe they have the legal and moral support of authorities, such as the judicial system, government, police, employers and teachers. That is, the larger, 'overall' culture and surrounding social environment in which the contact occurs must support equality in its laws and in the actions of its officials if prejudice is to be reduced (Tavris & Wade, 1995).

LEARNING ACTIVITY 9.20

Analysis of research — Sherif's (1956) Robber's Cave experiment

Prepare a flow chart in which you summarise the main features of the Robber's Cave experiment conducted by Sherif (1956). You should:

1. identify the participants in the Robber's Cave experiment
2. identify the two groups in the Robber's Cave experiment and the way in which participants were allocated to the two groups
3. state a research hypothesis that could have been tested in each of the three phases of the experiment
4. identify the operationalised independent and dependent variables in each phase
5. briefly state the main results obtained in each phase
6. briefly state a conclusion(s) for the Robber's Cave experiment
7. briefly describe two key ethical issues raised by the Robber's Cave experiment
8. explain whether the results could be generalised in situations outside the Robber's Cave experimental setting.

Cognitive interventions

Some psychologists suggest that if people are aware of the harmful effects of prejudice, they are then in a position to be able to do something about it. For instance, when they understand where prejudice comes from and how to reduce it, they have the knowledge to do something about it. This can be achieved through strategies involving cognitive intervention.

Cognitive intervention involves changing the way in which someone thinks about prejudice. For example, when used to reduce prejudice, a specific cognitive intervention strategy may require a prejudiced person or group to consider prejudice from the victim's perspective or to have their negative stereotypes challenged and broken down. If people can be encouraged to understand others based on their individual characteristics rather than generalising some of their characteristics to stereotype them, then prejudice may be lessened. For example, paying closer attention to personal attributes rather than focusing on race, gender or age may prevent stereotyping, and therefore prejudice, from forming.

The findings of research studies provide support for the effectiveness of cognitive intervention in reducing prejudice. In one study, Canadian psychologist Kerry Kawakami and her colleagues (2003) used a cognitive intervention strategy to break down and change age-related stereotypes held by university students.

The participants first completed a computer-based training session in which they were taught about age-related stereotypes. Following the training session, the participants were required to respond to stereotype and non-stereotype photographs of elderly people that were shown on their computer screens.

If the photograph showed an elderly person in a way that was consistent with age-based stereotypes (such as frail or weak, slow or dependent on another person), they were instructed to press a 'Yes' button. If the photograph showed an elderly person in a way that was not consistent with age-based stereotypes (for example, strong, quick, independent) they were instructed to press a 'No' button. As well as recording the number of 'Yes' and 'No' responses, the researchers recorded the time taken by each participant to respond to each photo.

The results showed that, gradually over time, the participants learned to more accurately identify age-based stereotypes and that their response times to the different photographs became faster and faster.

The researchers concluded from these results that their cognitive intervention strategy had led participants to break down or 'undo' negative stereotypes of elderly people and replace them with new, positive ones.

Furthermore, in testing whether the cognitive intervention would have a lasting effect, the researchers compared the participants' results for a similar activity with those of a group who had not received any information about age-based stereotypes. They found that the participants who received the training were less likely to label characteristics and activities of elderly people in terms of a negative stereotype than were those participants who did not receive the training.

Based on her findings of research studies on reducing prejudice through cognitive intervention strategies, American psychologist Patricia Devine (1989) has proposed that reducing the prejudiced attitude of an individual requires a three-step process:

1. the individual must decide that their prejudiced attitude and behaviour are wrong and consciously reject prejudice and stereotyped thinking
2. they must hold fast to their non-prejudiced beliefs and make these an important part of their personal self-concept; that is, how they think and feel about themself as a person
3. the individual must learn to suppress or block from conscious awareness prejudicial reactions that may occur and deliberately replace them with non-prejudiced responses that are based on their personal standards.

So, according to Devine, the next time you find yourself saying, 'Oh, those A people, they're all alike — not like us B people', stop and think. Stereotyping may be a 'natural' cognitive process, but we don't necessarily have to automatically assume the prejudiced attitudes that stereotypes can promote. Nor should we act on those biases. Rather, it's important that we make a conscious effort to see each person as he or she really is — a unique individual (Huffman, 2002).

Figure 9.35 Age-based stereotypes such as 'all very old people are frail' can be broken down with cognitive interventions that challenge the negative stereotypes.

LEARNING ACTIVITY 9.21

Review questions

1. Consider the use of legislation to reduce prejudice.
   (a) Give an example of Victorian and Commonwealth of Australia legislation that has been designed to eliminate discrimination arising from prejudice.
   (b) Which form of prejudice does legislation affect — old-fashioned/modern, explicit/implicit or all forms? Explain your answer.
   (c) Explain why legislation alone may be inadequate for reducing prejudice.

2. Psychological research has found that intergroup contact and cognitive intervention can help combat or reduce prejudice. Briefly describe the focus of each approach.

3. Intergroup contact helps reduce prejudice, but only under certain contact conditions. Briefly describe each of these contact conditions.

4. Explain what a superordinate goal is and give an example of how this type of goal could be used to reduce conflict between two rival groups in the school grounds.

5. Give an example of a cognitive intervention strategy for reducing prejudice. Refer to the three steps that must occur in a person's thinking in order for the strategy to be effective and lasting.

LEARNING ACTIVITY 9.22

Visual presentation — factors that may reduce prejudice

Prepare a concept map or use another diagram to show the connections between and the interrelatedness of factors that may help to reduce prejudice. An example of a concept map can be found on page 236.

LEARNING ACTIVITY 9.23

Media analysis/response — a movie on reducing prejudice

Watch the movie *Remember the Titans* (2000) with Denzel Washington playing coach Boone.

1. Give three examples of racial prejudice and discrimination shown in the movie.

2. Explain how the coach in this movie reduces the prejudice that exists between the two different groups of students. Refer to and give examples of the presence or absence of:
   1. one or more superordinate goals
   2. intergroup contact and the three contact conditions
   3. a cognitive intervention strategy
   4. any other type of strategy used by the coach.

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Remember the Titans official trailer 2 m 34 s

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Other non–R-rated movies on stereotypes, prejudice and discrimination

CHAPTER SUMMARY

- **SOCIAL COGNITION**
  - **Person perception — forming impressions of other people**
    - Impressions from physical appearance
    - Impressions from non-verbal communication
  - **Attribution — explaining behaviour**
    - The fundamental attribution error
    - Actor–observer bias
    - Self-serving bias
    - Culture and attribution
  - **Attitudes**
    - Tri-component model of attitudes
      - Affective component
      - Behavioural component
      - Cognitive component
    - Limitations of the tri-component model of attitudes
  - **Attitudes and behaviour**
    - Strength of the attitude
    - Accessibility of the attitude
    - Social context of the attitude
    - Perceived control over the behaviour
  - **Factors influencing attitude formation**
    - Classical conditioning
    - Operant conditioning
    - Social learning
    - Repeated exposure
  - **Stereotypes, prejudice and discrimination**
    - Stereotypes
      - Ingroups and outgroups
      - Jane Elliot's classroom activity
    - Prejudice
      - Old-fashioned and modern prejudice
      - Explicit and implicit prejudice
    - Discrimination
      - Direct discrimination
      - Indirect discrimination
    - Distinguishing between prejudice and discrimination
    - Methods that may reduce prejudice
      - Intergroup contact
      - Superordinate goals
      - Equality of status
      - Cognitive interventions

KEY TERMS

actor–observer bias p. 451
affective component of an attitude p. 455
attitude p. 454
attitude accessibility p. 460
attitude strength p. 460
attribution p. 450
behavioural component of an attitude p. 455
body language p. 444
classical conditioning p. 462
cognitive component of an attitude p. 455
cognitive intervention p. 480
collectivist culture p. 452
contact hypothesis p. 476
direct discrimination p. 473
discrimination p. 472
explicit prejudice p. 472
first impression p. 443
fundamental attribution error p. 451
halo effect p. 444
implicit prejudice p. 472
indirect discrimination p. 473
individualist culture p. 452
ingroup p. 467
intergroup contact p. 476
mere exposure effect p. 465
modern prejudice p. 472
non-verbal communication p. 444
old-fashioned prejudice p. 471
operant conditioning p. 463
outgroup p. 467
person perception p. 443
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perceived control p. 461
prejudice p. 471
repeated exposure p. 464
self-serving bias p. 452
situational attribution p. 450
social cognition p. 442
social learning theory p. 464
stereotype p. 467
superordinate goal p. 479
sustained contact p. 476
tri-component model of attitudes p. 455

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 486–90. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about social cognition	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Social cognition			
Person perception			
• Impressions from physical appearance			
– Halo effect			
• Impressions from non-verbal communication			
– Body language			
– Eye contact			
– Facial expressions			
Attribution			
– Personal attribution			
– Situational attribution			
• The fundamental attribution error			
• Actor–observer bias			
• Self-serving bias			
• Culture and attribution			

Key knowledge I need to know about social cognition	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Attitudes			
• Tri-component model			
– Affective component			
– Behavioural component			
– Cognitive component			
– Consistency and inconsistency between the three components			
• Limitations of the model			
Attitudes and behaviour consistency			
• Attitude strength			
• Attitude accessibility			
• Social context			
• Perceived control			
Factors influencing attitude formation			
• Classical conditioning			
• Operant conditioning			
• Social learning			
• Repeated exposure			
Stereotypes, prejudice and discrimination			
• Stereotypes			
– Ingroups and outgroups			
• Prejudice			
– Old-fashioned and modern prejudice			
– Explicit and implicit prejudice			
• Discrimination			
– Direct discrimination			
– Indirect discrimination			
• Distinction between prejudice and discrimination			
• Methods that may reduce prejudice			
– Intergroup contact			
– Superordinate goals			
– Equality of status			
– Cognitive interventions			

CHAPTER 9 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

The relationship between behaviour and attitudes tends to be

A. indirect.
B. consistent.
C. direct.
D. inconsistent.

Question 2

The statement 'All obese people eat too much' is an example of

A. prejudice.
B. discrimination.
C. person perception.
D. stereotyping.

Question 3

Which of the following characteristics is most likely to have the greatest influence on a first impression when meeting someone?

A. the person's physical appearance
B. the person's speech content
C. the person's personal biases
D. the person's expectations

Question 4

Attribution theory generally explains why people

A. act the way they do.
B. form impressions of themselves and others.
C. perceive others as they do.
D. perceive themselves and others as they do.

Question 5

The fundamental attribution error is best described as our tendency to

A. make a basic mistake in person perception.
B. overestimate the importance of situational factors in judging ourselves.
C. overestimate the importance of personal factors in judging ourselves.
D. overestimate the importance of personal factors and underestimate the importance of situational factors in judging someone else's behaviour.

Question 6

Lucio is on vacation in Alice Springs and observes an Aboriginal adult being ejected from a hotel. He assumes that the person is probably an alcoholic and caused trouble. Lucio is unaware that the Aboriginal person is a non-drinker who had attended the hotel to forcibly take home his brother who is actually an alcoholic and often gets into trouble when he gets drunk.

Lucio's assumption about the ejected Aboriginal person is best explained by

A. the just world belief.
B. modern prejudice.
C. the fundamental attribution error.
D. culture and attribution.

Question 7

Self-serving bias refers to a person's tendency to attribute their successes to _____ and their failures to ______.

A. an actor; an observer
B. an observer; an actor
C. external factors; internal factors
D. internal factors; external factors

Question 8

Prejudice is a/an _____; whereas discrimination is a/an _____.

A. stereotype; behaviour
B. attitude; stereotype
C. behaviour; attitude
D. attitude; behaviour

Question 9

Which of the following statements best describes discrimination?

A. Discrimination involves positive action to support someone in a minority group.
B. Discrimination involves negative action against someone in a minority group.
C. Discrimination involves either positive or negative action towards someone in a minority group.
D. Discrimination involves stereotyping all individuals in a minority group whilst overlooking individual differences.

Question 10

Which of the following behaviours best indicates old-fashioned prejudice?

A. making negative comments about the sexual preferences of a male nurse
B. being unconcerned about the appointment of a female to a position not traditionally held by females
C. publicly expressing a view that all people should have equal rights
D. publicly expressing a view that all people should have equal rights, but privately being against equal rights for all people

Question 11

When two rival groups have equality of status, then prejudice

A. is more difficult to reduce.
B. is easier to reduce.
C. will probably result in discrimination.
D. will probably result in intergroup conflict.

Question 12

Jane, who is working full time, applies for a credit account with a department store. She is told that she cannot have an account unless her husband acts as a guarantor. The store does not require male employees to have a guarantor.

This is an example of

A. stereotyping.
B. equal opportunity.
C. anti-discrimination.
D. discrimination.

Question 13

Self-serving bias tends to be less common in _____ cultures.

A. North American
B. Western
C. collectivist
D. individualistic

Question 14

An essential feature of an attitude is that it involves

A. an opinion.
B. evaluation.
C. prejudice.
D. behaviour that can be observed, either directly or indirectly.

Question 15

When used to reduce prejudice, a cognitive intervention strategy will involve

A. use of legislation.
B. formation of stereotypes.
C. changing the way in which prejudiced people think about others against whom they are prejudiced.
D. a goal that is unattainable by any one group alone and overrides existing goals which each prejudiced group may have.

Question 16

Sam takes a match winning shot at goal in the final seconds of the match and misses. He blames it on the slippery floor that caused loss of traction just as he released the ball. This is an example of

A. self-serving bias.
B. person perception.
C. actor–observer bias.
D. saliency bias.

Question 17

Which of the following statements best describes a superordinate goal?

A. A goal that everyone agrees with
B. A goal that everyone believes is achievable
C. A goal that everyone agrees with and everyone believes is achievable
D. A goal that cannot be achieved by any one group alone and overrides other existing goals which each group may have

Question 18

Which of the following factors influences repeated exposure in attitude formation?

A. learning
B. prejudice
C. discrimination
D. attitude strength

Question 19

An ingroup is best described as a group

A. to which people of a similar age or with common attitudes wish to belong.
B. to which someone belongs.
C. with members who have common attitudes.
D. with members who like to clash with outgroups.

Question 20

Prejudice between two rival groups is most likely to be reduced when the groups

A. are mutually interdependent on each other.
B. are in contact with each other.
C. compete in activities for which rewards are given to the winners.
D. have increased contact in non-competitive situations.

Question 21

A person who is opposed to Japanese whaling is more likely to do something that is consistent with their attitude if he or she

A. reads a very informative article about the cruelty of Japanese whaling.
B. watches a news items on TV which clearly establishes the excessive slaughter of whales by Japanese whaling fleets.
C. has a very strong attitude against Japanese whaling.
D. has a prejudiced attitude towards Japanese people.

Question 22

An attitude is more likely to predict behaviour when the attitude is

A. formed in a social context.
B. strongly held.
C. under perceived control.
D. learned through cognitive intervention.

Question 23

Developing racist attitudes through watching and listening to a parent's expression of racist comments within the family environment is best explained by

A. genetics.
B. social learning processes.
C. classical conditioning processes.
D. operant conditioning processes.

Question 24

Implicit prejudice is ______, whereas explicit prejudice is ______.

A. usually within the control of the person holding it; not usually within the control of the person holding it
B. unconsciously held; consciously held
C. usually within the control of the person holding it; modern
D. consciously held; unconsciously held

Question 25

Which of the following descriptions is an example of a dispositional attribution?

A. He smoked a cigarette because other people were smoking.
B. He smoked a cigarette because alcohol was not available.
C. He smoked a cigarette because he enjoys smoking.
D. He smoked a cigarette because he was offered one.

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (2 marks)

Define social cognition, with reference to an example.

Question 2 (2 marks)

(a) What is the halo effect? 1 mark

(b) Give an example of its possible role in person perception. 1 mark

Question 3 (3 marks)

Distinguish between personal and situational attributions with reference to a relevant example.

Question 4 (2 marks)

Describe two factors that can influence whether attitudes and behaviour will be consistent.

Question 5 (4 marks)

(a) Explain what person perception is. 1 mark

(b) Give an example of how person perception assists adaptation to the social world. 1 mark

(c) Describe two factors that can influence person perception. 2 marks

Question 6 (6 marks)

Mardi decided to take a gap year and complete volunteer work overseas before starting her tertiary studies. Using this example, describe the tri-component model of an attitude.

Question 7 (2 marks)

Distinguish between explicit and implicit prejudice with reference to refugees or asylum seekers.

Question 8 (4 marks)

Explain whether the sign below, displayed by the municipality of Bandol, demonstrates prejudice and/or direct and indirect discrimination.

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The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.
The answers to the Section B questions are in eBookPLUS.

10 SOCIAL INFLUENCES ON BEHAVIOUR

KEY KNOWLEDGE

- the influence of status and social power within groups, and obedience and conformity on individual behaviour, with reference to theorists including Asch, Milgram and Zimbardo
- the influences on helping behaviour (or reluctance to help) including personal, situational and social factors
- factors that influence bullying (including cyberbullying) behaviour and the effects of bullying behaviour on an individual's psychological functioning
- positive and negative influences of media on individual and group behaviour, illustrated by advertising, television, video games and social media

Source: ©VCAA, VCE Psychology Study Design (June 2017 update), p. 21.

CHAPTER CONTENT

Humans are social beings, and as such we spend much of our time in the company of other people. In our everyday activities we interact with and influence others in a variety of ways. Each and every one of us is the product of the relationships, groups, culture and society to which we belong. The person you are today is the result of the many interactions you have with others and the influence they have over you. Just as you have been influenced by others and the culture and society to which you belong, you have also influenced others with whom you interact in the many relationships and groups to which you belong.

Figure 10.1 Psychologists have investigated why some people are more susceptible to the influence of others and why some people can exert greater influence than others.

One widely researched topic of interest in psychology is the various conditions that lead people to behave in ways they otherwise would not, and the various conditions that prevent people from behaving in ways that they ordinarily would.

We all like to think of ourselves as independent in what we think, do and say, making our own decisions without being influenced by others and that if we do follow others, it is because we choose to and want to do so. However, researchers have found that we may be more susceptible to influence by others than we think.

Have you ever considered why we yawn when we observe someone else yawning, laugh in response to hearing others around us laughing or turn to look in a particular direction when we see a group of people looking in that direction? In these instances, the influence others exert over us is usually unintentional.

There are also many instances where influence is intentionally exerted over others. For example, when television producers include prerecorded laughter within their comedy programs to influence viewers into believing that the show is funny, or when politicians announce inflated results from their own party's opinion polls to influence others to vote 'like everyone else'. Similarly, some street buskers might put money into their collection tins to prompt their audience to do the same and advertisers often use sports stars and celebrities in their attempts to influence us to purchase their products or services.

Sometimes, it is an individual who may influence the thoughts, feelings or behaviours of others. At other times, it may be a group of people who exert their influence over someone. For example, if your close friends all wear a particular brand of clothing, you may be influenced to wear the same brand, or if your family all support a particular football team, you may be influenced to support them too. It is only when we begin to understand the effects of the various social influences on our lives that we are more able to control future attempts to influence us.

SOCIAL INFLUENCE

In psychology, the term social influence is used to refer to the ways in which others influence us. **Social influence** is typically defined as the effects of the presence or actions of others, either real or imagined, on the way people think, feel and behave.

Social influence is exerted in many different ways and may come from a person, a group or an institution such as a school, church or government. The impact of social influence may be constructive (helpful), destructive (harmful), or neutral (have no effect). In all cases, however, social influence involves a degree of pressure, varying from slight to intense, that is exerted on an individual to change their thoughts, feelings or behaviour in some way. This pressure from others can be real or genuine pressure, or it can be imagined; that is, it does not actually occur, but it is still experienced as real pressure. We do not always give in to the pressure — social influence can be, and often is, resisted.

In this chapter, we examine several different types of social influence on the individual and consider factors that can determine whether or not the individual will resist. Since social influence most often occurs when we are in a group situation, we first examine what a group is.

WHAT IS A GROUP?

Suppose two people are waiting for a bus. They are alone, sitting at opposite ends of the bench. Neither is looking at the other, but each is aware of the other's presence. Are they a group? Are two people who go jogging together each weekend a group? Are 33 fans patiently waiting for a glimpse of the favourite pop star a group? Are the tourists who get together one time only to ride a cable car to the same destination a group? Are the students in your psychology class a group?

The word group is often used in everyday conversation to refer to any set of two or more people. In psychology, however, a group is considered to be more than a gathering of people. Although definitions vary slightly, there is general agreement that a **group** is any collection of two or more people who interact with and influence one another and who share a common purpose.

It probably did not surprise you that you need at least two people to form a group. But is there an upper limit to the number of people for a group? Can you have a group of thousands of people? For example, can the 90 000 spectators who attend the Boxing Day test match at the Melbourne Cricket Ground be considered a group?

The *number of people* is just one of the characteristics of a group and the actual number of individuals is not so important. What is more important is that, for a collection of people to be called a group, the individuals involved must also *interact* with (for longer than a few moments) and *influence* one another. They must also share a common purpose, or *goal*.

Although the MCG spectators may interact with and influence one another occasionally during the game, for example, in a 'Mexican wave', the interaction is minimal and not actually the kind associated with true interacting groups. Members of groups act and react towards one another and typically have an effect on one another. Moreover, although a 'Mexican wave' may promote a sense of belonging for some spectators, this feeling is short-lived and unlikely to be shared by everyone present. Nor is it likely that the feeling of belonging is as well developed as that held by members of true groups — the feeling of being not merely *in* the group but *part* of the group.

Figure 10.2 Which of these 'collections' of people is a group?

In sum, those at the Boxing Day test match may be best described as a gathering of people in the same location engaged in a common activity. Psychologists often use the term *collective* (or *aggregate*) to describe such a gathering of people who have minimal direct interaction. The audience at a rock concert is a collective, as is a mob.

Under the definition of a group commonly used by psychologists, the two people waiting for a bus and the 33 fans waiting for the pop star in Figure 10.2 are not considered a group. The tourists in the cable car are not a group (but could become a true interacting group if the cable car got stuck mid-air). In contrast, the two joggers in Figure 10.2 would be considered a group and the students in your class would also be considered a group. In both of these groups, the individuals involved are likely to interact frequently, often for longer than a few moments, and they often have a common purpose. They probably will communicate with and affect each other at different times, they may be aware of having something in common and they are likely to have a sense of belonging.

BOX 10.1 Peer groups and cliques

A *peer group* is usually made up of people who have similar interests, do the same sorts of things and often associate or interact with one another. For example, the peer group of an adolescent will be made up of other adolescents.

A peer and a friend are not necessarily the same. The term *peer* refers to anyone who has one or more characteristics or roles in common with one or more other individuals, such as age, sex, occupation or social group membership. However, *friendship* involves a positive relationship between two (or more) people who usually regard or treat each other in similar ways. Adolescents attending a particular school or college have many peers (other adolescents), but they may or may not have many friends (Kaplan, 2004).

A distinguishing characteristic of adolescence is the amount of time young people spend with their peers. Some typical features of an adolescent peer group are:

- it often has its own norms or standards of acceptable behaviour and anyone who breaks these norms may be rejected by other members of the group
- it often has its own style of dress (including hairstyles), its own places for socialising, its own taste in music, dancing, sport and so on
- it usually has its own special attitudes to matters such as sex before marriage, smoking, alcohol, illegal drugs, bullying and so on
- it often has its own language or lists of expressions which may not make sense to anyone outside the peer group
- its members usually discuss their problems with one another but not with outsiders.

Australian psychologist John Cotterell (1996) has described the peer group to which most adolescents belong as a *clique* — a relatively small group of friends of similar age, and generally of the same sex. For example, when an adolescent speaks of ‘my friends’, ‘my mates’, ‘the girls’, ‘the guys’, or uses some other collective noun of this kind, they are usually referring to a *friendship clique*, an interaction-based grouping of peers who ‘hang around together’ and may be either close friends or ‘just friends’.

According to Cotterell, clique members communicate easily with one another, and spend a great deal of their time together simply talking and enjoying each other’s company. They vary in the extent of closeness or intimacy, ranging from individuals who are ‘friends’ only in a specific situation, such as a sports team or interest group, to clusters of close friends who are inseparable.

An adolescent may belong to several different cliques containing different friends; for example, team-mates at hockey practice after school, classmates in psychology lessons, ‘the guys’ at the party and the after-school ‘mates’ in the local neighbourhood. Some of these cliques meet only in a specific setting (e.g. the basketball stadium or the local shopping centre), and the relationship is one of companionship that is restricted to this particular setting. In contrast, close friendships are not restricted to a particular setting.

Figure 10.3 One of the most important and influential groups to which you belong is a peer group consisting of your friends, sometimes called a clique.

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Practical activity — designing and conducting an observational study on cliques

LEARNING ACTIVITY 10.1

Review questions

1. (a) Explain the meaning of social influence as used in psychology.
   (b) Give an example of when you (or someone you know) has experienced 'real' pressure and 'imagined' pressure to think, feel or behave in some way and managed to resist the pressure. How difficult was this in each situation?
   (c) Do you believe that 'imagined' pressure can be just as powerful an influence on an individual as 'real' pressure? Explain your answer.
2. What four key characteristics distinguish a group from other collections of people?
3. What is a collective? Give an example different from those used in the text.
4. In what ways are a group and a collective similar and different?
5. Which of the following collections of people are groups?
   - members of a hockey team
   - psychologists attending an international conference
   - all the cyclists participating in a race
   - a duo of singers
   - 150 VCE students in a school
   - a church congregation
   - three friends who live in the same house
   - 23 looters raiding a store during a civil riot
   - campers at a caravan park
   - shoppers at a shopping centre
   - shop owners at a shopping centre
   - 16 British spectators with the same face paint sitting together at the Australian Open tennis tournament

LEARNING ACTIVITY 10.2

Visual presentation — groups and collectives

Prepare a poster-style presentation on an A3 sheet of paper or in a digital format such as PowerPoint in which you:
- present images (e.g. photos, graphic representations) of three or four groups to which you belong
- define a group
- distinguish between a group and a collective
- define social influence.

Ensure the information is logically organised and you are concise with expression. Point form is acceptable.

STATUS AND SOCIAL POWER WITHIN GROUPS

Within a group, each member can have an identifiable status. In relation to group membership, **status** refers to the importance of an individual's position in the group, as perceived by members of the group. For example, consider your family group. Who has the highest status and who has the lowest status? Do these two individuals rate as equals in terms of the amount of power they have in the family? Does each person have a similar amount of influence or control over the other? The answer to these questions is probably 'no'.

It is important, however, to recognise that an individual's status can have an important effect on their behaviour towards others in the group. Status can specifically affect the expectations that individuals have of each other's behaviour and how individual group members relate to one another.

A person's status in a group also determines the amount of power they have within the group. **Power** refers to an individual's (or group's) ability to control or influence the thoughts, feelings or behaviour of another person (or group). Interaction between any two or more individuals typically involves power to some degree. When power is involved in a social interaction, it is often described as **social power**.

Social power is a basic aspect of life as a social being and can be observed in all kinds of relationships and interactions, including those involving people we dislike, as well as friends and lovers. Even when individuals are unaware of their effect on others, this effect still exists to some extent. However, there are many situations where one individual will deliberately and consciously attempt to use their power to influence others.

Types of social power

Psychologists have identified different types of social power. One approach to distinguishing between different types of power is summarised in Table 10.1 on the next page. Each type of power arises from the *source* of that power. For example, if a person has control over something you need or want, then that person has power over you.

The type of power used by an individual usually depends on their specific role as well as the specific situation. The status of an individual may also affect the type of power used in a specific situation. Often, more than one type of power is used simultaneously to exert influence.

Table 10.1 Types of social power

Type of power	Source of power	Example
Reward power	Ability to give positive consequences or remove negative consequences in response to specific behaviour	An employer has the power to give a pay rise or promotion; a teacher can reward students with grades, praise and privileges (and dismiss a student early from detention).
Coercive power	Ability to give negative consequences or remove positive consequences in response to specific behaviour	An employer can dismiss an employee; a teacher can give detention, or not allow a student to attend a school excursion or function.
Legitimate power	An individual's status or position in a group, institution or society in general gives them the right (authority) to exercise power over those with a lower status or with less authority.	A group leader, manager, captain of a team, classroom teacher, police officer
Referent power	Individuals identify with or want to be like or liked by this person.	A celebrity you want to be like or a friend who you want to be liked by
Expert power	Having special knowledge and skills that are desirable or needed	A classroom teacher perceived as knowledgeable in their subject; a supervisor of a workplace trainee or new employee
Informational power	Having resources or information that are useful and are not available elsewhere	Someone who knows exactly what needs to be done to meet an important team goal within a strict deadline; someone who has had a specific experience that someone else wants to know about

Figure 10.4 What type of power is shown here?

BOX 10.2 Social hierarchies

Status and power within a group are often based on an individual's position in the 'pecking order' or social hierarchy that may have developed. A *social hierarchy* shows the order of dominance of different members of a group, with the most dominant individual (the leader) at the top and the least dominant individual(s) at the bottom of the hierarchy.

Among animals, the hierarchy is often determined by age, physical strength and sex; for example, the oldest and strongest male often becomes the most dominant animal and holds the position at the top of the hierarchy.

In simple animal hierarchies, the general rules are male dominates female, bigger dominates smaller and older dominates younger individuals. There are, however, exceptions. For example, in breeding seasons, females may become more dominant, or at other times, a group of lower-ranking animals may band together to try to push out the highest ranked animal in the hierarchy.

Figure 10.5 In this troop of baboons, the most physically powerful male is at the top of the social hierarchy, followed by other males, then females and infants.

Within groups of people, a social hierarchy is often determined by the status, power and specific roles of the various individuals of the group. For example, in a work environment, the social hierarchy is relatively easy to identify and is determined by legitimate power that goes with certain positions. Most of the group members would accept that their manager, supervisor or team leader has the right to exert power over them in relation to their work tasks.

Hierarchies serve an important function in all groups as they can assist in reducing the amount of conflict within the group, thereby allowing for more harmonious functioning. Individuals who know where they stand in the group are less likely to create unrest than those whose position is unclear. The hierarchy also gives group members a better understanding of their role expectations — knowing what is expected of them in their various relationships with other group members.

Figure 10.6 In this platoon of soldiers, the person at the top of the hierarchy is clearly evident.

LEARNING ACTIVITY 10.3

Review questions

1. Define what is meant by the terms status and power.
2. Describe the relationship between status and social power in a group situation.
3. Give an example of a group situation in which you have:
   (a) considerable status
   (b) little or no status.
4. (a) Describe a group situation in which you have been involved where power has been exerted on an individual(s) in the group.
   (b) Using the information in Table 10.1, identify the type of power(s) that was used to influence the group member(s) in the situation described in 4(a).
   (c) Identify one or more types of power that may be held or used by each of the following individuals:
   - the cartoon character in Figure 10.4 on page 496 asking for the latrine (toilet) to be cleaned
   - classroom teacher
   - tennis coach
   - witness to a crime who refuses to testify
   - clinical psychologist
   - host of a radio talkback show
   - the Pope
   - dog owner
   - parking inspector
   - pilot of a passenger jet
   - museum tour guide
   - famous actor
   - soccer player with a penalty shot at goal
   - prison guard.

LEARNING ACTIVITY 10.4

Reflection

What are some observations you have made of the effects of status and power in one or more groups in which you have been a member?

LEARNING ACTIVITY 10.5

Role play on types of social power

In groups of three or four, select one type of power described in Table 10.1. Prepare a role play of an everyday situation that demonstrates the use of this power in influencing others. Present your role play to the class and ask other class members to identify which type of power was demonstrated in your presentation.

INFLUENCE OF STATUS AND SOCIAL POWER WITHIN GROUPS

Status and social power within a group are often linked to the role each individual has in the group. A **role** is the behaviour adopted by an individual or assigned to them that influences the way in which they function or act in different situations and life in general. Basically, a role is a part an individual plays in life that carries with it expectations of how to behave in different situations.

We have many roles in everyday life. Some roles are relatively temporary in the context of our lifespan (such as babysitter, student, casual employee, captain of a basketball team) and others are more permanent (such as female, brother, parent, friend, priest).

Regardless of whether a role is temporary or permanent, once the role is taken on, there is usually an expectation by other members of the group that the individual will behave in a way that is consistent with that role. These *role expectations* have a strong influence on an individual's behaviour within a group, especially when their role provides considerable power and status.

Generally, individuals tend to use their status and power in desirable ways and to the benefit of the group. In some cases, however, individuals misuse or abuse their power and status. One of the most significant demonstrations of the effects of power and status within a group occurred in a study that has come to be known as the Stanford Prison Experiment.

Zimbardo's Stanford Prison Experiment

The Stanford Prison Experiment (SPE) was conducted in the summer of 1971 by American psychologist Philip Zimbardo at Stanford University in California. Zimbardo wanted to find out the effects of roles, labels and social expectations of being either a prison guard or a prisoner. To do this, he set up a simulated prison environment in the basement of the Stanford University psychology building, complete with cells, security doors and drab surroundings without windows or light (Zimbardo, 2017a).

Zimbardo's participant selection procedure involved placing an advertisement in the local newspaper inviting male volunteers for a study on prison life that would run for up to two weeks for the pay of US$15 per day (equivalent to about US$150 today). More than 70 university students replied to the advertisement and were each interviewed and accessed 'to eliminate candidates with psychological problems, medical disabilities, or a history of crime or drug abuse' (Zimbardo, 2017b).

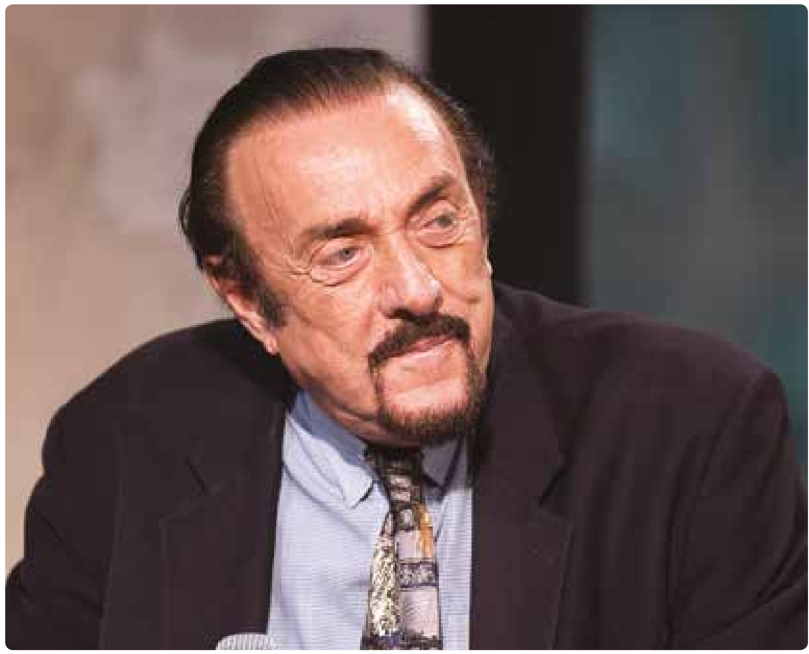

Figure 10.7 Philip Zimbardo (1933–)

Twenty-four of those judged to be 'normal, average and healthy' were selected to be participants in the experiment. Equal numbers of participants were randomly allocated to either of the two experimental conditions — either a 'mock guard' or a 'mock prisoner'. This was achieved by the toss of a coin. The experiment actually commenced with nine guards and nine prisoners. The remaining guards and prisoners from the sample of 24 were 'on call' in case they were needed (Zimbardo, 2017b, 1972).

Having the role of prison guard carried considerable power and status within the entire group of research participants. Having the role of prisoner carried minimal power and little or no status. As events unfolded, power, status and role expectations associated with being a guard or prisoner brought about unexpected changes in behaviour.

To enhance reality, participants selected as prisoners were arrested at their homes by real police. This surprised the prisoners as they had been told to wait at home until 'contacted'. Following their arrest, they were taken to a police station where they were searched, fingerprinted and charged with committing an offence. They were then taken to the 'mock prison' where they were stripped naked, skin-searched, sprayed for head lice, issued with a uniform, bedding, soap and a towel and placed in a 2 × 3 metre barred cell with two other prisoners.

Figure 10.8 (a) In the Stanford Prison Experiment, 'mock prisoners' were arrested by local police officers. (b) The prisoners were locked up in a 'mock prison'.

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Weblink
Zimbardo's website on the SPE, including video of the experiment

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Weblinks
- Documentary on the SPE
- SPE movie

The prisoners were required to ask permission from the guards to perform routine activities such as using the toilet, smoking a cigarette or writing letters. They were also required to refer to themselves and each other only by their prison numbers and to the guards as 'Mr Correctional Officer'. Guards were given military-style khaki uniforms to wear, clubs (similar to batons) and whistles to use in maintaining order, and reflective sunglasses to conceal their identities and emotions. They worked eight-hour shifts and went home when not on duty. Although instructed not to use physical violence, guards were allowed considerable freedom in developing rules and strategies to keep the prisoners under control.

All of these procedures ensured the guards believed that they had considerable status and power. According to Zimbardo (2013), their role was 'power laden' and it took them only a day to 'adapt to their new, unfamiliar roles as dominating, powerful and coercive'.

On the second day of their imprisonment, the prisoners staged a number of disturbances, but their rebellion was quickly stopped by the guards. Over the next few days the guards behaved with increasing aggression and became more authoritarian. They used their power to make the prisoners smile, laugh or refrain from smiling or laughing, on command, for no apparent reason. They encouraged prisoners to call each other names and made them do things like clean the toilets with their bare hands.

The prisoners became increasingly traumatised, passive and dehumanised. Four prisoners had to be released during the first four days because of reactions such as rage, hysterical crying, confusion, severe anxiety and depression. One had to be released early after developing a rash all over his body. The rash was diagnosed as being stress related. Each day the guards abused their power further by tormenting the prisoners with more frequent commands, insults and demanding tasks.

Although the experiment had been planned to last for two weeks, it was terminated after six days because it was getting out of control. Every aspect of the prisoners' behaviour 'fell under the total and arbitrary control of the guards'. However, the guards were abusing their power and becoming genuinely brutal and vicious towards the prisoners who, in turn, were becoming withdrawn, submissive and bitter.

According to Zimbardo (2013), 'we observed and documented on videotape that the guards steadily increased their coercive and aggressive tactics, humiliation, and dehumanisation of the prisoners day by day. The staff (researchers) had to remind the guards frequently to refrain from such abuses . . . and displays of their dominating power and authority.'

Most of the participants never forgot how they had behaved in the experiment, whether they were guards or prisoners. A number of participants temporarily suffered emotional distress which was not present prior to the experiment. At the conclusion of the experiment, one guard commented: 'I was surprised at myself . . . I practically considered the prisoners cattle and I kept thinking: I have to watch out for them in case they try something' (Zimbardo, 1975). While the prisoners were relieved that their ordeal was over, the guards were reluctant to give up their positions of power.

The results of this experiment showed that the behaviour of normal, well-educated men can be significantly affected when a role they are given involves considerable power and status. Zimbardo (2013) believes that the findings of his experiment can be applied to the harsh and sometimes inhumane treatment of prisoners in real-life prisons. He believes that 'prisons are places that demean humanity . . . and bring out the worst in social relations among people. They are as bad for the guards as the prisoners in terms of their destructive impact . . . and continue to be places of evil . . . that are failed experiments.'

Figure 10.9 The guards repeatedly humiliated the prisoners, sometimes lining them up for a body search for no apparent reason.

Figure 10.10 The 'mock guards' abused the status and power which came with the role they had been randomly allocated.

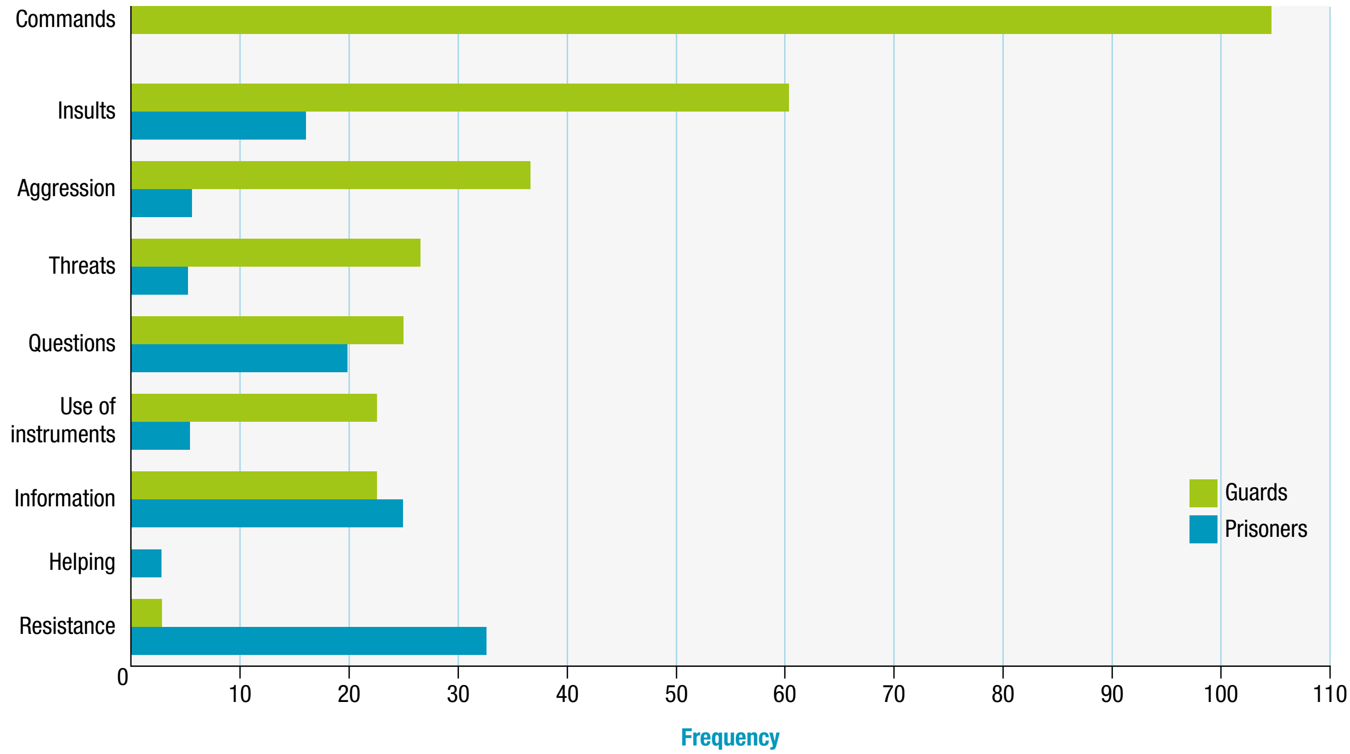

Figure 10.11 Guard and prisoner behaviour across 25 observation periods over six days in the Stanford Prison Experiment. Note the substantial difference between the dominating, controlling, hostile behaviour of the guards and the passive resistance behaviour of the prisoners.

Source: Zimbardo, P. G. (1996). *Psychology and life.* (14th ed.). New Jersey: Pearson Education. p. 587.

Ethical issues in Zimbardo's experiment

The Stanford Prison Experiment provides valuable insights into the effects of status and power on individual behaviour. The experiment also raises important ethical issues and has been criticised by many psychologists on ethical grounds.

Zimbardo (2017a, 2013) has addressed these criticisms by arguing that his study was both ethical and unethical. It was 'not unethical because it followed the guidelines' of the Ethics Committee that reviewed it and approved it.

> *There was no deception; all participants were told in advance that, if they became prisoners, many of their usual rights would be suspended and they would have only minimally adequate diet and healthcare during the study. Their rights should have been protected by any of the many citizens who came to that mock prison, saw the deteriorated condition of those young men, and yet did nothing to intervene — among them, their own parents and friends on visiting nights, a Catholic priest . . . and many professional psychologists . . . and staff of the psychology department, all of whom watched live action videos of the study or took part in parole board hearings or spoke to participants and looked at them directly.*

Furthermore, 'we ended the study earlier than planned, ended it against the wishes of the guards, who felt they finally had the situation under their control, and that there would be no more disturbance or challenge by the prisoners'.

Zimbardo (2015) has stated that his study was unethical 'because people suffered and others were allowed to inflict pain and humiliation on their fellows over an extended period of time'; all participants were exposed to 'seeing and hearing the suffering' of prisoners who 'had done nothing to deserve punishment and abuse'; and 'we did not end the study soon enough. We should have terminated it as soon as the first prisoner suffered a severe stress disorder on Day 2'.

CONSENT

Prison Life Study
Dr. Zimbardo
August 1971

____________________ (date)

____________________ (name of volunteer)

I, ____________________, the undersigned, hereby consent to participate as a volunteer in a prison life study research project to be conducted by the Stanford University Psychology Department.

The nature of the research project has been fully explained to me, including, without limitation, the fact that paid volunteers will be randomly assigned to the roles of either "prisoners" or "guards" for the duration of the study. I understand that participation in the research project will involve a loss of privacy, that I will be expected to participate for the full duration of the study, that I will only be released from participation for reasons of health deemed adequate by the medical advisers to the research project or for other reasons deemed appropriate by Dr. Philip Zimbardo, Principal Investigator of the project, and that I will be expected to follow directions from staff members of the project or from other participants in the research project.

I am submitting myself for participation in this research project with full knowledge and understanding of the nature of the research project and of what will be expected of me. I specially release the Principal Investigator and the staff members of the research project, Stanford University, its agents and employees, and the Federal Government, its agents and employees, from any liability to me arising in any way out of my participation in the project.

____________________ (signature of volunteer)

Witness: ____________________

If volunteer is a minor:

____________________ (signature of person authorized to consent for volunteer)

Witness: ____________________

____________________ (relationship to volunteer)

Figure 10.12 All Zimbardo's participants signed this consent form before the experiment began.

eBook*plus*

Weblink
Zimbardo comments on SPE ethics

BOX 10.3 Real-life prisoner abuse at Abu Ghraib

In March 2003, the Iraq War commenced with the invasion of Iraq in the Middle East by a multinational force consisting mostly of American and British soldiers. The invasion was based on a belief that Iraq possessed ‘weapons of mass destruction’. The international community, including Australia, was fearful that Iraq would use the nuclear and chemical weapons in a hostile way.

When Baghdad, the capital of Iraq, was overtaken, the prison in the town of Abu Ghraib was re-established as a detention centre for Iraqi prisoners of war.

In 2004, photos (and videos) such as those shown in Figure 10.13 were leaked from Abu Ghraib. Many of these images were taken by military personnel who were serving as guards in the prison. The photos appeared in newspapers throughout the world and shocked most people. Investigations gradually revealed details of how the prisoners were abused and treated inhumanely in many ways by both the male and female guards. Unlike Zimbardo’s prison experiment, this happened in real life. The guards who committed the inhumane acts all did so voluntarily. They were all eventually sentenced to lengthy prison sentences.

Abu Ghraib is significant as it drew global attention to human rights violations in prisons throughout the world. Zimbardo has drawn parallels between his SPE and events in Abu Ghraib (see eBook weblink).

eBook*plus*

Weblink
Interview with Zimbardo on parallels between his SPE and Abu Ghraib 13 m 59 s

eGuide*plus*

Weblink
Zimbardo TED talk 23 m 10 s

Figure 10.13 Torture and humiliation at Abu Ghraib

LEARNING ACTIVITY 10.6

Review questions

1. Explain how status and social power can affect behaviour within a group, ensuring you refer to the Stanford Prison Experiment (SPE) and the behaviour of both guards and prisoners.
2. Can the findings of the SPE be generalised to:
   (a) prison situations in real life, as described in Box 10.3 above?
   (b) group situations in real life other than prisons? Explain, with reference to an example.
3. (a) Identify and describe three of the more significant breaches of current ethical guidelines for human research that occurred in the SPE.
   (b) Comment on the ethical beneficence of the research.

LEARNING ACTIVITY 10.7

Reflection

Comment on whether you would have behaved like the guards in the Stanford Prison Experiment and explain why you hold this belief. Would the instruction in the consent form (Figure 10.12) to 'follow directions from staff members of the project or from other participants' influence your behaviour?

LEARNING ACTIVITY 10.8

Analysis of Zimbardo's (1971) Stanford Prison Experiment

Prepare a flow chart summary of the main features of Zimbardo's SPE. The flow chart should include the following:

1. a possible aim of the experiment
2. a possible research hypothesis
3. who the participants were and how they were selected
4. the experimental conditions and key variables that were measured, stated in operational terms
5. the main results obtained
6. the conclusion that was drawn from these results
7. whether the experiment has external validity, with reference to a possible generalisation
8. two main limitations or criticisms of the research method
9. key ethical issues.

OBEDIENCE

There are many occasions in everyday life when we change our behaviour in some way to fit in with whatever is required in a particular situation. The pressure to do so often occurs in subtle, not so easily identifiable ways; for example, when it 'feels right' to be more or less noisy. We also change our behaviour in response to more obvious influences.

This can occur when we are required to do something because someone with authority asks or tells us to do or not do something. For example, our parents, teachers, sports coaches and employers are all authority figures who have the power to get us to behave in certain ways in particular aspects of our lives. When they ask us to do something that is clearly in their area of power, we usually obey and do as we are told. When we defy them, we usually do so knowing that there may be undesirable consequences.

From a very early age, we learn that we must be obedient when someone with legitimate authority over us commands us in some way or other to behave in a certain way. **Obedience** occurs when we follow the commands of someone with authority, or the rules or laws of our society. The term is sometimes used interchangeably with the term compliance. However, while *compliance* involves changing one's behaviour in response to a request to do so, it does not necessarily involve an authority figure.

Leaders in groups are often in the powerful position of being able to exert influence over other members of the group. Why do other group members usually obey the leader? This question becomes important when the leader attempts to exert their power and influence over other group members, pushing them to behave in a manner that is different from the way in which they want to behave or would normally behave.

Several disturbing historical events sparked interest in this question among psychologists. An example is the gassing, starving and shooting of millions of Jewish people in concentration camps during World War II by Nazi soldiers under Hitler's direction. Psychologists often refer to this situation as one involving 'blind obedience' to authority. Victims were usually unknown to their executioners and were, in the main, unseen. Did all those Nazi soldiers who carried out Hitler's instructions support this course of action, or were they 'just following orders' as they stated at the Nuremberg trials of war criminals following World War II?

Figure 10.14 A mass grave of Jews killed during World War II. In defence of their actions, many Nazi soldiers and officials stated that they killed and maimed people because they were 'just following orders'.

Milgram's experiments on obedience

In a series of well-known and very controversial experiments, American psychologist Stanley **Milgram** (1963) investigated factors that can influence obedience to an authority figure. In all, there were 19 variations of the experimental procedures to identify specific influences.

For his first experiment, Milgram advertised for 40 male research participants between the ages of 20 and 50 years, offering to pay them US$4 (equivalent to about US$35 today) for one hour of their time to participate in an experiment at Yale University in the state of Connecticut. He wanted to find out whether individuals would obey an authority figure who was instructing them to inflict pain on another person. Participants were informed, however, that they were involved in a study on 'memory and learning' (see Figure 10.20 on page 510).

Imagine yourself as one of the respondents to the advertisement and as one of Milgram's participants being treated in the following way. You arrive at the university to be met by one of Milgram's assistants, the experimenter, dressed in a white laboratory coat. You chat with the experimenter who seems quite friendly and the purpose of the research is explained. You and another participant (who, unknown to you, is a 'confederate' working for the experimenter) draw slips of paper to determine who will be the 'teacher' and who will be the 'learner'. Again, unknown to you, the draw is rigged so that the participant (you) always becomes the teacher and the confederate (experimenter's assistant) is always the learner.

The learner is taken to an adjoining room, strapped into a chair wired through the wall to an electric shock machine and has electrodes placed on their wrists. You witness all this before being taken to your seat in the next room and receiving instructions about your task — to teach the learner to remember pairs of words.

You are instructed that each time the learner makes a mistake you are to deliver a brief shock of increasing intensity through a shock generator with 30 levers marked at 15-volt intervals from 15 to 450 volts (see Figure 10.15 (a)). The shock generator also has descriptions of the severity of the shock levels from 'slight shock' to 'danger' to 'severe shock'. On the first error, you are required to administer 15 volts and are to move up to the next higher voltage for each further error. With each flick of the switch, lights flash and an electric buzzing sound fills the room.

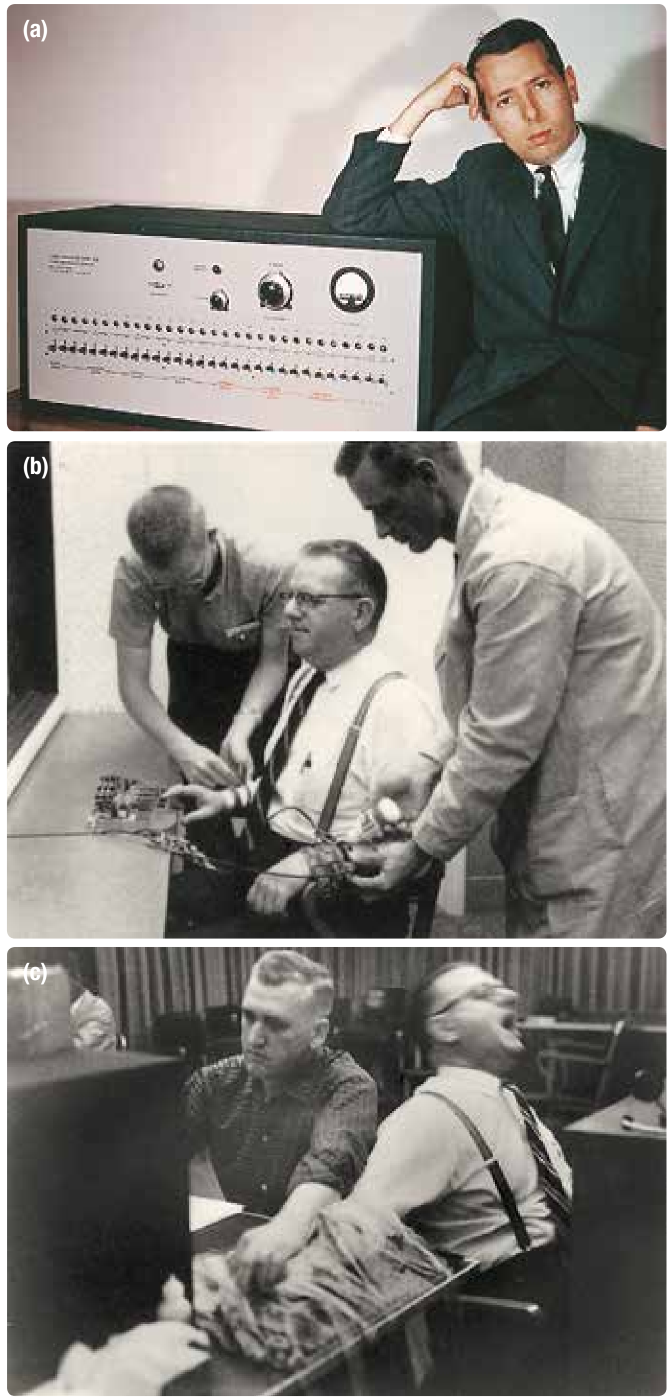

Figure 10.15 (a) Stanley Milgram (1933–1984) with the shock generator used to administer the shocks. (b) A learner (confederate) being strapped into the apparatus. (c) An obedient research participant in the role of the teacher administers a shock.

eBook*plus*

Video on Milgram's experiment 2 m 17 s

eGuide*plus*

Weblinks

- Documentary on Milgram's experiments 9 m 53 s
- Zimbardo outlines Milgram's experiment 4 m 39 s

Deliberately, the learner (confederate) makes errors. By the fifth error (75 volts), you hear a grunt from the next room. If you question the experimenter as to whether to continue you receive a standard reply, 'The experiment requires that you must continue'. Then, if you show further reluctance to continue administering the shocks, you are told, 'It is absolutely essential that you continue' and finally, 'You have no other choice, you must go on'.

If you continue to administer the shocks, after the eighth error (120 volts), the learner cries out, at 150 volts the learner demands to be let out, at 180 volts the learner cries that they cannot stand the pain any longer and at 300 volts the learner refuses to continue and becomes silent. How would you feel as the teacher at this point? How far would you go in administering the shocks? How obedient would you be in this situation?

After the experiment, all participants (the 'teachers') were debriefed and informed that the learners did not actually receive the electric shocks and that they were confederates of the experimenter. The results were unexpected — of 40 participants, none stopped administering the shocks before 300 volts and 26 continued to administer the shocks at the 450-volt level. Five participants refused to go on with the experiment at 300 volts when the learner began kicking the walls.

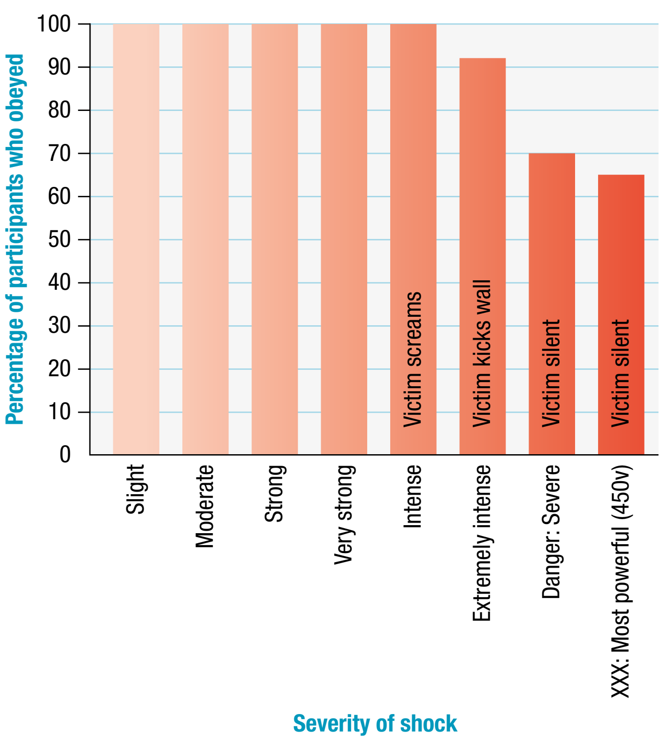

Figure 10.16 Results of the Milgram (1963) experiment. The data show that 65% of participants obeyed an authority figure to the extent that they potentially put someone else's life at risk by doing so.

Table 10.2 A learner's protests in the Milgram experiment

75 volts	Ugh!
90 volts	Ugh!
105 volts	Ugh! *(louder)*
120 volts	Ugh! Hey this really hurts.
135 volts	Ugh!!
150 volts	Ugh!!! Experimenter! That's all. Get me out of here. I told you I had heart trouble. My heart's starting to bother me now. Get me out of here, please. My heart's starting to bother me. I refuse to go on. Let me out.
165 volts	Ugh! Let me out! *(shouting)*
180 volts	Ugh! I can't stand the pain. Let me out of here! *(shouting)*
195 volts	Ugh! Let me out of here. Let me out of here. My heart's bothering me. Let me out of here! You have no right to keep me here! Let me out! Let me out of here! Let me out! Let me out of here! My heart's bothering me. Let me out! Let me out!
210 volts	Ugh!! Experimenter! Get me out of here. I've had enough. I won't be in the experiment any more.
225 volts	Ugh!
240 volts	Ugh!
255 volts	Ugh! Get me out of here.
270 volts	*(Agonised scream)* Let me out of here. Let me out of here. Let me out of here. Let me out. Do you hear? Let me out of here.
285 volts	*(Agonised scream)*
300 volts	*(Agonised scream)* I absolutely refuse to answer any more. Get me out of here. You can't hold me here. Get me out. Get me out of here.
315 volts	*(Intensely agonised scream)* I told you I refuse to answer. I'm no longer part of this experiment.
330 volts	*(Intense and prolonged agonised scream)* Let me out of here. Let me out of here. My heart's bothering me. Let me out, I tell you. *(Hysterically)* Let me out of here. Let me out of here. You have no right to hold me here. Let me out! Let me out! Let me out! Let me out of here! Let me out! Let me out!

Source: Milgram, S. (1974). *Obedience to authority: An experimental view.* New York: Harper Row.

Milgram's experiments attracted a great deal of interest among psychologists. Many variations of his standard experiment were subsequently conducted in other countries and cultures, including Australia, Austria, England, Germany, Italy, Jordan, Spain, the Netherlands, and more recently in Poland. These studies produced a range of results, with the level of obedience found to be higher in some studies and lower in other studies than that in Milgram's original experiment, but nonetheless still occurring at a significant level.

eBook*plus*

Weblinks

- Modern Milgram experiment
- Would you deliver an electric shock?

LEARNING ACTIVITY 10.9

Review questions

1. Define what is meant by the term obedience.
   (a) In what way is compliance like obedience?
   (b) In what way is compliance different from obedience?
2. Why was Milgram's (1963) experiment 'very controversial'?
3. How obedient do you believe you would be as a 'teacher' in Milgram's experiment? Explain your answer.
4. Is obedience to authority likely to be influenced by an individual's cultural background? Briefly explain with reference to research findings.

LEARNING ACTIVITY 10.10

Reflection

Comment on how far the teachers' responses in Milgram's experiment reflect what happens in real life. Explain your opinion with reference to an example.

LEARNING ACTIVITY 10.11

Analysis of research by Milgram (1963) on obedience to authority

Prepare a flow chart summary of the main features of Miligram's experiment on obedience to authority. The flow chart should include the following:

1. a possible aim of the experiment
2. a possible research hypothesis
3. who the participants were and how they were selected
4. the experimental conditions and key variables that were measured, stated in operationalised terms
5. the main results obtained
6. the conclusion that was drawn from these results
7. whether the experiment has external validity, with reference to a possible generalisation
8. two main limitations or criticisms of the research method
9. key ethical issues.

eGuide*plus*

Weblink
Official trailer for 2015 Milgram movie 2 m 11 s

Factors affecting obedience

Milgram's original experiment on obedience to an authority figure used a sample made up entirely of adult male participants. In subsequent experiments, Milgram (1974) tested the effect of other variables on obedience. For example, in another study, 40 adult females showed the same level of obedience as did the males — 65% delivered an electric shock to the maximum intensity of 450 volts.

Similar results have also been obtained in different countries throughout the world using people from different socio-economic and cultural backgrounds, including children and elderly people in the role of the teacher. Most participants expressed considerable distress at what they were asked to do, yet most also continued to obey.

In sum, obedience in a 'Milgram-type' experimental situation seems to occur regardless of gender, socio-economic background, age or culture. Does this mean you would be likely to obey an authority figure to deliver 450 volts that could kill somebody? The answer is 'Not necessarily'.

It appears that several factors interact in influencing someone to obey an authority figure. These factors include the physical distance between the authority figure and the person who must obey, whether the authority figure is perceived as being legitimate and having power, and group pressure to obey.

Social proximity

Generally, **social proximity** refers to the closeness between two or more people. This may include the physical distance between the people as well as the closeness of their relationship. In Milgram's experiment, social proximity was operationalised as the physical distance between the teacher and learner, including whether or not the teacher is physically present in the same room as the learner.

Milgram found that, the closer the learner ('victim') was to the teacher (person administering the shock), the more likely that person was to refuse to administer the shock. For example, as shown in Figure 10.17 on page 508, when the teacher was in the same room with the learner and standing only 45–50 cm away, the number of *fully* obedient teachers dropped from 65% to 40%. And when the teacher was required to force the learner's hand down into contact with a simulated 'shock plate', the number of fully obedient teachers dropped to 30%.

Milgram also found that when the teacher was out of the room and issued his or her orders by telephone, the number of fully obedient teachers dropped to about 20%. Furthermore, in this experimental condition, the experimenter's authority was frequently defied. For example, several of the teachers administered shocks of lower intensity than they were supposed to and never told the experimenter that they were doing this.

In situations outside the laboratory, it seems that it is also easier to obey an order to do something horrific when the victim is distant and not physically nearby or visible. For example, consider how much 'easier' it might be during a war to obey a military command to drop a bomb from a high-flying aeroplane and kill thousands of helpless people, as compared with obeying a command to shoot and kill a helpless individual standing in front of you. It is also 'easier' to sign a document ordering someone's torture or death than to actually torture or kill them yourself.

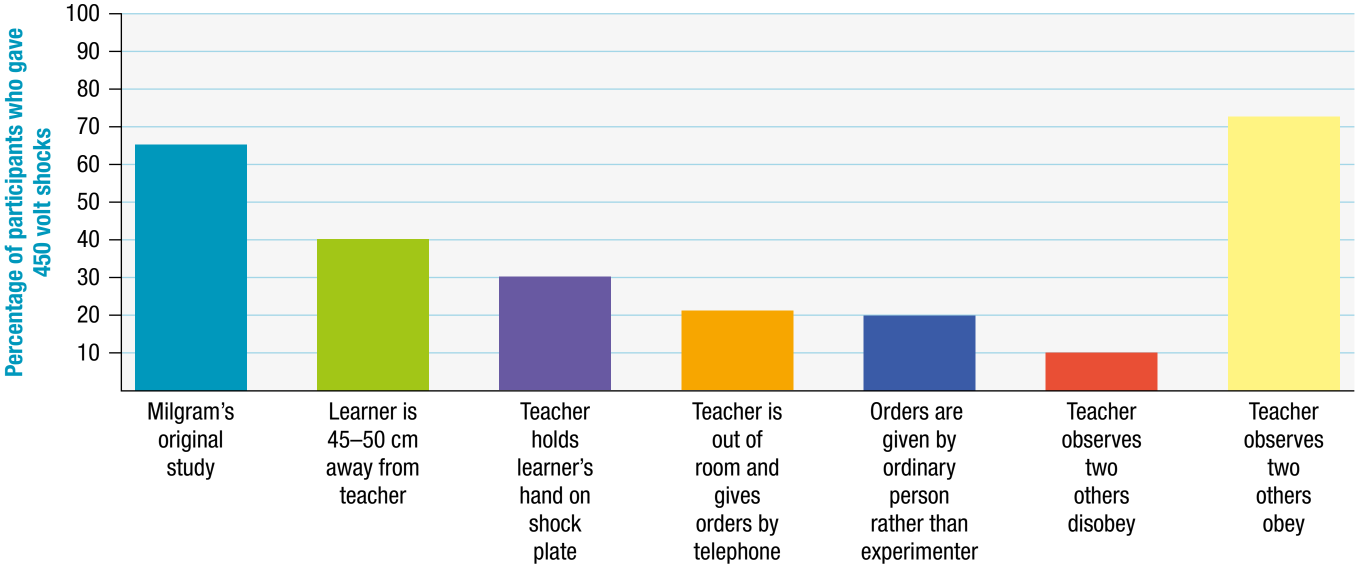

Figure 10.17 Factors that influenced obedience to authority

Legitimacy of authority figures

An individual is also more likely to be obedient when the authority figure is perceived as being legitimate and having power. As shown in Figure 10.17 above, when an 'ordinary person' (someone with no particular authority) instead of the experimenter gave the orders, full obedience dropped from 65% to 20%.

In one variation of his experiment, Milgram (1974) set up a situation in which the experimenter received a fake telephone call that required him to leave the laboratory. After the experimenter left, another confederate who was posing as a participant entered the room and took charge. He 'decided' that the shock should be increased one level for each wrong answer and ordered the teacher to follow this command.

With the legitimate authority figure gone and someone with no apparent authority in charge, 80% of the teachers often ignored the confederate and refused to comply fully. When the confederate pretended to be disgusted by this defiance and sat down in front of the shock generator and tried to deliver the shock himself, most of the defiant participants protested vigorously. Some even tried to unplug the shock generator so it could not be used. In one instance, a physically big teacher actually picked up the confederate from his chair in front of the shock generator and threw him across the room. This 'rebellion' against an illegitimate authority figure contrasted sharply with the compliance usually shown to the 'authorative' experimenter.

In Milgram's (1963) original experiment, the authority figures were easy to recognise because all the experimenters wore white lab coats. They looked like 'expert scientists from a prestigious university' and this helped reinforce the legitimacy of their authority in the experimental situation.

In everyday life, individuals in authority also tend to have visible signs of their authority. Police officers, PSOs, paramedics, firefighters, parking officers and security guards all wear uniforms. CEOs of large corporations and politicians wear suits. Doctors in hospitals wear stethoscopes around their necks. These symbols of their authority are often enough to bring about obedience. When confronted by these obvious signs and reminders of who is in charge, many people find it difficult to resist.

Figure 10.18 We are more likely to obey an authority figure when we perceive them as having legitimate authority. A uniform provides a readily visible sign of someone's authority.

Group pressure

An individual is also more likely to be obedient where there is little or no group support for resisting the authority figure. As shown in Figure 10.17, when the 'teachers' were exposed to the actions of disobedient people who refused to obey the authority figure's commands, full obedience dropped from 65% to about 10%.

Milgram observed this effect of **group pressure** by placing the teacher with two confederate teachers. Initially, the two confederates pretended to collaborate by agreeing to follow the shock administration procedure. Then, they pretended to defy the experimenter and refused to administer shocks after the 150 volt to 210 volt range. After the participant observed this disobedience, the confederates turned to the participant and ordered them to administer the shock. Almost 90% refused to do so.

The results also indicate that an individual is more likely to be obedient where there is group support for the authority figure. As shown in Figure 10.17, when the teachers were exposed to the actions of two people who consistently obeyed the authority figure's commands to the end, full obedience increased from 65% to 72.5%.

In Milgram's study, participants were faced with the dilemma of whether to obey an authority figure or consider the health and safety of another human being. Obedience to authority was the more common response.

Milgram's study demonstrates how strong social influence is in affecting individuals' behaviours. Individuals will often rationalise, or justify, their behaviour by offering the excuse that they cannot be held responsible for their actions because they are acting under instructions.

Experiments such as those conducted by Milgram provide an interesting and important insight into human behaviour. We are often confronted with situations where we have to decide whether to do what others are expecting or demanding from us, or take a stand against their expectations or demands. However, you should keep in mind that the Milgram experiments provide an example of authority being abused. Without obedience to the laws of our democratic society, groups could not function and social life in the way we are accustomed to it would be extremely difficult, if not impossible.

Figure 10.19 Many civilian protests against government corruption and human rights abuses have been met by troops obeying orders to forcibly stop them. The power of obedience leads young soldiers to carry out these orders and murder people. Observing other soldiers obeying the order is one factor that influences their compliance.

Ethical issues in Milgram's experiments

A common criticism of studies of obedience, such as those conducted by Milgram, is that they are unethical. For example, according to current ethical standards for human research, a participant's full and informed consent must be obtained prior to the start of an experiment, the participant's health and wellbeing must be safeguarded and the participant must be informed about their rights and permitted to withdraw whenever they choose to do so. Milgram's experiment seems to have disregarded each of these standards.

Milgram did not actually obtain informed consent from his participants. To do so would have meant that participants had full knowledge of the real purpose and nature of his research. This would have undoubtedly influenced their natural responses in the experiment and, therefore, the results.

To avoid this, Milgram used deception. This means the participants were intentionally misinformed about what the experiment actually involved. Consequently, the participants did not truly give informed consent when they agreed to participate in the research study. There were also other deceptions after the participants had agreed to take part in the experiment. For example, participants were introduced to someone whom they were led to believe was another participant, but who was in fact a confederate, and participants drew slips of paper to determine who was to be the teacher and who was to be the learner, but the draw was rigged to ensure that the confederate would always be the learner.

It is also clear that the mental health and wellbeing of participants were not adequately safeguarded. In fact, for one experiment, Milgram (1974) reports a participant as having been 'reduced to a twitching, stuttering wreck who was rapidly approaching a state of nervous collapse. He constantly pulled on his earlobes, and twisted his hands. At one point, he pushed his fist into his forehead and muttered: "Oh God, let's stop it".' But Milgram did not intervene and 'stop' the experiment.

Nor did Milgram make it clear to the participants that they could withdraw from the experiment whenever they wanted to do so. While they were free to withdraw in the sense that they were not tied down or locked up in the experimental room, it was never made clear to them that they could withdraw. The fact that the participants were paid money to take part in the experiment may have also placed a certain obligation on them not to end their participation.

Ethical standards for research take account of the need for deception in some studies. When using deception, researchers are required to follow strict guidelines, including debriefing participants at the end of the experiment. Debriefing involves explaining the reasons for conducting the research and clearing up any misunderstandings or concerns on the part of the participant. Debriefing may also involve ensuring the participant leaves the experimental setting in the same mental state as they were in

<u>Public Announcement</u>

WE WILL PAY YOU $4.00 FOR ONE HOUR OF YOUR TIME

Persons Needed for a Study of Memory

*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

*Each person who participates will be paid $4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

***No special training, education, or experience is needed. We want:**

Factory workers	**Businessmen**	**Construction workers**
City employees	**Clerks**	**Salespeople**
Laborers	**Professional people**	**White-collar workers**
Barbers	**Telephone workers**	**Others**

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram. Department of Psychology. Yale University. New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

*You will be paid $4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

- -

TO:
PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY, YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in this study of memory and learning. I am between the ages of 20 and 50. I will be paid $4.00 (plus 50c carfare) if I participate.

NAME (Please Print) ....

ADDRESS ....

TELEPHONE NO. ....Best time to call you......................

AGE ....................OCCUPATION.................................SEX................
CAN YOU COME:

WEEKDAYS .... EVENINGS .... WEEKENDS ....

Figure 10.20 This advertisement was used by Milgram to recruit participants for his first experiment.

before the experiment. Milgram (1974) reported that his debriefing procedure, involving a friendly reconciliation with the 'victim', was sufficiently thorough to ensure that each participant left the laboratory 'in a state of wellbeing'.

In a follow-up study, Milgram, assisted by a psychiatrist, discovered that very few participants felt they were harmed by their experiences. Only 1.3% of participants felt that they were 'sorry' or 'very sorry' to have taken part in the experiment, whereas 83.7% were glad to have taken part.

Despite this, some psychologists argue that Milgram's efforts to obtain naive participants were unethical because the participants were not fully informed and every opportunity was taken to persuade the participant to continue when some were clearly uncertain whether they wished to do so. On the other side of the debate, some psychologists believe that the risks to participants were worth taking in order to investigate a very important aspect of behaviour that has important benefits for society when properly understood (Wren, 1999).

BOX 10.4 Obedience in cults and sects

The terms cult and sect are often used interchangeably because they have some common features. They are, however, different types of groups. A key distinction is in the separateness of the identity of the group.

A *cult* is a group which claims to have a great devotion to some person, idea or object. A cult usually has a religious basis and there is a living, charismatic and influential leader who is often seen as the 'guiding spirit' behind the religious beliefs and practices of the group.

A *sect* is a group that follows a particular set of principles, beliefs and practices and which has a separate identity within a larger group or organisation. A sect is generally a faction (breakaway group) within the larger group and is often not formally recognised by the larger group.

There are many cults and sects throughout the world. Most cults and many sects establish their own set of social norms that are often different from those of the rest of society.

One well-known cult was established in the 1960s by the Reverend Jim Jones. Initially located in Indiana in the United States, Jones relocated his 'congregation' to Guyana in South America, where he set up his own community called Jonestown. Jones was extremely influential over his group of loyal followers.

In 1978, the mass media around the world were filled with horrific scenes (below) and stories from Guyana, South America, where 'close to 1000 people died at Jonestown. Under the direction of the Reverend Jim Jones, the members of Jones's People's Temple fed a poison-laced drink to their children, administered the potion to their infants, and drank it themselves. Their bodies were found lying together, arm in arm; 911 perished' (Aronson, 1988).

Figure 10.21 Jonestown massacre, 1978

LEARNING ACTIVITY 10.12

Review questions

1. (a) Describe the relationship between social proximity and how obedient someone is likely to be to an order to do something harmful to another person.
   (b) Describe the relationship between the perceived legitimacy of an authority figure and how obedient someone is likely to be to an order to do something harmful to another person.
   (c) In what way can group pressure influence obedience?
2. Draw a diagram showing how social proximity, legitimacy of an authority figure and group pressure influence obedience.
3. Describe three ethical issues raised by Milgram's experiments on obedience.
4. Explain whether or not the amount of stress to which participants were subjected is justifiable in terms of the importance or benefits of the research itself and its outcomes.

LEARNING ACTIVITY 10.13

Role play — obedience experiments

Working in small groups, prepare and conduct a five minute TV current affairs report on one of the obedience experiments and what the findings suggest about factors that affect the behaviour of individuals and groups.

Your group's report should include such aspects as:

- aim(s) or rationale of the experiment; that is, why it was conducted
- key features of the experimental design
- main results obtained
- one or more interview(s); for example, an interview with a participant ('teacher') exploring their thoughts and feelings during the experiment, and what influenced their behaviour; an interview with a representative of the Australian Psychological Society on ethical issues relevant to the experiment.

The report may include media techniques for creating interest or controversy but must be substantially factual.

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Practical activity — observational study on obedience to a road law

CONFORMITY

At various times in our lives, we all experience group pressure to conform. **Conformity** is the tendency to adjust one's thoughts, feelings or behaviour in ways that are in agreement with those of a particular individual or group, or with accepted standards about how a person should behave in certain situations (social norms). For example, conformity occurs when someone does something (e.g. swears) which they do not normally do, to 'go along' with the rest of the group (who all swear). Conformity also occurs when we wear a formal evening dress or a suit (rather than jeans) to a deb ball, or stand (rather than sit) when the national anthem is played at a sports event.

Psychologists have conducted many experiments to understand various conditions under which conformity occurs. One of the best known series of experiments on conformity was conducted by Polish-born American psychologist Solomon Asch in the 1950s.

Figure 10.22 Conformity involves adjusting our behaviour so that it meets with accepted standards in a given situation. For example, mosque etiquette in Istanbul, Turkey, includes washing hands and feet in clean water before entering to pray. Visitors must also follow a dress code.

Figure 10.23 Solomon Asch (1907–1996)

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Weblinks

Videos on Asch experiment 4 m 10 s, 3 m 40 s

Asch's experiments on conformity

In several classic experiments, Asch investigated group pressure to conform. In different experiments, Asch studied factors that he believed influenced conformity, such as group size and whether or not the group is unanimous (in complete agreement) on what should be said or done.

In one of the experiments conducted by Asch (1951), the participant came into a room that contained six other people and an experimenter and sat at the end of a long table, in a chair that had been purposely left vacant. Each participant was told they were taking part in a 'psychological experiment on visual judgment'.

The experimenter then showed two cards to the group. On one card was a single vertical line. On the second card were three vertical lines (see Figure 10.24). The participant was asked to select the line from the second card that matched the length of the line on the first card. In total there were 18 trials, each using a different pair of cards. In some of the trials, the difference in the length of the lines was hardly noticeable so the matching line was difficult to identify. In other trials, the three lines were noticeably different.

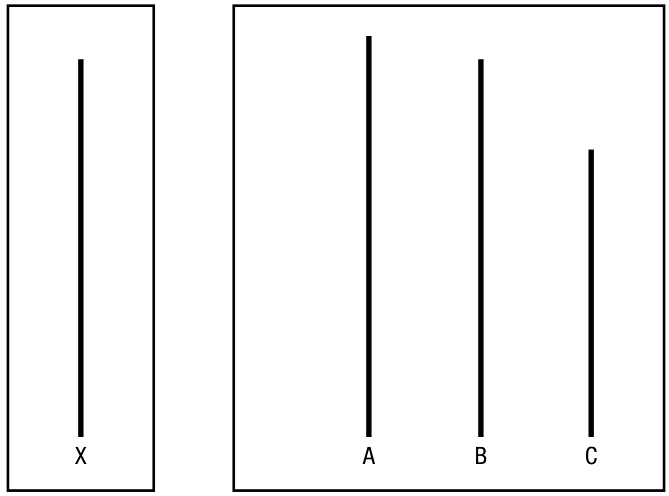

Figure 10.24 Asch's research participants were asked which of lines A, B or C was closest in length to line X.

The participant was not aware that the other people around the table were confederates. The confederates had been instructed to answer correctly for some of the trials and to answer incorrectly for the majority of trials. After hearing the confederates' answers, the participant had to decide between giving the same answer as the others in the group (i.e. conforming), even though on many trials their answer was obviously incorrect, or giving the answer they believed was correct.

About 75% of the participants agreed with the confederates' incorrect responses at least once during the trials. About 33% of the participants agreed with incorrect responses in half or more of the trials. However, 24% of the participants did not conform to the incorrect responses given by the confederates at all.

When the participants in Asch's experiment were questioned later, all reported experiencing some degree of self-doubt about their opinion as to which lines matched up. Those participants who had generally conformed and agreed with the answers the confederates gave, said that they were aware that their responses and the confederates' were wrong but they went along with the group because they did not want to spoil the experimenter's results and they did not want to generate disharmony or conflict. Some of the participants who gave the correct response went so far as to apologise for correctly responding. Those participants who did not conform said they felt 'conspicuous' and 'crazy', like a 'misfit' when they gave answers that disagreed with those of the rest of the group.

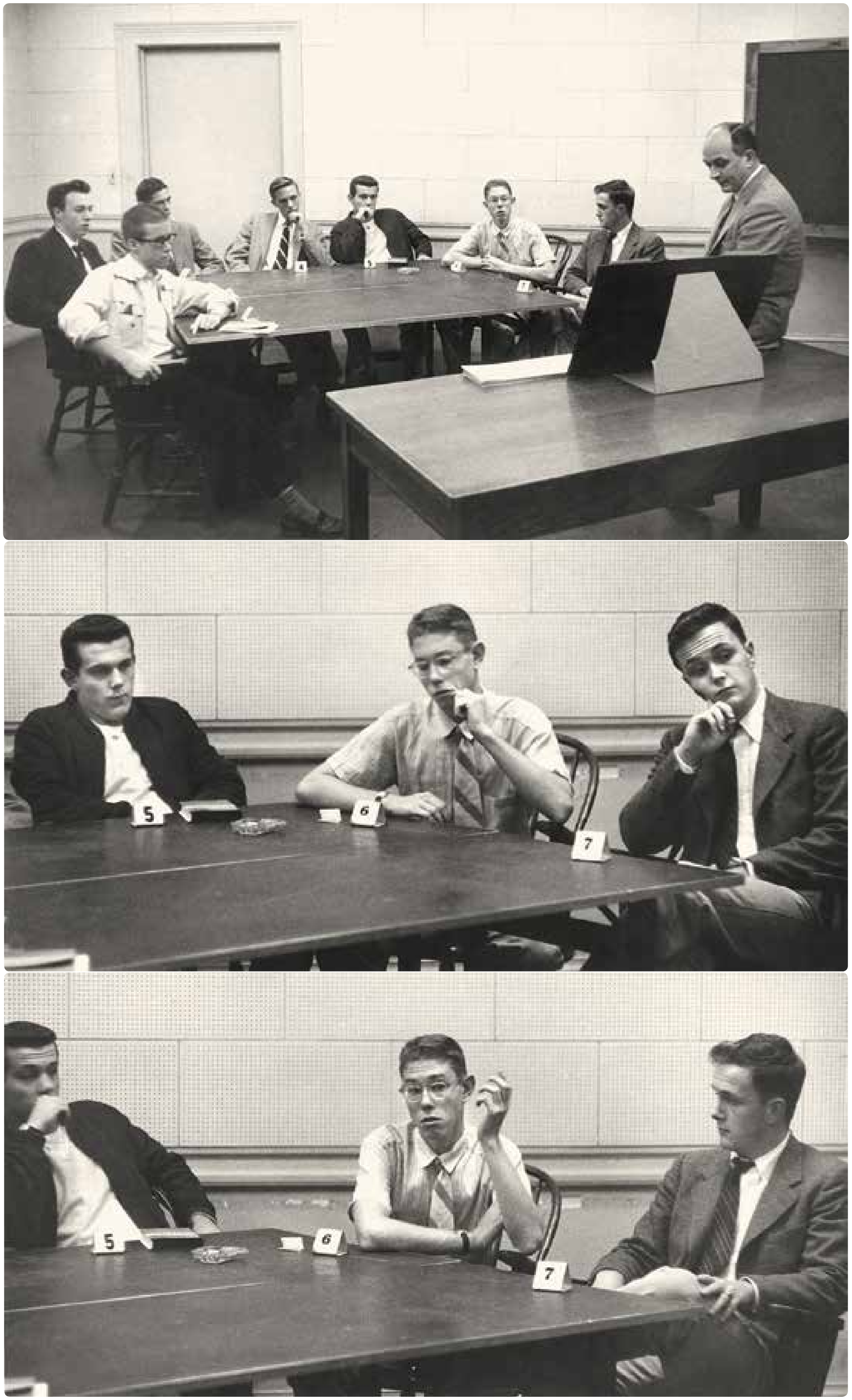

Figure 10.25 The unsuspecting participant (number six) was asked to make judgments about the length of lines presented to the group, after the other group members had exerted group pressure on him by unanimously selecting the same wrong answer.

LEARNING ACTIVITY 10.14

Review questions

1. (a) Define what is meant by the term conformity with reference to an example different from those used in the text.
   (b) Explain whether wearing the required uniform when at school is an example of uniformity or obedience.
2. Consider the Asch (1951) experiment.
   (a) Briefly describe the procedure used by Asch to study conformity.
   (b) Is it valid to conclude that participants gave incorrect answers because they experienced group pressure to conform? Explain with reference to the results obtained in the experiment.
   (c) What explanation can you offer for the 24% of the participants in the experiment who did not conform and disagreed with the confederates' incorrect responses during any of the trials?
   (d) Suggest a variation to the procedure that would use an experimental group as well as a control group for comparison purposes.
3. Which of the following factors do you believe would influence conformity in an experiment using Asch's (1951) procedures? Answer without referring to the text.
   - the size of the group
   - whether the group members are unanimous in their views
   - whether the group is viewed as being a valuable source of information
   - awareness of accepted standards about how one should behave (social norms)
   - cultural background of participants
   - whether participants simply don't 'try hard' and just go along with the group
   - whether participants feel 'anonymous' in the group situation
4. Asch's experiment has been criticised by some psychologists as being unethical because of the use of deception. Is the criticism justifiable? Answer with reference to relevant ethical standards.

LEARNING ACTIVITY 10.15

Reflection

In your opinion, to what extent do the participants' responses in the Asch experiment reflect what happens in everyday life outside the laboratory?

LEARNING ACTIVITY 10.16

Analysis of research by Asch (1951) on conformity

Prepare a flow chart summary of the main features of Asch's experiment on conformity. Your flow chart should include the following:

1. a possible aim of the experiment
2. a possible research hypothesis
3. who the participants were and how they were selected
4. the experimental conditions and key variables that were tested, stated in operationalised terms
5. the main results obtained
6. the conclusion that was drawn from these results
7. whether the experiment has external validity, with reference to a possible generalisation beyond the sample
8. two main limitations or criticisms of the research method
9. key ethical issues.

Factors affecting conformity

Prior to his experiments, Asch hypothesised that people would not conform in situations where they could clearly see what is correct and what is incorrect. Although most of the university students who were research participants in his experiments did not conform to group pressure that was exerted on them, many did. Asch made his views about this clear: 'That reasonably intelligent and well-meaning young people are willing to call white black is a cause of concern' (Asch, 1955).

Asch's findings also aroused interest among other psychologists and a great deal of research on conformity followed. On the basis of Asch's and other research findings, a number of key factors that influence conformity have been proposed. These include:

- the size of the group
- whether or not the group members are unanimous in their views
- whether the group is viewed as being a valuable source of information
- awareness of accepted standards about how one should behave (normative influence)
- cultural background
- social loafing
- anonymity in a group (deindividuation).

Group size

Asch varied group size in his experiments by having 1, 2, 3, 4, 6, 7, 9 or 15 confederates unanimously and falsely state that a comparison line was the same length as the standard line. His results showed that conformity increased with group size, up to a size of four. Beyond a group size of four confederates, conformity did not continue to increase significantly. A group size of 15 actually produced a lower level of conformity than did a group size of three.

Other researchers who tested these findings have obtained similar results. A possible explanation is that as more and more people start to express the same opinion, an individual may suspect that they are behaving like 'mindless sheep' and therefore not want to 'follow in their footsteps'. However, when opinions are the same in a smaller group, an individual may think that each member of the group is behaving independently.

This latter view may be more influential on whether a conforming response is made. Consequently, a belief that one, two or three independent thinkers have reached the same answer may have a more powerful effect than a belief that 14 people are mindlessly 'doing as the others do'. In sum, group size seems to be an important factor influencing conformity, but probably only up to a point.

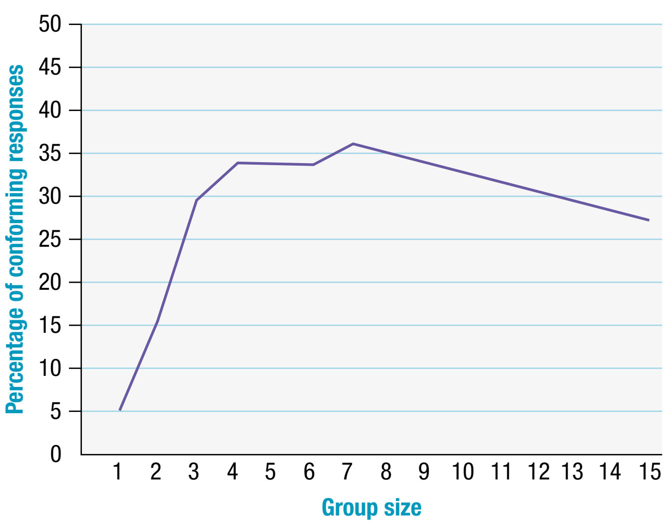

Figure 10.26 Conformity increases with group size up to about four, but beyond that, group size tends to have little influence on conformity.

Unanimity

Imagine yourself in Asch's experiment when everyone in the group gives the same answer, but an answer that is different from your answer; that is, there is **unanimity**, or complete agreement, among the other group members as to what the answer is. Would you be willing to disagree with everyone else if you believed that they were all incorrect? The results of Asch's experiment indicate that it is difficult to be a minority of one, to stand against the group, even when you think you are right and everyone else is wrong.

However, Asch also found that it takes only one person to disagree with the group's judgment to significantly affect conformity. When he allowed one confederate to answer in the same way as the research participant, the amount of conformity reduced by about 80%.

Experiments by other psychologists who subsequently investigated this *ally effect* have found that when research participants are led to believe that their thoughts, feelings or behaviour are supported, shared or not disagreed with by someone else in their group, even when everyone else in the group agrees with a different view, the presence of the ally leads to a reduction in the level of conformity. The presence of an ally who shares one's view, or at least doesn't accept the views of the majority, can be seen as providing social support that strengthens resistance to conformity.

Figure 10.27 A group's unanimity creates pressure to conform, but it takes only one individual to disagree with the group's judgment to significantly affect conformity.

Informational influence

In other experiments on conformity, psychologists have found that individuals are more likely to conform to the views of group members when they want to provide a correct response but they are unsure about what the correct response is. For example, suppose that you want to buy a car and have narrowed your preferences down to two cars, a red car and a purple car. They are both about the same price but have some different features. You don't know much about cars so you seek advice from a friend who does. Your friend checks both cars and recommends that you buy the purple one because it has lower kilometres on the odometer, the tyres are less worn, the registration will take longer to expire and the engine runs more smoothly.

If you accepted your friend's recommendation, then you would be conforming because information they provided influenced you to make a specific choice. In this case, you were motivated to make the right choice, viewed your friend as a valuable source of information that you lacked, then were guided by the information your friend provided when deciding what to do. **Informational influence** occurs when conformity results from a need for direction and information on how to respond in a specific situation.

Informational influence leads people to accept other people's views when they are uncertain about what to do. Research studies have specifically found that informational influence is more likely to lead to conformity when participants feel incompetent, when the task is difficult, or when participants are concerned about being right (Hewstone, Stroebe & Jonas, 2008; Myers, 1990). In all these situations, we may be motivated by wanting to be 'right' and access to relevant information can influence us to conform.

Normative influence

When informational influence leads us to conform, we conform because we want to be right. When normative influence leads us to conform, we conform because we want to be liked and accepted by the group.

Normative influence to conform occurs when our response in a group situation is guided by one or more social norms. When we are aware of social norms for a particular situation, awareness of these norms can be a powerful influence on both the likelihood that we will conform and the strength of conformity that occurs.

According to psychologists, this is partly explained by our desire to be liked and accepted by other people, as well as our concern with being rejected by others. We also like to receive praise and approval from others, particularly from those who are important in our lives, such as friends, parents, teachers and employers.

A useful way of meeting these needs for acceptance and approval is to be (or appear to be), as similar to others as possible (Hewstone, Stroebe & Jonas, 2008). From a very young age, at home and at school in particular, we learn that agreeing with other people and behaving as they do when the situation demands it usually brings positive results — people are more likely to like us and accept us, and may even give us praise or approval when we conform.

Figure 10.28 Social norms influence conformity to unstated rules for queue behaviour that help maintain order. For example, even when you are in a hurry, you have to join the back of the queue.

Culture

Asch's experiment using the line-judgment task has been repeated by researchers in many different countries and cultures throughout the world. Sometimes it has been repeated in exactly the same way and at other times it has been repeated with variations; for example, by using patterns rather than lines or participants of different social backgrounds, such as gender, age and educational qualifications.

When British psychologists Rod Bond and Peter Smith (1996) examined the results of 133 of these 'Asch-type' experiments that have been conducted in 17 different countries, they found differences in conformity. As shown in Table 10.3, conformity occurred less often in studies conducted in North America and Western Europe (e.g. France and Portugal) than in other parts of the world such as Africa, Fiji and Asia (e.g. Hong Kong and Japan).

Bond and Smith believe that the results of their meta-analysis study suggest that there are cultural differences in conformity. The lowest conformity occurred in individualist cultures where achievement of personal goals tends to be placed ahead of achieving group goals. In addition, people who maintain independence and resist group pressure tend to be viewed as strong-minded and regarded more positively than those who conform. Consequently, conformity to incorrect answers given by the group in an Asch-type experiment would tend to be regarded as undesirable and weak.

The highest level of conformity occurred in collectivist cultures where individuals tend to be encouraged, and sometimes expected, to place group goals ahead of their personal goals. These cultures also encourage uniformity ('everyone being like everyone else') and values and beliefs that promote conformity and 'fitting in' for the good of the wider community, rather than individuality. Consequently, conformity to incorrect answers given by a group of confederates in an Asch-type experiment would tend to be regarded as appropriate (Bond & Smith, 1996; Smith & Bond, 1998).

Table 10.3 Results of Asch-type conformity studies across different cultures associated with different countries or regions

Nation	Number of studies	Averaged effect size
Asch's USA studies	18	1.16
Other USA studies	79	0.90
Canada	1	1.37
UK	10	0.81
Belgium	4	0.94
France	2	0.56
Netherlands	1	0.74
Germany	1	0.92
Portugal	1	0.58
Japan	5	1.42
Brazil	3	1.60
Fiji	2	2.48
Hong Kong	1	1.93
Arab samples (Kuwait, Lebanon)	2	1.31
Africa (Zimbabwe, Republic of the Congo (Zaire), Ghana)	3	1.84

The averaged effect size in the right-hand column is the result of a statistical procedure to allow the results of Asch-type studies to be combined and averaged across different studies. The smaller the effect size, the lower the conformity, and the greater the effect size, the higher the conformity.

Source: Smith P. B., & Bond M. H. (1998). *Social psychology across cultures* (2nd ed.). Boston, Massachusetts: Allyn & Bacon, p. 16.

Figure 10.29 Conformity can be influenced by cultural norms: (a) a collectivist culture such as throughout Japan tends to be more conformist; (b) an individualist culture like the USA tends to be less conformist.

Social loafing

Sometimes the presence of others in a group situation results in reduced performance, especially when the other people are co-workers or team mates. This reduction in the effort of an individual member of the group as a result of the presence of others results in social loafing.

Social loafing refers to the tendency of an individual to make less effort when involved in a group activity than when working alone. It was first systematically studied and observed in a tug-of-war experiment involving two teams of eight people. The results showed that the collective effort exerted by each team did not match the total of the individual efforts. For example, blindfolded participants who were assigned the first position in the tug-of-war machine (see Figure 10.30) and told to 'pull as hard as you can' pulled 18% harder when they knew they were pulling alone than when they believed that others were also pulling (Ingham et al., 1974).

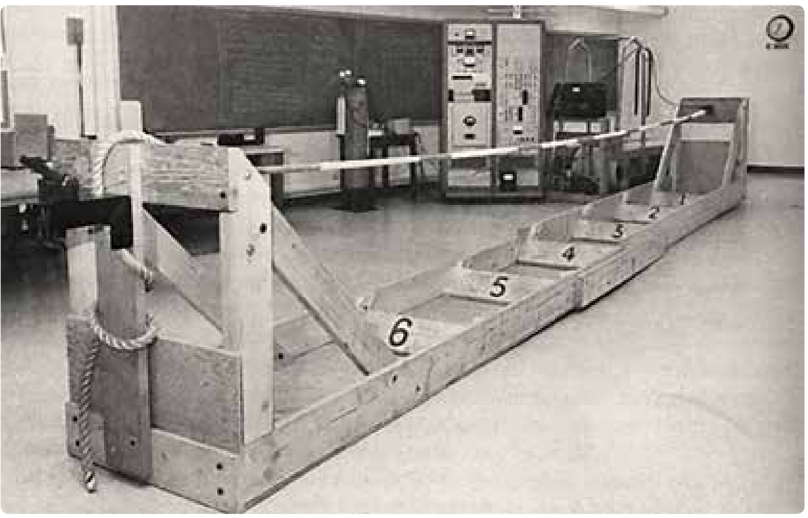

Figure 10.30 This tug-of-war apparatus was used in the experiment by Ingham et al. (1974). Participants in the first position did not pull as hard when they thought that people behind them were also pulling.

In the laboratory, social loafing has been observed among people in a variety of situations such as rope-pulling (tug-of-war), shouting and clapping, pumping water or air, writing poems or editorials, producing ideas and typing. However, most of these studies were conducted with American and European participants. Research on social loafing using Chinese participants has found that participants work harder in a group situation than when they work alone. This finding indicates a cultural difference in social loafing (Moghaddam, Taylor & Wright, 1993).

Social loafing can also be observed in everyday life situations. For example, some workers who do not pay for membership of a union are social loafers if they accept the improved benefits for workers achieved by the union.

Generally, social loafers conform to their group, but with less effort. This is based on their belief that conforming (or not conforming) will not make much of a difference in what the group decides (or does), so they just go along with whatever the group agrees to do (or does).

The influence of social loafing on conformity can depend on many different factors. Experimental research findings indicate that people are less likely to 'loaf' in groups when the group consists of friends rather than strangers, but this depends on the extent to which the group's decision or behaviour is of importance to the individual. For example, an individual is less likely to conform through social loafing when they view their group's outcome as important, challenging or appealing.

American psychologists Steven Karau and Kipling Williams (1993) analysed the results of 78 research studies on social loafing and found that social loafing is less likely to influence conformity, if at all, when:

- maximum effort from everyone in the group is essential for the group's goal to be attained
- the group is valued by its members (for example, the group is made up of close friends)
- the task is important, challenging or appealing to those performing it
- the group is small
- members of a group believe that it is possible for their individual performance to be judged in some way
- other group members are not expected to perform well so social loafing might lead to failure on the task
- those working on the task are women rather than men.

Figure 10.31 Conformity by social loafing is eliminated entirely when maximum effort from individual members of a group is essential for the group's goal to be attained.

Deindividuation

A group can sometimes have a negative influence on the thoughts, feelings and behaviour of its members. In particular, when in a very large group or a 'faceless crowd', people sometimes shed their normal inhibitions and conform to the group by participating in acts of aggression and other types of anti-social behaviour in which they would normally not engage. Such changes in thinking, feeling and behaving that occur in a large group have been explained by deindividuation.

Deindividuation is the loss of individuality, or the sense of anonymity, that can occur in a group situation. Deindividuation is a psychological state and is believed to be an important factor in explaining the extreme behaviour of some people in crowds, particularly in situations where high levels of emotion are involved; for example, screaming hysterically during a rock concert or abusing a football umpire, as well as less restrained mob behaviour, street riots and the violence observed in some English and European soccer fans.

Research studies have identified two important factors that bring about deindividuation which results in conformity to a group. These factors are anonymity and a shift in attention.

Anonymity in a group

In groups, when people feel anonymous or 'invisible', and less accountable for their actions, they may choose to conform to a group which is behaving in ways they otherwise would not. Furthermore, being part of a large crowd or being unrecognisable through some sort of disguise, such as a uniform or fancy dress, can lead people to conform to a group by doing things they ordinarily would not even think about.

For example, a jeering crowd protects the aggressive individual football fan from taking responsibility for threatening an umpire because 'everyone else is doing it too'. And rioters who become anonymous in a mob may loot other people's property, as is witnessed during periods of civil unrest or war. In a large group situation or crowd, people believe they can get away with such anti-social behaviour because they cannot easily be distinguished from others who are behaving in the same way.

In these situations, group members do not pass judgment on an individual's behaviour because they are all 'doing it'. To pass judgment would be to also condemn one's own behaviour. Therefore, the behaviour continues because group members blame the situation they are in, rather than taking the responsibility for their own decisions and behaviour.

Generally, the bigger the group, the greater the anonymity and the more likely it is that group members will use this anonymity to behave in ways they usually would not. In one experiment, Zimbardo (1970) dressed adult females in identical white coats

Figure 10.32 The loss of individuality that can occur in a large group can lead people who would not normally engage in anti-social behaviour to conform to what many others are doing. (a) The riotous chair throwing shown above occurred at a darts tournament in Melbourne. (b) A social norm of darts tournaments requires spectators to wear fancy dress, which in turn promotes anonymity and deindividuation.

and hoods so they were individually anonymous and resembled members of the racist group known as the Ku Klux Klan (see Figure 10.33). Zimbardo found that female participants disguised with masks, and therefore deindividuated, were more likely to conform to a request to give high-voltage electric shocks to a helpless female than those without masks who were easily identifiable and not deindividuated.

Shift in attention

When individuals are with others in a group, their attention is often focused on the activities of the group and events in the environment; that is, events 'external' to the individual (Lord, 1997). This results in fewer opportunities to focus on 'internal' thoughts. Consequently, individuals in a group are less likely to reflect on the appropriateness of their actions, and will therefore give less thought to the consequences of their behaviour (Diener, 1980).

As a result, people are more likely to act impulsively and conform to a group or situation. This is intensified when group members act 'as one', such as by wearing uniforms, singing or chanting together. The heightened emotions that accompany the group behaviour make it difficult to stop (Aronson, Wilson & Akert, 1999).

Figure 10.33 The anonymity of the masks in Zimbardo's (1970) experiment resulted in the participants being more likely to give electric shocks to another female.

LEARNING ACTIVITY 10.17

Review questions

1. Name and briefly describe each of the key factors that influence conformity, with reference to relevant examples and research findings.
2. If you completed question 3 in learning activity 10.14, check your answers. Which of the factors did you believe would influence conformity? Does this suggest 'common sense' is adequate in science? Briefly explain your answer.
3. Name the factor that primarily influences conformity in each of the following situations.
   (a) Olivia doesn't know which of three outfits she could buy for the upcoming deb ball is the 'best one' so she accepts the advice of her older sister on which outfit to buy.
   (b) Jake doesn't actually enjoy drinking in hotels but he still goes to the local hotel with his workmates on Fridays because 'everyone else wants to go'.
   (c) Sujintha doesn't usually worry about 'good manners' when eating at home with his family but is well-mannered when eating out with his family in a restaurant.
   (d) Voula is normally shy but joins in a Mexican wave at the MCG during the Boxing Day test cricket match.
   (e) All guards in the Zimbardo Stanford Prison Experiment abuse prisoners.

LEARNING ACTIVITY 10.18

Media analysis/response — suicide bomber

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Weblink
Video of Rania being disarmed 1 m 18 s

Consider the photo of 15-year-old Rania shown below.

Rania is chained to window bars as Iraqi police remove her vest loaded with explosives. The police believed that she was a suicide bomber, but her explosives failed to detonate. Their investigation revealed that her father was a suicide bomber for the al-Qaida terrorist organisation in Iraq and her mother was an 'emira' — a princess or leader in the al-Qaida organisation.

1. Explain Rania's behaviour with reference to factors that influence conformity.
2. Give a possible explanation(s) of Rania's behaviour in terms of obedience and a combination of conformity and obedience.

LEARNING ACTIVITY 10.19

Concept map on factors influencing conformity

Prepare a concept map showing the key factors that influence conformity and possible relationships between the different factors.

Consider constructing your concept map around a centrally placed example, such as 'conformity in a queue for concert tickets' or 'conformity in the school yard'.

LEARNING ACTIVITY 10.20

Reflection

Comment on the ethical acceptability of conformity studies such as those conducted by Asch, especially the justification for deception.

INFLUENCES ON HELPING BEHAVIOUR

Voluntary helping behaviour for no apparent personal reward is common in everyday life in Australia. People offer directions, collect money for charities and fund-raising appeals, deliver food and clothing to people in need, feed a neighbour's cat when they go on holidays, listen to a friend's problems, mow the lawns of the local school and volunteer their personal time and labour to others in many different ways. Sometimes, people even risk their own health and safety to help total strangers. For example, consider emergency services personnel and volunteers who willingly search for survivors in unstable buildings and rubble after a natural disaster such as a cyclone or an earthquake. Similarly, some people give up their own time, money and other resources to go overseas to provide volunteer aid, often in environments that carry risk to their personal wellbeing.

Psychologists refer to everyday acts of helping others, as well as helping that involves personal cost to the helper, as **pro-social behaviour**. True pro-social behaviour is intentional; that is, the helper deliberately tries to provide assistance. Opening the door for someone who has their arms full of parcels is an example of pro-social behaviour. It doesn't matter whether you voluntarily opened the door or were asked to do it — the intention was to help someone.

If the outcome of behaviour benefits someone, but there was no intention to help, then the behaviour is not considered to be pro-social. For example, suppose that you are driving down a narrow laneway and stop to remove a box that is in the way so you don't damage your car. You place the box on the footpath out of your way and drive off. This action will also benefit other motorists who use the laneway. However, your behaviour is not considered to be pro-social because it was not your intention to benefit other motorists.

In the 1960s and 1970s, numerous research studies were undertaken to identify and better understand factors that influence pro-social behaviour. Many of these studies were prompted by the disturbing case of Kitty (Catherine) Genovese, who was murdered in a New York street in 1964.

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Practical activity — social influence on volunteering

Figure 10.34 Voluntary helping behaviour is pro-social behaviour. (a) Some people collect for a charity or other organisation that helps others. (b) Others travel overseas during a gap year to help more directly by improving educational outcomes for disadvantaged school children.

At around 3 am, after returning home from her work in a bar, Kitty was attacked by a knife-wielding man as she walked across the road from her car to her apartment. Kitty tried to escape, but her attacker caught her and repeatedly stabbed her. Kitty's screams of terror and desperate pleas for help such as 'Oh my God, he stabbed me!', 'Please help me!', 'Please help me! I'm dying! I'm dying!' woke 38 of her neighbours. Many switched on their lights and stood at their windows watching for up to 35 minutes as Kitty struggled with and tried to escape her attacker. Her attacker eventually fled, but only after he had left Kitty to die on the footpath. By most reports, only one of Kitty's neighbours called the police. No-one went to her aid.

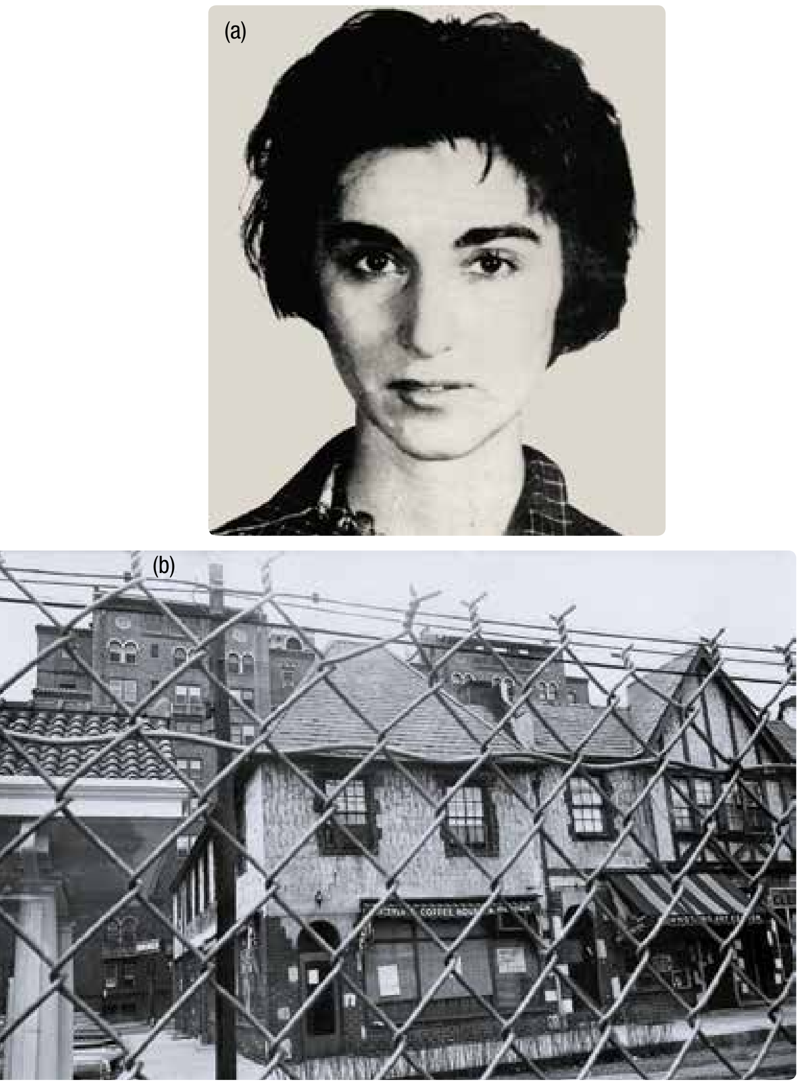

Figure 10.35 (a) Kitty Genovese (b) The street on which Kitty was stabbed to death

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Weblinks

- Video on Genovese 6 m 43 s
- Review of Genovese case 7 m 15 s

Why did the other 37 people apparently do nothing, particularly those who had worked out that Kitty's life was clearly in danger? Are there any circumstances under which someone might have intervened to help Kitty?

On the basis of their research findings, psychologists have identified a number of factors that influence the likelihood of pro-social behaviour occurring. These factors include aspects of the situation in which help is required, social factors involving norms ('rules') that inform us about our obligations to help, and personal factors associated with the individual who has the opportunity to help.

Situational factors

Two researchers who were particularly interested in Kitty's case were American psychologists Bibb Latane and John Darley. In order to understand why so many people failed to help Kitty, they conducted several experiments.

On the basis of their research findings, Latane and Darley (1968) identified three key factors associated with the specific situation that influence whether people will be pro-social and help. These factors involve whether we *notice* the situation, whether we *interpret* the situation as one in which help is needed, and whether we are prepared to take *responsibility* for helping in that situation and consider actually doing something to help. Latane and Darley described these in a series of steps that occur one after the other.

Noticing the situation

If you were walking through a shopping centre with your friends, would you necessarily notice a person who is slumped in front of a store and in need of help? It may be that you are so involved in a conversation with your friends that you do not. Clearly, if you do not notice that there is a situation where help may be required you will not respond in an appropriate pro-social way.

But would you be more likely to notice the person slumped in front of the store if you were walking alone? Research findings indicate that, both in laboratory and real-world (field) experimental settings, when individuals are on their own they are quicker to notice something 'different' or 'unusual' than when they are in a group. A simple, commonsense explanation is that people in a group are more likely to be focused on their interactions with each other than on their surroundings, as compared with when they are alone.

Noticing an incident that is different or unusual and may involve someone in need of help is a necessary first step in making a helping response. However, this is not enough. Once the incident is noticed, the person must then interpret the situation as one in which help is required.

Interpreting the situation

Many situations in which help may be required are ambiguous or unclear. Therefore, people cannot always be sure that a helping response is appropriate or required. For example, if you saw someone slumped against a tree in the middle of the day, as shown in Figure 10.36 below, would you think they were drunk, injured, ill, upset, affected by an overdose of drugs or simply resting? Any one of these interpretations may be correct.

Figure 10.36 How would you interpret this situation? Is the person ill, upset, suffering from a drug overdose or simply resting? Your answer is likely to influence how you might respond to this situation, if at all. You must interpret a situation as one which requires your help. This is the second step in making a helpful response.

Research findings indicate that the less ambiguous the situation, the more likely it is that help will be offered. Conversely, the more ambiguous the situation, the less likely it is that help will be offered. For example, in an experiment conducted by American psychologist Leonard Bickman (1971), female participants sitting alone in a cubicle heard a crash and a person's scream, followed by the reaction of a 'witness' to the apparent accident. Each participant heard one of three types of reactions:

- the accident described by the witness as a certain emergency
- the accident described as a certain non-emergency
- the accident described with uncertainty about whether or not it was an emergency.

When the participants heard the witness interpret the event as a certain emergency, they helped more frequently and more quickly than when the interpretation was uncertain or when the event was identified as a non-emergency.

In another experiment, American psychologists Russell Clark and Larry Word (1972) set up a different emergency situation where there was no ambiguity. In a room adjoining the room in which the participants were located, a 'maintenance worker' who was actually a confederate climbed a ladder, fell off it and pulled the ladder over on top of himself. He grunted loudly and exclaimed, 'Oh my back; I can't move!' He continued groaning with each breath, then he gave a cry for help.

In all conditions of the experiment, whether they were alone or with other participants, 100% of the participants went to the aid of the victim.

In a second experiment, Clark and Word (1974) staged the same fall. However, in this follow-up experiment, they added ambiguity by removing the verbal cues that an injury had occurred; that is, the victim did not say anything or groan after the fall. Under these circumstances, only 30% of the participants helped (Vander Zanden, 1981).

To sum up, in order for helping behaviour to occur in response to an emergency situation, a potential helper needs to first notice the situation, then interpret the situation as one in which help is required. The interpretation can be influenced by other people, particularly the way in which others respond to the same situation. If an individual interprets a situation as one in which a helping response is needed, they must then decide whether they will take responsibility for helping.

Figure 10.37 The less ambiguous the situation, the more likely it is that help will be offered.

Taking responsibility for helping

Though you may notice and correctly interpret a situation as one in which help is required, you are unlikely to intervene and help unless you believe it is your responsibility to do so. For example, if you were at a swimming pool and saw a swimmer calling for help in full view of the lifeguard, you would be unlikely to jump in the water to provide help. Instead, you would probably decide that helping a swimmer in distress is the responsibility of the lifeguard (Baron & Byrne, 1991).

When someone else is nearby in an emergency situation, we may leave the responsibility to help to them, even if we don't interpret them as having the responsibility to help. For example, in the Kitty Genovese murder, most of the neighbours who saw Kitty being attacked and heard her pleas for help accurately interpreted the situation as an emergency, but they failed to help her. Seeing lights and silhouetted figures in neighbouring windows would have made Kitty's neighbours aware that others were also watching.

Darley and Latane (1968) hypothesised that the presence of other onlookers affected each individual's sense of responsibility to take action. Consequently, no-one helped, in the mistaken belief that someone else would take on the responsibility for helping.

Figure 10.38 If you were at this pool and saw a swimmer in need of help you are likely to assume that helping is the lifeguard's responsibility rather than yours.

The bystander effect

Many experiments were subsequently developed to test the hypothesis about responsibility. In one experiment conducted by Latane and Dabbs (1975), 145 confederates 'accidentally' dropped coins or pencils while in a lift. In 1497 journeys in the lift, the confederates were helped 40% of the time when they were in the lift with only one other person and less than 20% of the time when there were six other passengers.

When asked afterwards why they responded as they did, most of the participants who were the only other passenger in the lift referred to their feelings of a personal responsibility for helping. However, only a very small percentage of participants who were in the lift with one or more others indicated any feelings or beliefs of a personal responsibility to offer help.

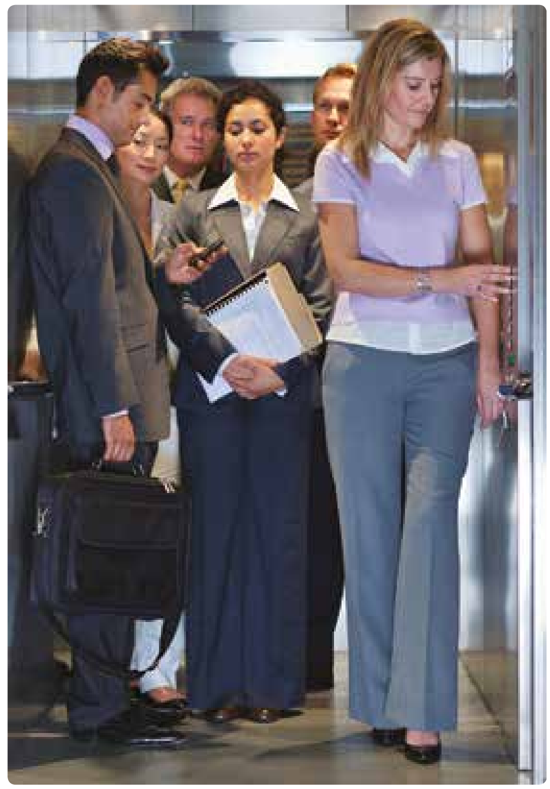

Figure 10.39 In an experiment on helping, Latane and Dabbs (1975) found that the more 'passengers' there were in a lift, the less likely they were to take responsibility for helping another 'passenger'.

The results of this experiment demonstrate what psychologists call the bystander effect. The **bystander effect** is the tendency for individuals to be less likely to help another person in need when other bystanders are present, or believed to be present, as compared to when they are alone. Furthermore, the greater the number of bystanders, the less likely any one of them is to help. The bystander effect indicates that when we are in a situation where help is needed and we know that others are around, we may place the responsibility to help on them.

Would you step in to aid victim of a racist attack?

By Marissa Calligeros

It's about 3 o'clock on a Friday afternoon on a crowded city train.

Two tradies in high-vis work gear are hurling abuse at three Muslim women wearing headscarves. One tells them not to speak their 's---' in Australia. The other says he'll 'f---ing smash' them.

Had you been there, would you have intervened?

Experts would suggest not.

The reason for people's inaction lies in the 'bystander effect', a theory that predicts the more people who are present when someone is in distress, the less likely anyone is to help.

People are often too shocked, too scared, or too indifferent to act when someone else is in trouble, or they think someone else will, the theory suggests.

According to a 2013 VicHealth survey, one in four people do not feel supported enough to speak up or step in when someone else is being racially abused. The 'bystander effect' relates to a diffusion of responsibility, said Dr Naomi Priest, leader of the Anti-Racism and Diversity Studies Program at the University of Melbourne.

'People are much more likely to intervene if there are few, or no other witnesses, than if there are lots.'

On Friday, May 15, the train had left Melbourne Central station when the tradesmen began abusing the women, telling them their headscarves should not be worn in Australia. It was only when the tradesmen threatened to 'f---ing smash' the women, that Jason Cias stepped in.

'I said to the guy, "Mate, they're women",' Mr Cias said.

He said he was told to mind his own business, before he was punched in the face.

The escalation of violence prompted dozens of other commuters to intervene, said witness Katie Parker, who filmed the incident on her mobile phone.

'When it appeared to be getting physical, that's when people started looking for the emergency button,' she said.

Mr Cias said he understood why others did not step in with him.

'You hear one terrible story about something being done to someone for stepping in and you assume that's going to happen to you.

'You always have to be aware of your safety, but it's a matter of weighing up your own sense of what's right.'

Source: Calligeros, M. (2015, May 28). *The Age*, pp. 12–13.

LEARNING ACTIVITY 10.21

Review questions

1. (a) Define the meaning of helping behaviour.
(b) A police officer arrives at the scene of a minor car accident during peak hour and immediately takes action to redirect traffic away from the accident. Although the police officer is 'doing their job', is their behaviour pro-social? Explain your answer.
(c) Give an example of a helping behaviour that is pro-social, and which is different from those in the text.
(d) Give an example of a helping behaviour that probably would not be considered pro-social, and which is different from those in the text. Explain why your example would not be considered pro-social behaviour.

2. (a) Explain the meaning of the term situational factor in relation to the occurrence of pro-social behaviour.
(b) Briefly describe three features from a situation in which help may be required that may lead an individual to notice that situation.

3. (a) Explain how an individual's interpretation of an incident can increase the likelihood of their helping.
(b) State two factors that influence an individual's interpretation of an incident.
(c) Identify the operationalised independent and dependent variables in the experiment conducted by Bickman (1971) to investigate interpretation of a situation.

4. (a) What key factor can influence an individual's decision to take responsibility for helping after noticing and interpreting that help is required?
(b) Identify the operationalised independent and dependent variables in the experiment conducted by Latane and Dabbs (1975).

5. (a) What is the bystander effect?
(b) In what way can the presence of others affect our taking responsibility for helping?

eGuide*plus*

Practical activity — influence of the number of bystanders on helping

LEARNING ACTIVITY 10.22

Media analysis/response

Read the newspaper article on page 527 about helping a victim of a racist attack, and answer the following questions.

1. How accurate is the description of the bystander effect?
2. Does the bystander effect explain reluctance to help by most of the passengers who witnessed the incident? What other factors may be relevant?

Social factors

Often we help others because we believe that we *ought* to help; for example, we *ought* to return a lost wallet that we find and we *ought* to help a new student find their way to a classroom. In such cases, our desire to help is influenced by social norms. **Social norms** are standards that govern what people should or should not do in different social situations (Cialdini & Trost, 1998). Although social norms are often not written down or explicitly stated, they are known ways of behaving in particular social groups or cultures, or society in general.

We learn about the social norms for our culture or wider society by observing what other people say and do. In most cultures and societies, there is a norm which specifies that to be selfish is wrong and to be helpful is right. Furthermore, in most cultures and societies it is expected that we do what we can to help other people (Malim, 1997). Two social norms that can influence us to help are the reciprocity norm and the social responsibility norm.

Reciprocity norm

The reciprocity norm is based on the *reciprocity principle*, an unwritten rule that we should give what we receive or expect to receive. The word 'reciprocal' means to give mutually and the saying 'Do unto others as you would have them do unto you' reflects the reciprocity principle.

In accordance with the reciprocity principle, the **reciprocity norm** prescribes that we should help others who help us. For example, if you help a friend with their maths homework, you would expect them to return the favour and assist you with maths or another subject when you need help. This expectation is both reasonable and socially acceptable.

Similarly, if you take a photo of a tourist using their camera if they ask you for that help, then you would reasonably expect that they would do the same for you if you were alone and in need of that help.

To receive without giving in return goes against or breaks the reciprocity norm. This is especially the case if the initial help is given voluntarily and involves some sacrifice (Gross & Latane, 1974). Although the type of help that is reciprocated can vary to some extent, it is not expected that it vary too much in scope or amount. For example, if you help a friend by applying sunscreen to their back when at the beach, it is expected that they could do the same in return, but not necessarily help you move all your furniture to a new home the next day.

For a variety of reasons, some people are unable to reciprocate when they have been helped. For example, children, very old people and disabled people are often unable to give as much help as they receive. In such cases, the social responsibility norm influences us to help.

Figure 10.40 The reciprocity norm means that if someone gives you a helping hand, you would do the same in return.

Social responsibility norm

The **social responsibility norm** prescribes that we should help those who need help because it is our responsibility or duty to do so. For example, if you stop to assist someone who asks for directions, give up your seat on a bus to someone on crutches or help a lost child find their parents on a crowded beach, your helping behaviour is likely to have been influenced by the social responsibility norm. As a member of a community and wider society, we learn and are led to believe that it is our duty or responsibility to help those in need, without any expectation that this help will be reciprocated (or returned or rewarded).

It seems, however, that we are selective in the way we apply the social responsibility norm. For example, if someone needs assistance because they are a victim of circumstances such as fire, flood or burglary, and they have not been responsible for bringing about their hardship, then we are more likely to help and be generous in our help (Meyer & Mulherin, 1980).

This is demonstrated by the generosity of the Australian public with their donations to support victims of natural disasters that seem to occur annually throughout the country, such as bushfires in the south and floods in the north. People directly affected by these events are perceived by the public as being victims of circumstances outside their control. Consequently, the social responsibility norm is a significant influence in motivating this type of helping behaviour.

If, however, we believe that someone in need of assistance is in some way responsible for bringing about their own problems, for example, by their laziness or poor judgment, then we are less likely to help them or we are unlikely to help them as much as we could. We tend to justify this by reasoning that 'they are in need of assistance because of problems they created themselves'.

Figure 10.41 (a) The social responsibility norm is demonstrated when helping a total stranger with directions. (b) This norm can influence us to help other strangers who are victims of circumstances outside their control, as shown by these volunteers helping clean up flood damage in Brisbane.

LEARNING ACTIVITY 10.23

Review questions

1. (a) What are social norms?
   (b) What is the social norm for helping in Australian society?
2. (a) Define the reciprocity norm in relation to helping, using an example different from those in the text.
   (b) Give two examples of when someone might ignore the reciprocity norm to help.
3. (a) Define the social responsibility norm in relation to helping, using an example different from those in the text.
   (b) Under what circumstances might someone ignore the social responsibility norm to help?
4. For each of the following examples of helping, identify whether the reciprocity norm or social responsibility norm is more likely to be involved:
   (a) helping a friend choose an outfit for a school formal
   (b) collecting money for the Royal Children's Hospital Good Friday Appeal
   (c) helping a visually impaired person to find the door button or handle in a train carriage
   (d) buying raffle tickets for someone's sporting team hoping that they might subsequently buy raffle tickets from you
   (e) buying chocolates for a school fund-raising appeal after realising that you are hungry.

Personal factors

Every year, many Australians are recognised for their helpful contributions to the community beyond what might ordinarily be expected, by being named as a recipient of an Australia Day honour. Some people also receive bravery awards for risking their lives through acts of heroic helping. Do these people have specific personal characteristics that make them more likely to help others?

While research on this topic has been limited, there is empirical evidence that suggests various personal factors can influence pro-social behaviour demonstrated through helping. Such factors include our ability to empathise with others, the mood we are in when help is needed and whether we feel competent to give the help that is required.

Empathy

We are more likely to help someone in need of help if we feel empathy for them. **Empathy** is the ability to identify with and understand another person's feelings or difficulties. Empathic people tend to feel the distress of others, feel concern for them, and can imagine what it must be like to be in need of help. When we empathise with someone, we usually want their suffering to end and this can be a powerful motive for us to help in some way (Batson, 1991, 1995).

Figure 10.42 The more distressed and upset bystanders become when observing someone who appears to be distressed, the more likely they are to help.

Research findings indicate that, in an emergency situation where people appear to be in distress, the more distressed and upset bystanders become from observing the distress experienced by others, the more likely they are to provide help (Dovidio, 1984; Schroeder et al., 1995).

American psychologist Daniel Batson has conducted many experiments on the influence of empathy on helping behaviour. In one experiment, Batson and his colleagues (1997) asked 40 male and female university students who volunteered to be participants to listen to a pre-recorded interview with a female student.

In the interview, the student described how both of her parents had been killed in a car accident and that she now had the responsibility of caring for her younger brother and sister. She wanted to remain at university, but because she had no money, she was considering either leaving university or having her siblings adopted.

Before hearing the story, half of the participants in the experiment received background information about the female student designed to promote empathy for her. The other half of the participants were not given any background information on the female student.

Later, all the participants were asked if they would help raise money to assist her. Batson and his colleagues were interested in whether the participants who heard the empathy-promoting background information would be more likely to help than those who had not heard it.

As evident in Figure 10.43 below, the results showed that those participants who heard the empathy-promoting background information offered to help more than those who had not heard this information (Batson et al., 1997).

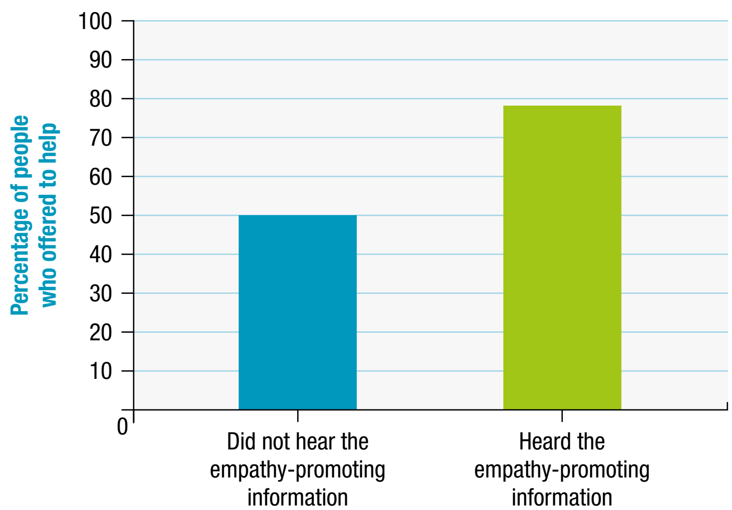

Figure 10.43 Results of the experiment by Batson et al. (1997). Those participants who heard the empathy-promoting background information were more likely to offer help than those who did not hear the empathy-promoting information.

Batson (1995) believes that empathic people may help others in distress for *egoistic* or 'selfish' motives, as well as purely helpful, 'selfless' motives (which he calls *altruistic*). For example, when we feel distressed about someone else's distress, we are motivated to do something to relieve or 'get rid of' our own unpleasant feelings of distress. One way of doing this is to help the distressed person. In some cases, people may deal with their distress in another way. They get rid of their unpleasant feelings by leaving the distressing situation. However, Batson (1981) has also conducted research which found that 'out of sight' does not necessarily mean 'out of mind'. When empathic concern is high, most people will help regardless of how easy it is to leave the situation.

LEARNING ACTIVITY 10.24

Analysis of research by Batson et al. (1997) on empathy

Prepare a flow chart to summarise the experiment on empathy conducted by Daniel Batson and his colleagues (1997).

The flow chart should include the key features of the experiment and the procedures involved, presented in a logical sequence — for example, an aim, a possible research hypothesis, the operationalised independent and dependent variables, the experimental and control groups, results, a conclusion and ethical considerations in conducting the experiment.

Mood

Are we more likely to help someone if we are in a good mood or a bad mood? For example, do you believe that you would be more likely to help someone just after finding out that you achieved an A+ for an important exam? What if you just had a huge fight with your best friend? Would you be more or less likely to help a stranger who asked for your assistance at that time?

Commonsense suggests that we will be more likely to help when in a good mood and less likely to help when in a bad mood. Generally, the results of research studies also indicate that a good mood increases helping, whereas a bad mood will sometimes increase and sometimes decrease helping behaviour.

Many studies have found that people are more likely to help when they are feeling good. These studies typically create a mood-lifting experience for participants, such as finding money, imagining a holiday in Hawaii, being successful on a specific task or reading pleasant, positive statements about themselves. The researchers then observe whether or not participants demonstrate helping behaviour when given the opportunity to help.

In one experiment, a researcher made a phone call to 42 people who, in the previous 20 minutes had been given a gift of stationery by a research assistant who went from door to door. The researcher pretended that she had dialed a wrong number and asked each recipient of the gift to pass on a message as she had used the last of her money.

The results indicated that the preparedness of people to pass on a phone message increased to around 95% during the five-minute period immediately after they received the gift. However, the effect of the good mood gradually wore off, and by 20 minutes after receiving the stationery, the experimental group did not differ from the control group. Of the control group (those who did not receive a gift), only 10% were prepared to help by passing on a message (Isen, Clark & Schwartz, 1976).

Generally, happy people tend to be helpful people, irrespective of what has caused the good mood (Salovey, Mayer & Rosenhan, 1991). However, the good mood effect on helping tends not to last very long (Isen, Clarke & Schwartz, 1976).

Figure 10.44 Happy people tend to be helpful people.

Because helping makes us feel good, people sometimes help in order to stay in a good mood. People may also help in order to escape from a bad mood. Consequently, people who feel guilty are often helpful people.

For example, suppose that an acquaintance from school invites you to their holiday house for the weekend. You know this person has very few friends so you agree to go. However, on Friday afternoon you are invited to a party where all of your close friends will be. You text message your acquaintance with the excuse that your father has been taken to hospital so you cannot go away. You go to the party, and while you are out, your acquaintance rings your house to ask how your father is. Your father answers the phone and tells your acquaintance that he is perfectly well and that he has not been in hospital. When you find out what has happened, you are guilt-ridden and do not know how you will face this person at school on Monday.

Research findings have consistently found that many people will do whatever they need to in order to rid themselves of their guilt and restore positive feelings about themselves. For example, they may try to deal with their guilt by confessing, making negative comments about a person who made them feel guilty or they may repay the bad deed that caused guilt with a good deed.

When given a chance to help a person to whom they had just lied, participants in one research study offered to help for a mean time of 63 minutes, compared with a mean time of two minutes by participants who had not lied and therefore felt no guilt. Our apparent eagerness to make up for a wrongdoing may reflect both the need to reduce our private guilt and the desire to restore the view others have of us.

Psychologists believe that the positive influence of mood on helping behaviour results from a number of interrelated factors. Helping can soften a bad mood and maintain or promote a good mood. For example, a good mood, which usually develops from positive experiences such as receiving a gift or winning something, brings about positive thoughts. In turn, positive thoughts enable us to feel good about ourselves, and feeling good about ourselves makes us more likely to help others (Kassin, Fein & Markus, 2008).

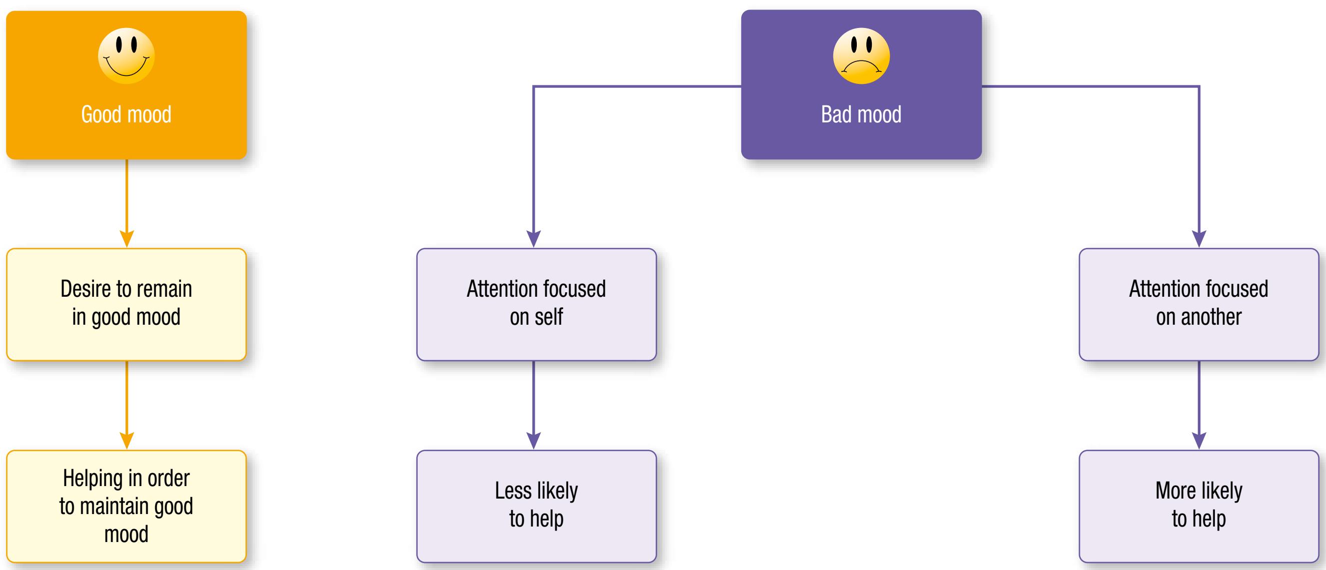

Figure 10.45 The effects of mood on helping. A good mood usually increases the likelihood of helping, whereas a bad mood can either increase or decrease the likelihood of helping.

Competence

Suppose that you are holidaying beside the Murray River and observe a swimmer in the middle of the river calling out for help as they are swept downstream. You have noticed the situation, have correctly interpreted it as one in which help is required and have also accepted responsibility for helping. You quickly look around and realise that there is no-one else around. Would you help by diving into the river and trying to reach the person in distress?

If you did not know how to swim, you would be extremely unlikely to do this. You would probably realise that diving into a river to rescue someone if you are not a strong swimmer could lead to your own drowning as well as that of the other person. If, however, you were a strong swimmer and had been trained in lifesaving skills, you would be much more likely to help, even if other bystanders were present (Baron & Byrne, 1991).

Figure 10.46 What would you do if you saw someone in this situation? Does your decision depend on whether you are a strong swimmer?

Clearly, we can't help someone if we do not have the skills required or do not know how. Consequently, our actual or perceived ability to help can influence whether or not we help in a specific situation, as well as the type of help we may offer. In the example described previously, if you were not a competent swimmer, you might not dive into the river, but you may try to help by calling for or running to find someone else who could.

Research findings indicate that people with abilities or training that are relevant to a situation in which help is required are more likely to help. Furthermore, relevant training makes help not only more likely to be offered, but also more likely to be effective.

For example, in one experiment, researchers staged an emergency in which someone was bleeding. Participants who had Red Cross first aid training were most likely to help the 'victim' directly by applying pressure to the wound. Untrained participants were equally likely to help in this obvious emergency, but indirectly; for example, they phoned for an ambulance (Kassin, Fein & Markus, 2008; Smith & Mackie, 2000).

In another experiment, American social psychologist Robert Baron (1972) found that when a person was in obvious pain, and the bystander knew that their response could relieve the person's suffering, then, the greater the pain, the more quickly the bystander responded. Conversely, Baron also found that when the bystander believed that they could not reduce the person's pain, the greater the apparent pain, the more slowly the bystander responded.

These findings suggest that when someone needs help and there is clearly something we can do about it, we tend to act quickly (especially when the victim is suffering). However, if we believe there is nothing we can do to help, we are less likely to offer assistance (Aronson, 2008).

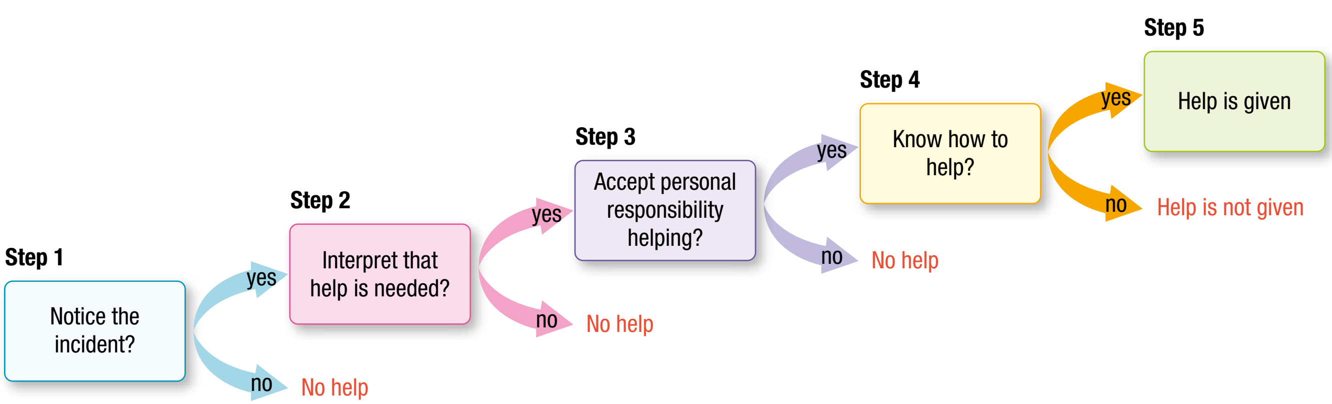

Figure 10.47 The five-step decision making process for helping behaviour. If the answer is yes at each step, help is given. If the answer is no at any step, help will not be given.

BOX 10.5 Altruism

Sometimes, pro-social helping behaviour such as voluntary work for the disabled, donating money to the Salvation Army Red Shield Appeal, or participating in the Lort Smith Pet Therapy program by taking your dog to visit sick or elderly people is labelled as altruism. Altruism is a specific kind of pro-social behaviour where the motive to help is totally selfless. *Altruism* refers to pro-social behaviour focused on the wellbeing or benefit of others without any thought to personal gain or reward (Batson, 1998).

Suppose, for example, that you donate $10 to someone collecting money for homeless street kids. While you are keen to help the street kids, you also want to impress a friend with your generosity and apparent concern for others less fortunate than yourself. Because this behaviour involves an intention to help, it is an example of pro-social behaviour. However, it is not an example of altruism, because altruism involves no personal gain, reward or benefit.

Figure 10.48 This firefighter risked his life to enter a fire in an apartment block to rescue the person in his arms. Is his behaviour altruistic?

Some psychologists have argued that altruism also differs from ordinary helping behaviour in that it involves an element of personal risk — that an altruistic act is one in which no conscious thought is given to one's personal wellbeing or interests, even placing the survival of another person ahead of one's own survival.

Consequently, 'genuine' altruism would be demonstrated by a passer-by who, for example, puts themself at risk by running into a blazing house to rescue a stranger trapped inside. If the element of personal risk is added to the definition of altruism, and the person is not taking that risk as a part of their normal job (such as emergency services personnel do), then examples of altruism are relatively rare.

Most psychologists adopt the more conventional definition of altruism referred to previously — that altruism is helping behaviour which is not motivated by personal gain or reward, but does not necessarily involve an element of personal risk. However, there is still considerable debate about whether 'genuine' altruism actually exists.

There is some research evidence to suggest that some people may be genuinely altruistic. For example, in one study, people who had the opportunity to walk away without helping from a distressing situation they had observed with others, or who were offered rewards *not* to help, still chose to help someone in distress (Batson & Moran, 1999).

American psychologist Daniel Batson (1995), who has also extensively studied altruism, believes that sometimes people are truly altruistic and their focus is solely on the welfare of others with no consideration of themselves. The opposing view proposes that all instances of helpfulness have an underlying selfish explanation, even if it doesn't seem obvious.

LEARNING ACTIVITY 10.25

Review questions

1. (a) What does research evidence suggest about the relationship between an individual's level of empathy and their likelihood to help?
   (b) Why are empathetic people more likely to help someone who is in need of help?
2. (a) How does an individual's mood affect the likelihood of their helping? Ensure that you refer to both good mood and bad mood.
   (b) Name one experiment designed to study good mood and one experiment designed to study bad mood. For each experiment, identify the independent and dependent variable.
3. (a) Explain how an individual's view of their competence to help in a specific situation can affect the likelihood of their helping.
   (b) Construct a diagram similar to that in Figure 10.45 on page 532 to summarise the effect of perceived competence on helping.
4. Rasheen is 'on a high' as she has just bought the dress she has been saving for and it was unexpectedly on sale. On her way to the shoe store, she notices a girl about her own age sitting up against a shop window on the footpath with a small sign and a box requesting money to help her buy a ticket to visit her family in Sydney. She believes that the girl is probably a 'street kid' who may have made some 'wrong decisions' in her life, possibly like Rasheen's childhood friend who turned to drugs when he hooked up with the 'wrong crowd'.
   How likely is it that Rasheen will drop some money into the girl's box? Explain with reference to the three key personal factors that can influence helping behaviour.

LEARNING ACTIVITY 10.26

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Word copy of table

Summary of factors that influence helping

Complete the table below to summarise key factors that influence the occurrence of helping.

Factor	Description
Situational – Noticing – Interpreting – Taking responsibility	
Social norms – Reciprocity norm – Social responsibility norm	
Personal – Empathy – Mood – Competence	

INFLUENCES ON RELUCTANCE TO HELP

When so many people failed to help directly or seek help while watching the Kitty Genovese incident, psychologists were interested to discover not only those factors that lead someone to help, but also those factors that prevent someone from helping.

Among the many factors that influence someone to provide help are those to do with the specific situation in which help is required (situational factors) and those to do with the person who has the opportunity to help (personal factors).

These factors can also explain why someone may be reluctant to provide help when help is required. For example, a person obviously will not help if they do not notice a situation in which help is required. Nor will they help if they fail to interpret the situation as one requiring their help or if they do not see themself as being competent to help. Therefore, understanding the situational and personal factors that lead people to help also reveals the circumstances under which people might not help.

Many other factors have been identified through research studies to explain why people are reluctant to help or do not provide help even when they have the opportunity to do so. Two factors involve social influence — the effects of the real or imagined presence or actions of others.

Diffusion of responsibility

The presence of other people can influence our decision about whether helping is our responsibility or not. People often fail to help when others are around because of the diffusion of responsibility across all the people who are present. **Diffusion of responsibility** is the belief that, in a situation where help is required and others are present, one or more other people will or should take responsibility for helping.

When other people are present, responsibility is divided up or spread ('diffused') across the whole group. This leads each individual to feel less responsible for helping than when alone because they assume that someone else will take on the responsibility of helping. Thus, diffusion of responsibility helps explain why no-one helps when many people are present in a situation where help is required.

As occurs with the bystander effect, the fact that there are a lot of other people around actually *decreases* the likelihood that any one person will help (Aronson, 2008). In the Genovese murder, the responsibility for helping may have diffused across all 38 neighbours who witnessed the event. Ultimately, responsibility diffused to the level where only one person felt any personal responsibility to act.

Figure 10.49 The more people around when help is required, the less likely it is that an individual will help.

BOX 10.6 Research on failure to help due to diffusion of responsibility

An experiment conducted by Darley and Latane (1968) examined diffusion of responsibility as an explanation of the failure to help in the presence of others. There were 72 university students (59 female, 13 male) who participated in the experiment. Participants were placed alone in separate rooms but were able to communicate with each other via an intercom. Thus, the participants could hear but not see one another.

The experimenters then staged a simulated (fake) epileptic seizure emergency by playing a tape recording of a person experiencing convulsions. Participants were led to believe that the person having the epileptic seizure was in an adjoining room.

Three experimental conditions were compared:

- Condition 1: each participant was led to believe that they were the only one whose intercom was tuned in during the seizure. That is, the participant was alone with the victim (in a two-person group).
- Condition 2: participants were led to believe that two others were also tuned in (a three-person group).
- Condition 3: each participant was led to believe that five others were tuned in (a six-person group).

As shown in Figure 10.50(a), participants who believed they were the only ones who could hear the victim, and therefore believed that they had complete responsibility for helping the person, were more likely to attempt to help in some way. Those who believed that other people also heard the victim were less likely to help. The more people believed to be available to help and therefore sharing the responsibility to help with others, the less likely any individual was to help.

In addition, as shown in Figure 10.50(b), those who did attempt to help waited longer to do so as the number of people who heard the victim increased. Help was measured by recording the time from the beginning of the seizure until the participant left their room to help in some way. If no participant attempted to help, the experimenters waited six minutes before ending the experiment.

Afterwards, all participants were asked to complete a questionnaire on their thoughts and feelings during the emergency, as well as tests designed to measure personal characteristics such as sociability and social responsibility. Furthermore, all participants were debriefed and given support to deal with any stress or negative emotions they might have experienced during the experiment.

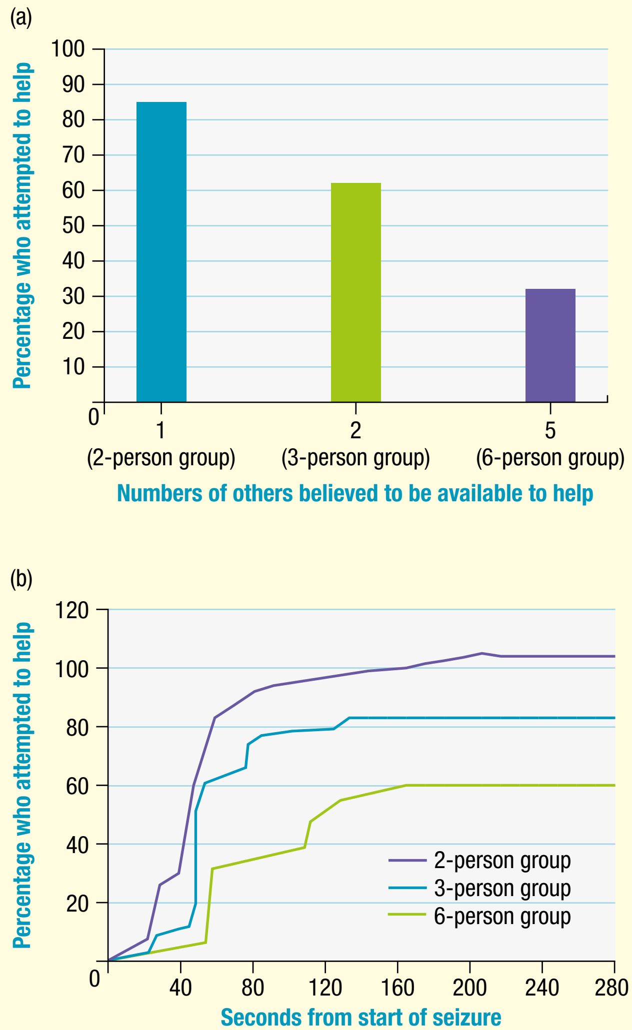

Figure 10.50 Results of Darley and Latane's 1968 experiment (a) Participants were more likely to help if they believed they were the only person who could hear the victim and therefore available to help than if they believed other people also heard the victim. (b) People who helped waited longer before attempting to help as the number of people who heard the victim increased.

LEARNING ACTIVITY 10.27

Review questions

1. (a) Define the meaning of diffusion of responsibility, with reference to a situation in which help is needed.
   (b) Explain how diffusion of responsibility can influence someone to not help when help is needed.
2. Explain each of the following situations in terms of diffusion of responsibility.
   (a) A local primary school sends out a notice asking parents to volunteer for a 'working bee'. Most parents receive the notice but no-one turns up for the working bee.
   (b) In a firing squad, one of the shooters is randomly assigned a gun or rifle containing a blank bullet. All shooters fire their weapon simultaneously but no individual shooter knows whether they fired the fatal shot.

LEARNING ACTIVITY 10.28

Analysis of data from research on diffusion of responsibility

Read the research in Box 10.6 on page 537. Consider the procedure used by Darley and Latane (1968) to study diffusion of responsibility and the variables which were tested, and then complete the following tasks.

1. In relation to Figure 10.50(a), describe the relationship between the percentage of people who attempted to help and the number of other people believed to be available to help.
2. Based on the results shown in Figure 10.50(b), what conclusion can be drawn about the time taken to help when one or more others are believed to be available to help?
3. Explain what the results indicate about the cause–effect relationship between the variables that were tested.
4. What conclusion can be drawn about diffusion of responsibility?
5. To what extent can the results be generalised?

Audience inhibition

As well as diffusing responsibility for helping to the point that no-one helps, the presence of other people can influence people not to help in other ways. People may stand back and not do anything to help because they don't want to embarrass themselves or feel foolish, especially if it turns out that help is not actually needed or there is no emergency.

The presence of others at the scene provides an *audience* and this increases the chance of being embarrassed or feeling foolish. Consequently, these aspects of the situation can *inhibit*, or prevent, someone from helping.

This reason for failing to help is called **audience inhibition** — not helping another person because of a fear of appearing foolish in the presence of others. Audience inhibition typically leads bystanders to keep calm in an emergency and check to see how others present are reacting. The problem is that if people observe that everyone else is keeping calm they will conclude that no-one else is concerned or upset and therefore help is not needed (Smith & Mackie, 2000).

This explanation of the reluctance of anyone to help when given the opportunity to help was also tested by Latane and Darley in what has become known as the 'smoke-filled room experiment'.

The 'smoke-filled room' experiment

Latane and Darley (1968) used 60 male university students as participants. All were asked to complete a questionnaire in a small room that had a one-way mirror for observation purposes. Each participant was either alone in the room or in the same room with two other people.

The experiment had three conditions that differed by number and type of people who were in the room:

- Condition 1: a participant was in the room alone
- Condition 2: one participant was in the room together with two confederates who had been instructed to not react when help was needed
- Condition 3: a group of three participants were in the room together and all three were 'true' participants.

While participants in the three experimental conditions were completing the questionnaire, a staged emergency occurred where smoke was gradually pumped into the room through an air vent in the wall. The smoke was clearly visible and had a faint odour, but was not harmful. The experimenters observed the participants through the one-way mirror for the next six minutes and recorded how much time passed before the smoke was reported. For the entire experimental period or until a participant took action, smoke continued to flow into the room. Enough smoke had flowed into the room after four minutes to obscure vision.

Of the participants who were alone in the room (condition 1), 50% left the room to report the smoke within two minutes and 75% had reported the smoke within 3½ minutes. In contrast, 62% of the participants in the room with two other people (conditions 2 and 3), continued filling out the questionnaire throughout the entire six-minute period, even though the room was completely filled with smoke.

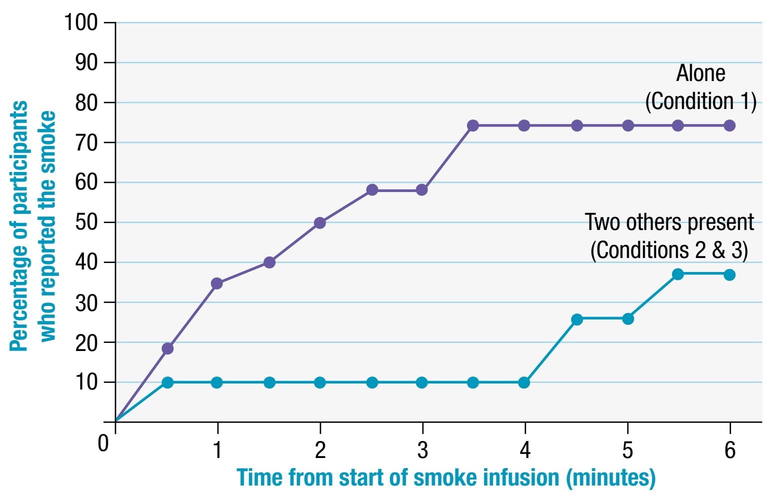

Figure 10.51 Results from the Latane and Darley (1968) experiment. When alone in a room filling with smoke, participants were more likely to report the smoke than when others were present.

When interviewed after the experiment, many participants reported that when they were in the room with two others, although they were concerned about the smoke initially, they didn't want to embarrass themselves or appear foolish by looking too anxious, so they tried to remain calm. Furthermore, participants noticed that the others appeared calm and unconcerned about the smoke. This led them to interpret the smoke as harmless, deciding that it was steam or a problem with the air conditioning. Reassured that there was no cause for concern by the lack of an obvious response by the others, each participant ignored the situation and continued completing the questionnaire.

Thus, each participant's interpretation of the situation was influenced by their perception of the other people's responses and their audience inhibition. More specifically, each participant's lack of response influenced other individuals to do nothing. In contrast, when in the smoke-filled room alone, once the individuals noticed the smoke, many hesitated only briefly before investigating its source and reporting it.

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Weblink
Video on smoke-filled room experiment 2 m 7 s

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Latane and Darley outline the smoke-filled room experiment 3 m 52 s

Cost–benefit analysis

Suppose you had a close friend with kidney failure who was required to spend a great deal of time in hospital on a dialysis machine to prevent them from dying. A kidney transplant would enable them to resume a normal lifestyle and avoid the regular hospital visits. If they asked you to donate one of your kidneys (assuming you could do so), what would you do?

In making the decision about whether to help, you might weigh up the 'costs' of donating (considerations about your own health, risks of an operation, time, disruption to your own life) against those of not donating (guilt, disapproval from others). You may also consider the 'benefits' of donating (feeling good about helping someone, time off school), compared with not donating (no interruptions to your own life, no pain or anxiety). If you went through this process in deciding whether or not to donate a kidney, and therefore to help or not, you would have undertaken a cost–benefit analysis.

A **cost–benefit analysis** involves an individual weighing up the personal and social costs of helping against the benefits of helping. *Benefits* of helping are like rewards. For example, depending on the type of help required, they may include an actual monetary reward or rewards such as the gratitude of the victim, help in return (reciprocity), feeling good and an increase in self-esteem, or social approval through the cheers from a crowd of onlookers or the thrill of making the evening news. *Costs* may include the effort and time required to help, risks such as personal injury, feeling bad (guilt or embarrassment), worsening the situation or loss of resources such as damaged clothing and missing an important appointment that may have led to a job.

While we probably do not consciously work through a formal cost–benefit analysis each time we are confronted with a choice about whether to help someone or not, if the anticipated costs of helping outweigh the benefits, we are less likely to help; if not, we are more likely to help.

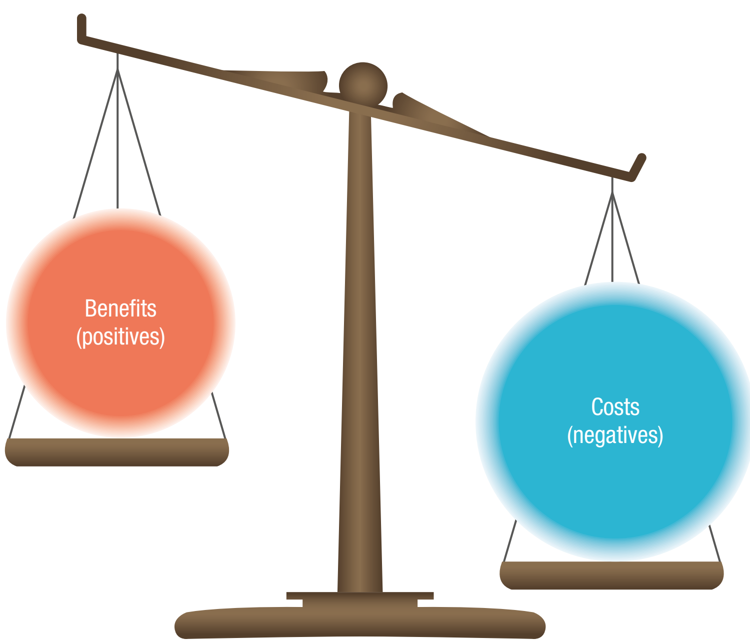

Figure 10.52 We are less likely to help when the anticipated costs of helping outweigh the benefits.

BOX 10.7 Gender and helping behaviour

Commonsense suggests that males are more likely to help females than to help other males and that females are more likely to help other females than males. However, research findings indicate that when it comes to helping others, it is not simply the gender of the helper or the recipient that determines whether help will be given or received. It is the combination of the gender of the helper, the gender of the recipient and the specific situation that determines whether help will be given.

American psychologists Alice Eagly and Maureen Crowley (1986) analysed research studies on helping behaviour that compared the help received by male and female victims. They found significant trends in helping behaviour based on gender.

When the helper was female, female and male victims were equally likely to receive assistance. However, when the helper was male, females were more likely to receive assistance than males, even when the females were strangers.

The type of help that was required also influenced whether help was received. Males were more likely to help a female if the female was alone and perceived as being 'helpless' or in 'distress'; for example, when she was seen to be a victim of circumstances outside her control, such as having a broken-down car or having her handbag stolen.

Some psychologists have suggested that the willingness of male helpers to 'rescue' females in need may be motivated by something other than a genuine desire to help and that cost–benefit analysis may more accurately explain why they help. This is consistent with the research finding that men tend to help attractive women more often (Stroufe et al., 1977).

The results of studies on gender and helping need to be considered in their historical and socio-cultural contexts. Generally, in western societies and cultures, females not only receive more offers of help in certain situations, they also tend to seek help more readily than males. For example, research studies have found that, they are twice as likely to seek medical help, welcome help from friends more readily and are more likely to seek psychotherapy or counselling. Perhaps help-seeking behaviour is more socially acceptable for females in many cultures within our society than it is for males? Perhaps some males in our society grow up believing it is their role to protect females, hence they are more willing to take on a helping role when the person in need of help is female? (Eagly, 2009; Eagly & Crowley, 1986)

Figure 10.53 A male's willingness to assist a female who needs help may be motivated by many different factors.

LEARNING ACTIVITY 10.29

Review questions

1. (a) Explain the meaning of audience inhibition and how it can make someone reluctant to help.
(b) Give an example of when you (or someone you know) have experienced audience inhibition.
(c) What do audience inhibition and diffusion of responsibility have in common when considered as factors that influence people not to help?

2. Describe the results shown in Figure 10.51 on page 538.

3. (a) What does cost–benefit analysis mean in relation to helping?
(b) Describe a cost–benefit analysis that may occur when deciding whether or not to help a friend with their homework.

4. Using a flow chart format or another type of diagram, explain how a cost–benefit analysis can
(a) make someone reluctant to help
(b) result in helping.

LEARNING ACTIVITY 10.30

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Word copy of table

Summary of factors that influence reluctance to help

1. Complete the table below to summarise key factors that influence someone not to help.

Factor	Description
Social influence – Diffusion of responsibility – Audience inhibition	
Cost–benefit analysis	

2. Refer to factors that influence someone to help. Which factors could be included in the table above? Give a reason for your choice of each factor.

BULLYING

The problem of bullying has been of considerable research interest in recent years, both in Australia and throughout many other countries. Research findings show that about 1 in 4 Australian students are being bullied 'every few weeks or more often', 1 in 7 children are cyberbullied often and 13.5% of students report having lies spread about them at school (National Centre Against Bullying [NCAB], 2017a).

Of course, bullying does not only occur in schools. Bullying can occur in any environment, in any culture or society. It may occur at home, in the street, in a playground, in the workplace, in a hospital, in a prison or anywhere else where people are in a group or can interact. A bully may be an individual or a group, male or female, an adult, adolescent or child, an employer or employee, a teacher or a student, a team mate, the captain or the coach.

Of particular concern to psychologists, educators and the community in general is bullying by students in both primary and secondary schools. Research findings indicate that bullying impacts on the perpetrator, the victim and bystanders.

Young people who bully over time are more likely to engage in ongoing anti-social behaviour and criminality, have issues with substance abuse, demonstrate low academic achievement and be involved in future child and spouse abuse (NCAB, 2015)

Furthermore, as you might expect, students who are victims of bullying are less happy at school than students who are not victims. Victims of bullying also tend to have lower levels of self-esteem and increased feelings of worthlessness and hopelessness. These negative feelings can continue outside the school and through to adult life.

Research findings also indicate that bullying can have far-reaching effects within a school. Bullying can create a climate of tension and intimidation in which students feel threatened and unsafe. Victims of bullying usually spend a great deal of time feeling anxious and worried. These feelings of anxiety and worry can spread across a year level or the entire school. Those who are not victims and see someone being bullied or know that it is happening at school can become distressed, often thinking that they may become victims too.

What is bullying?

Bullying has been defined in many different ways but there are some key elements common to all these definitions. They all suggest that bullying is a type of aggressive behaviour that involves the inappropriate use of power over another less powerful person or group, and is generally repeated over time.

More specifically, **bullying** occurs when an individual or group with more power repeatedly and intentionally causes hurt or harm to another person or group of people who feel helpless to respond. Bullying may be physical or psychological in nature and the consequential hurt or harm may include distress or fear (NCAB, 2017b).

When bullying occurs, there is an *imbalance of power,* with a more powerful person or group attacking a less powerful one who is unable to defend themselves adequately. This power imbalance is sometimes very obvious, such as when a bigger and stronger person bullies a much smaller, weaker one, or when a group of people bully an individual. However, bullying can often be much less obvious, such as when the difference in power is psychological (Rigby 2014). For example, knowing something about someone who desperately doesn't want this information known by anyone else can be a source of psychological power for the person who knows the information over the person who doesn't want anyone else to know.

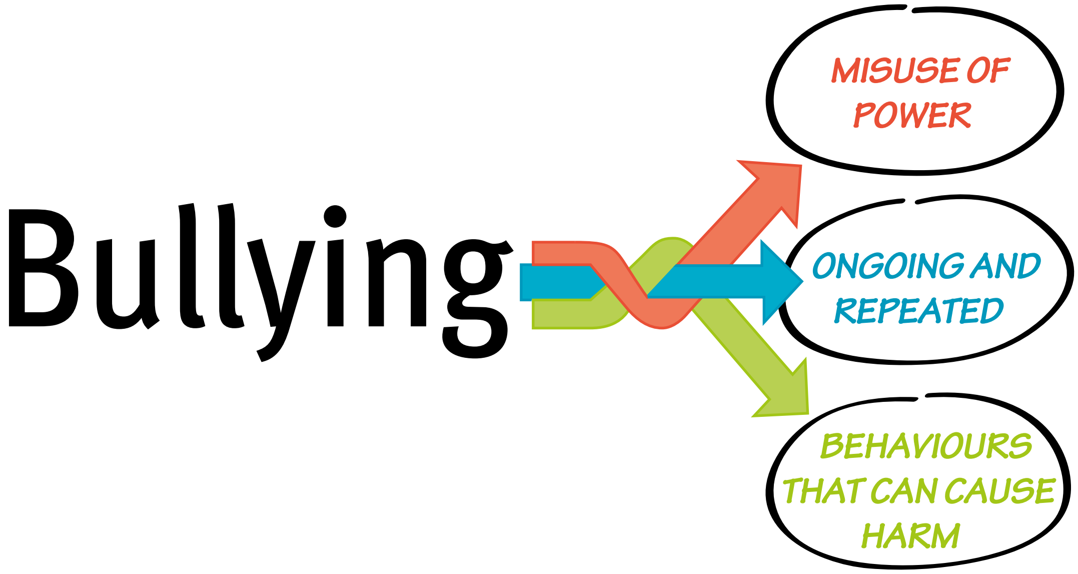

Figure 10.54 Key elements of bullying

Source: *Bullying. No Way*! https://bullyingnoway.gov.au/ This is a website for Australian schools managed by the Safe and Supportive School Communities Working Group which has representatives from all states and territories, including the Catholic and independent schooling sectors.

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Australian videos on bullying

Bullying is also *intentional* or premeditated. It is a planned 'attack' on someone, in either a physical or a psychological way. Finally, bullying involves acts that are usually *repeated* over time. This means that it is a persistent behaviour that generally involves acts that occur more than 'once or twice'. For example, consider someone who hits or verbally abuses someone else in self-defence, or who suddenly flares up and retaliates after being provoked. Are these behaviours bullying? Consider also the assistant at a childcare centre who excludes an infant from an activity because they believe that the activity is dangerous for a child so young. Is this bullying? These behaviours would not be considered bullying because bullying is behaviour intended to hurt or cause harm that occurs repeatedly across a period of time.

According to Australia's National Centre Against Bullying (2017b), bullying is *not*:

- single episodes of social rejection or dislike
- single episode acts of nastiness or spite
- random acts of aggression or intimidation
- mutual arguments, disagreements or fights.

Types of bullying

The National Centre Against Bullying has also defined different types of bullying, which involve different types of behaviour and are often interrelated. This organisation advises and informs the Australian community about childhood bullying and the creation of safe schools and communities. Its membership comprises some of Australia's leading experts in the field of bullying and cyberbullying, including psychologists, academics, researchers and educators.

According to the National Centre (2017c), four of the more common types of bullying that can be experienced by children and adults alike are:

Physical bullying

Physical bullying includes hitting, kicking, tripping, pinching and pushing or damaging property.

Verbal bullying

Verbal bullying includes name calling, insults, teasing, threatening, intimidating, homophobic or racist remarks, or verbal abuse.

Social bullying

Social bullying is often harder to recognise and can be carried out behind the bullied person's back. It is sometimes called *covert bullying* because it is typically 'hidden', out of sight of, or unacknowledged and/or unaddressed by adults. This type of bullying is designed to harm someone's social reputation and/or cause humiliation. Social bullying includes:

- lying and spreading rumours
- negative facial or physical gestures, menacing or contemptuous looks
- playing nasty jokes to embarrass and humiliate
- mimicking unkindly
- encouraging others to socially exclude someone
- damaging someone's social reputation or social acceptance.

Cyberbullying

Cyberbullying is carried out using digital technologies, including hardware such as computers and smartphones, and software such as social media, instant messaging, texts, websites and other online platforms. It is therefore sometimes called *online bullying*.

Cyberbullying can happen at any time. It can be in public or in private and sometimes only known to the target and the person bullying. Cyberbullying includes activities involving:

- *image sharing:* forwarding or sharing unflattering or private images without permission, including naked or sexual images
- *text and email:* sending insulting or threatening text messages or emails
- *personal online information:* sharing online someone's private, personal or embarrassing information without permission, or spreading rumours online
- *identity theft:* assuming someone's identity online and negatively representing them in a manner that may damage their reputation or relationships with others
- *hate sites:* creating hate sites or implementing social exclusion campaigns on social networking sites.
- *attacking players in online gaming*: repeatedly and for no strategic reason, attacking players in online gaming
- *pranking*: repeated hang-ups, anonymous, mocking or threatening phone calls.

It is also cyberbullying when one or more people uses technology to run a multi-step campaign to bully someone else (or a group); for example, setting another student up to be assaulted, video-recording their humiliation, posting the video-recording online and then sending the website address to others (Bullying. No Way!, 2016a; Department of Education and Training [DET], 2017a).

Cyberbullying vs bullying in person

While cyberbullying is similar to bullying in person, there are also differences. In particular:

- *Cyberbullying is invasive.* Cyberbullying can be difficult to escape and is incredibly invasive. It is more likely to occur outside of school, including while at home, and can happen at any time.
- *Cyberbullying can involve a large audience.* Cyberbullying can involve harmful material being widely and rapidly shared with a large audience; for example, rumours and images can be posted on public forums or sent to many people at once. This material can also continue to be available and harmful long after the cyberbullying has ceased.
- *Cyberbullies have a sense of anonymity.* Cyberbullying can provide the bully with a sense of relative anonymity and distance from the target, so there is a lack of immediate feedback or consequences (Bullying. No Way!, 2016a; DET, 2017a).

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Australian government eSafety and cyberbullying site

Figure 10.55 Bullying may be physical or psychological in nature.

BOX 10.8 Bullying in Australian schools

Bullying is a serious problem in schools within all types of cultures throughout the world. Based upon self-reports of school children aged 11 to 15 years from 35 countries, one study found that 10.9% were being bullied two or three times a month or more (Rigby, 2015).

Bullying is even more prevalent in Australian schools. About one in four report having been bullied at some time during their schooling and at least that many are being bullied on a regular basis. One major Australian study found that being bullied every few weeks or more often (considered to be frequent) overtly and/or covertly is a fairly common experience, affecting approximately one in four year 4 to year 9 Australian students (27%) (Bullying. No Way!, 2017a; Cross et al., 2009; NCAB, 2017a).

Although bullying occurs in both primary and secondary schools, it tends to peak in the latter years of primary school and the early years of secondary school. For example, frequent school bullying has been found to be highest among year 5 (32%) and year 8 (29%) students. Generally, hurtful teasing is the most prevalent of all bullying behaviours experienced by students, followed by having hurtful lies told about them (Cross, et al., 2009). In addition, boys tend to be victims more than girls and they tend to bully more than girls (Healey, Dowson & Nelson, 2006).

The majority of students (61%) who report having been bullied in any way had also experienced social bullying (either on its own or in conjunction with other types of bullying). Of students who had experienced social bullying, 60% had also been teased in 'nasty' ways, 24% had been physically hurt, and 13% had been sent nasty messages on the internet. Slightly over half (53%) of students who said that they bullied others had engaged in social bullying (either on its own or in conjunction with other types of bullying) (Cross, et al., 2009).

When asked qualitatively why some students bully, most believed it was because the person bullying didn't like the person they were bullying; found bullying fun; enjoyed bullying others; and liked to feel tough and strong, in control and popular (Cross et al., 2009).

Primary schools

In one study of bullying amongst year 6 students in a Melbourne primary school, the researchers found that 45% of the students reported being seriously bullied at school (Fuller et al., 1997). The most common types of bullying experienced, in order of their occurrence, were:

1. being teased or called names
2. being hit, punched or kicked
3. comments about appearance
4. being left out of things on purpose.

The worst time for bullying in the primary school was lunchtime, when few teachers are present or visible for a long period of time. Morning recess and before and after school were also times when bullying was more likely to occur.

The researchers also found that once a primary school student was a target for bullying, the student remained a target for some time. For instance, 26.7% of the students in the sample reported that they had been bullied for longer than one month and 17% reported that they had been a victim of bullying that had lasted for more than six months.

Secondary schools

In another study on bullying among year 8 students from a number of Australian schools, the researchers found that 44% of the students reported having been seriously bullied at school (Healey, Dowson & Nelson, 2006). The most common types of bullying, in order of their occurrence, were:

1. being teased or called names (44%)
2. having rumours spread (21%)
3. being left out of things on purpose (14.5%)
4. being physically threatened or attacked (12.5%).

Research has also found that the worst time for bullying in the secondary school was during lunchtime, followed by before and after school, then on public transport while travelling to or from school.

While there has been some reduction in the incidence of bullying in the past few years due to greater awareness and anti-bullying programs in schools, a great deal still remains to be done to control, let alone stop, bullying in Australian schools.

LEARNING ACTIVITY 10.31

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Word copy of table

Review questions

1. What is bullying?
2. Briefly describe three key characteristics that distinguish bullying from other forms of aggressive behaviour.
3. Complete the following table to summarise the four types of bullying described by Australia's National Centre Against Bullying.

Type of bullying	Example
Physical bullying	
Verbal bullying	
Social bullying	
Cyberbullying	

4. Compare and contrast bullying in person and cyberbullying with reference to three similarities and three differences.
5. Which of the following examples involves bullying (including cyberbullying)? Give a reason for each answer.
   (a) A school captain keeps giving a younger student a 'hard time' because the younger student keeps spoiling other students' games.
   (b) A teacher is fed up with a student who continually misbehaves, so the teacher decides to mimic the student in front of the rest of the class whenever the student misbehaves.
   (c) A sibling keeps 'giving cheek' to her older sister whenever her sister's boyfriend comes over.
   (d) A year 8 girl is tired of being given a 'hard time' by a year 8 boy and decides to retaliate by giving him a 'hard time' whenever the opportunity arises.
   (e) A girl turns around and whacks the girl behind her who pulled her hair.
   (f) A child is hit by another child, runs home and reports it to his dad. His dad immediately goes outside, corners the offending child and speaks angrily for several minutes to the child who did the hitting.
   (g) Two friends have an argument, then one text messages the other via their mobile, 'You are a bad person and everybody hates you'.
   (h) Two friends decide they no longer want to have a third person as part of their friendship group so they suggest that the person should join another group.
   (i) A person anonymously posts comments about someone else 'every so often' to 'get a reaction' from them 'just for a bit of fun'.

Effects of bullying on individuals

Bullying can seriously affect physical, social and psychological health and functioning. Children, adolescents and adults who are bullied may suffer from short-term and long-term consequences due to being bullied. Moreover, the impact of the bullying can last longer than the bullying itself.

Common physical consequences of bullying include fatigue, disturbed sleep, shaky hands and loss of appetite. Psychologically, bullied children and adolescents tend to become more withdrawn than normal while complaining about their lack of desire to go to school, work or see friends. Victims of all ages have an increased risk of depression and substance abuse. In extreme cases, victims can lash out violently. In addition, bullying victims tend to have a higher risk of self-harm and suicide (DET, 2017b; Hertz, Donato & Wright, 2013; NCAB, 2017d).

The severity of impact depends on the type and nature of the bullying, the bully, the reasons for bullying and personal characteristics of the victim, such as their family environment, their mental health condition, whether they have a disability and whether they belong to a minority group for which isolation or lack of community support is an issue.

According to Victoria's Department of Education and Training (2017b) which has collated research findings on the effects of bullying in schools, students who are bullied are more likely to experience psychological effects such as:

- feeling unsafe and/or wary (suspicious) of others
- feeling disconnected from school and not like school
- feeling lonely, isolated and experiencing friendship problems at school
- displaying emotional problems that indicate feelings of vulnerability and low levels of resilience
- being less well accepted by peers, avoiding conflict and being socially withdrawn
- having low self-esteem
- difficulties concentrating, learning and with motivation for schoolwork and school attendance
- disturbed sleep, such as insomnia and nightmares
- experiencing anxiety and/or depression.

Figure 10.56 Students who are bullied at school often feel lonely and isolated.

Bullying can also have an impact on bystanders. For example, in schools, students who witness bullying may:

- be reluctant to attend school
- feel fearful or powerless to act and guilty for not acting
- have increased mental health problems, including depression and anxiety
- have increased use of tobacco, alcohol, or other drugs.

At a more general level, when bullying continues and a school does not take action, the entire school climate and culture can be negatively affected. Students continue to be in contact with each other over time and it is not easy for targets of bullying to walk away or leave the situation.

When bullying becomes entrenched in a school, this can impact on student learning and engagement, staff retention and satisfaction and parental confidence in the school, which can lead to:

- the school developing an environment of fear and disrespect
- students experiencing difficulty learning
- students feeling insecure
- students disliking school
- students perceiving that teachers and staff have little control and don't care about them.

The prevention of bullying in schools is now recognised as part of the human rights movement. It is part of the school's duty of care towards students and staff, and for schools to address bullying and keep children safe. Schools that do not address bullying can become places where the more powerful dominate the less powerful, a process and set of attitudes behind 'domestic violence, child abuse, workplace violence, hate crimes and road rage' (NCAB, 2017e).

Sex differences in bullying

Researchers have found males and females bully at comparable rates but how they are bullied can be different. For example, boys are more likely to threaten someone with physical force and actually use physical violence, whereas girls are more likely to spread rumours, exclude other girls from social activities, belittle other girls or tease them (Griezel, et al., 2012; Healey et al., 2006; Kaplan, 2004). There is, however, research evidence which indicates that girls may be just as aggressive as boys but are more able to hide this from adults (Fuller, 1998; Popp, et al., 2014). In relation to cyberbullying, researchers have found that males are more likely than females to engage in cyberbullying and that females tend to outnumber males as victims of cyberbullying (Li, 2006; Wang, et al., 2009).

Psychologists tend to explain sex differences in bullying in terms of social norms and gender role expectations of how males and females should behave. For example, in relation to males, it tends to be a social norm for them to display dominance and this may underlie their greater use of physical forms of bullying. Furthermore, males (or females) who do *not* fit social norms are more likely to be targeted for bullying. For example, they may be targeted for some aspect of 'non-conforming' behaviour or appearance, more specifically, for not looking or behaving in the expected ways of how they should look or behave (Bullying. No Way!, 2017a).

Figure 10.57 When bullying continues and a school does not take action, the entire school climate and culture can be negatively affected.

Figure 10.58 The frustration–aggression hypothesis proposes that bullying others can be a means of relieving frustration by taking it out on another, less powerful person.

American psychologist Paul Kaplan (2004) suggests that sex differences in bullying may exist because girls tend to be punished more severely than boys when they use physical violence. He also suggests that teasing and exclusion may be viewed by female bullies as very effective strategies when wanting to hurt another girl. Girls tend to place a higher value on their relationships and social connections than do boys. Therefore, threatening or manipulating those friendships is considered potentially more harmful or hurtful by and for females. This view has been confirmed by an Australian research study. Australian psychologists Ken Rigby and Dale Bagshaw (2001) surveyed girls and boys in schools and found that more girls than boys viewed social forms of aggression as more hurtful than physical forms of aggression.

Causes of bullying

As with other forms of aggression, bullying is intended to hurt or harm others. In the case of bullying, the victim is often someone who has done nothing at all to the bully. What causes someone to use bullying acts?

According to Bullying No Way! (2016a), there are three perspectives on why bullying happens. They are:

- *individual perspective* — views bullying as an individual, psychological and behavioural problem
- *social–ecological perspective* — views bullying as an interpersonal relationship dynamic problem and the expression of the varying status and unequal power relations between individuals and groups (social) in that context (ecology)
- *systemic perspective* — views bullying as a cultural and system-wide problem related to the power dynamics inherent in all institutions.

Each perspective views bullying in a different way and therefore identifies different underlying reasons. A comprehensive understanding of bullying and why it happens integrates all three perspectives. Table 10.4 below gives examples of reasons for bullying from each perspective. In this section, we focus on explanations and research findings from the psychological perspective.

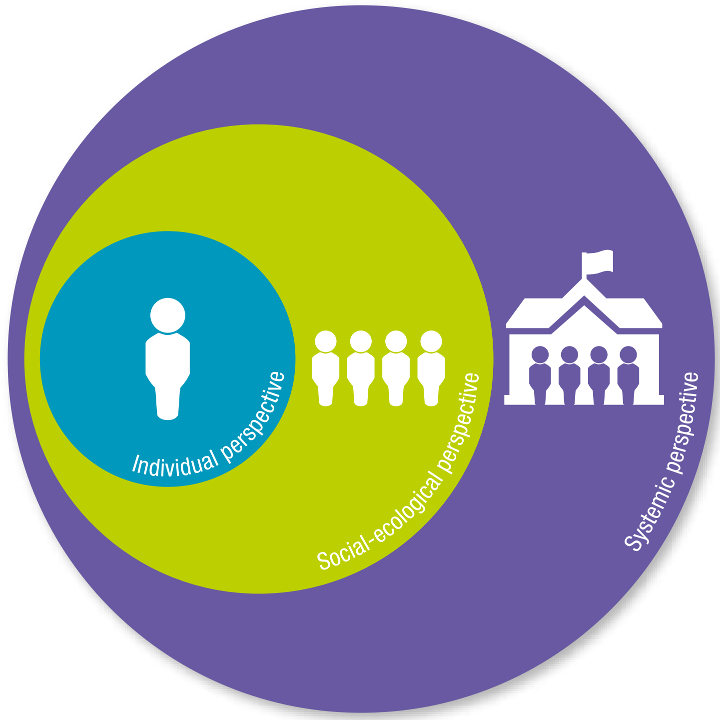

Figure 10.59 Three perspectives on causes of bullying

Source: Bullying No Way! (2107). www.bullyingnoway.gov.au/

Table 10.4 Perspectives on why bullying happens

Individual perspective	Social–ecological perspective	Systemic perspective on bullying
Bullying happens because of: • natural instinct towards social dominance • individual psychological attributes and personality traits • the tendency of the 'target' to annoy and provoke • lack of understanding about appropriate behaviour • failure to conform to rules and regulations • age and developmental phase.	**Bullying happens because of:** • peer pressure and the desire to conform to social norms • social dynamics between students • community norms, including the modelling of parents/carers, staff and other school community members • beliefs about people that are used to justify discriminatory or victimising behaviour • social messages about appropriate or desirable characteristics and behaviour (e.g. aggression is okay, toughness means strength) which lead to acceptability of bullying-like behaviours.	**Bullying happens because of:** • the power differential between different social groups • institutional, political and cultural assumptions, e.g. dominance of individualist paradigm • failure to recognise systemic violence, e.g. punitive approaches, bullying by teachers and principals.

Source: Bullying No Way! (2107). www.bullyingnoway.gov.au/

eBook*plus*

Weblink
Bullying. No Way! website

Since bullying is a form of aggression, factors that influence aggression also influence bullying. For example, one explanation of aggression, called the *frustration–aggression hypothesis*, has been used to explain bullying. This is based on research findings that some parents of bullies tend to be inconsistent with discipline. Sometimes they are harsh and at other times they are lax ('slack'). When they do punish their children for misbehaviour, the punishments are often harsh and involve strong emotional outbursts. Overall, the climate of the family can be considered to be very angry and hostile, with parents having little involvement in their children's activities or lives. Bullies with this type of home background may be relieving the frustration experienced at home by taking it out on another, less powerful person (Kaplan, 2004). However, not all parents of children who bully others are inconsistent in their use of discipline or are less caring towards their children. Many children and adolescents who bully others come from caring families.

There is also considerable research evidence to suggest that a child in a *dysfunctional family* is more likely to bully others. For example, Ken Rigby (1996) conducted research on the family backgrounds of 644 adolescent children in South Australian schools. He found that children identified as bullies, regardless of sex, were different from children not identified as bullies in terms of the way in which they thought their families functioned. For example, bullies tended to view their families as ones in which honesty was not important, there was a lack of freedom to express opinions and family members were not encouraged to work together in dealing with problems. Furthermore, bullies tended to view their families as being unsympathetic when they felt sad, not being able to understand them, treating them like a child rather than a maturing person, and generally not being caring or accepting of them.

Other specific causes of bullying have also been suggested. On the basis of research findings conducted by other psychologists, Kaplan (2004) argues that some bullies may have a need to dominate and gain control over other people; for example, their victims. Other bullies may believe that they are gaining the respect of others through their acts of intimidation. By being a bully and getting what they want, they may achieve and maintain dominance and control in their friendship groups. Furthermore, because bullying often enables a bully to get what they want through aggressive acts, they learn that bullying is an effective way of achieving things. Consequently, bullies often have a positive attitude to bullying.

In schools, bullies tend to be rejected or avoided by other students; however, they are not necessarily isolated by others. Bullies often report that they find it easy to make friends. Among younger children in particular, highly aggressive boys may be among the most popular and socially connected children in primary school classrooms, as viewed by their fellow students and even their teachers.

Bullies do form friendships, but mostly with other bullies or aggressive students. They seem unaware or unconcerned about their unpopularity with non-aggressive students. Furthermore, they often fail to understand the ways in which other students may view them, not realising how their bullying reduces the number of relationships they may have had if they did not bully others.

Figure 10.60 Bullies do form friendships, but mostly with other bullies or other aggressive students.

BOX 10.9 How to deal with bullies

If you think you are being bullied, here are some things you can try. These suggestions have been compiled from authoritative sources such as the National Centre Against Bullying, beyondblue and the Victorian Department of Education and Training.

Ask them to stop

- Tell the person you don't like how they are behaving towards you.
- Use a strong and confident voice. Even if you don't feel strong and confident, fake it!
- Talk with the person who is bullying you (if you think it's a safe thing to do). Ask them if there is a problem that you might be able to sort out together. If you feel too scared to do it alone, ask a friend to come with you.

Try some other things yourself

- If possible, ignore the person who is bullying you. When a person is ignored they often lose interest in continuing the bullying.
- Act unimpressed; pretend not to notice if you're excluded or if the bullying is verbal, say something like, 'Yeah, whatever' or 'Oh, OK'.
- Walk away.
- Pretend to agree 'Yep, that's what I'm like alright' 'Yeah, I've got red hair. Tried dyeing it but decided it was better red than green'...
- Don't retaliate or try to get back at the person who bullies you. It usually doesn't work, and you can end up in trouble too.

Talk to someone

- There is always someone who can help. Tell someone you trust, even if you don't think it will help. Just talking about a situation can help put it in perspective. You could talk to a friend; a parent; a relative; or a trusted teacher, work mate, team leader or manager who you know will take what you're saying seriously. Ask for their advice and support to deal with the bully. If things don't get better after you've told someone, tell them again or tell a different person.
- Lawstuff.org.au can explain your rights and can help to support you.
- Call the Kids Helpline, a 24-hour, seven-day-a-week counselling service for Australian young people aged between 5 and 25 years. Kids Helpline takes more than 6000 calls each week, about all sorts of problems. Young people can access Kids Helpline anonymously and for free by calling or visiting their website. Contact details are on the right.

Keep a record of incidents

- Write down everything that happens and what you have tried to stop the bullying.

Focus on looking after yourself

- Try to focus on positive thoughts and distract yourself from the negative ones.
- Spend time with friends and family doing things that you enjoy.
- Look around for other friendship groups in or out of school, the club, work or wherever the bullying occurs.
- Get involved in clubs or activities at school where you'll be safe.
- Keep physically healthy; maintain a balanced diet and exercise regularly.

If you are being cyberbullied, you can:

- Block senders.
- Keep messages by sending them to someone else. Don't look at them yourself.
- Don't retaliate or respond to messages or images online; this can aggravate the situation.
- Change passwords.
- Ask the person to delete any online images, posts or chats that are offensive to you.
- Turn off your mobile device or go offline so the bully doesn't have your attention.
- Unfriend or block the bully and change your privacy settings on your social media accounts.
- Keep mobile phone messages, emails or social media posts or chats that hurt you as a record of what has happened.
- Talk to a friend, parent or teacher about how to deal with the bullies.
- Ask for help to put a block on your mobile device or social networking page so you don't get the bullying posts or texts. For example, install a cybersafety help button on your computer or mobile device. It offers help and advice about upsetting things that you have seen on the internet. A button is available for free at http://cybersafety-help-button.soft112.com/
- If there are threats or calls to harm yourself, report abuse to the police and also the service provider or social media site.

Kids Help Line
www.kidshelp.com.au
1800551800

If you're not sure what to do and don't want to call the Kids Helpline, other sources of help include:

For help with how you're feeling

headspace
www.headspace.org.au
www.eheadspace.org.au
1800 650 890

Lifeline 13 11 14
https://www.lifeline.org.au/

ReachOut
Reachout.Com

For more info on bullying

Australian Human Rights Commission
http://www.humanrights.gov.au
1300 656 419

Bullying No Way!
www.bullyingnoway.gov.au

Fair Work Commission
https://www.fwc.gov.au
1300 799 675

Lawstuff
www.Lawstuff.org.au

Office of the eSafety Commissioner
https://www.esafety.gov.au/
1800 880 176

Source: Compiled from National Centre Against Bullying (2017). *Bullying for kids: How to deal with bullies;* beyondblue (2017). *Bullying and cyberbullying* (Youthbeyondblue fact sheet); Department of Education and Training (2017). *I'm Being Bullied* (Bully Stoppers: Students).

LEARNING ACTIVITY 10.32

Review questions

1. What have you observed at school in relation to research findings on sex differences in types of bullying? To what extent are your observations consistent with research findings?
2. Briefly explain bullying from each of the three perspectives, with reference to two possible reasons for each perspective.
3. Briefly explain bullying in terms of each of the following:
   (a) frustration-aggression hypothesis
   (b) dysfunctional family
   (c) need for dominance and control.
4. Researchers have found that some of the effects of bullying described on pages 545–6 can be both a partial cause and a consequence of the bullying, especially for victims who are passive and submissive in nature. What have you observed at school?
5. Give three examples of strategies that may help prevent bullying in schools. Briefly explain each strategy and why it may work.

LEARNING ACTIVITY 10.33

Reflection

Bullying at school is an age-old problem but bullying prevention programs have reduced its incidence to some degree.

Comment on whether it is possible to entirely control bullying in schools.

INFLUENCES OF MEDIA ON BEHAVIOUR

We live in an age of mass communication in a media-saturated world. Most people now have access to traditional media such as television, and many also have access to newer digital media technologies such as a computer, an internet connection and a mobile phone. In the last 20 years or so, these media technologies have transformed the world into a 'global village'. An ever increasing number of people have never known life without a computer or the internet. The new media has not only changed how we communicate, but also how we gather and use information about the world and how we present ourselves to others.

Our access to new types of media has generated new questions and new research about the positive and negative influences in our lives, particularly in children and adolescents. This research has been in three areas. First, there are studies that have examined how often and for how long people interact with different types of media. Second, there are studies investigating how the media is used. Third, there are studies that consider the effects of media on our lives (Smith, Cowie & Blades, 2011).

In this section, we briefly consider findings from the first two areas to outline the media environment in which we live and the patterns of media access and use in Australia. We then focus on influences of television, video (electronic) games, social media and advertising from a psychological perspective.

Figure 10.61 Digital media use is an integral part of everyday life in Australia.

Patterns of media access and use

Australians are renowned for being among the fastest adopters and most prolific users of digital media. Digital media rapidly change, but just as quickly as they become available, they are integrated into many areas of Australian life. In the past decade, TV viewing has been eroded by internet use during free time. Although these activities are often combined, watching TV (but on any device) continues to be prevalent in all age groups (Alcorn, et al., 2015).

According to the most recent Australian Bureau of Statistics [ABS] (2017b) data (as at April 2017), in 2011–12, Australian adults spent an average of about 15 hours a week watching TV. Adults also spent over 5 hours per week using the computer at home and about 40 minutes playing video games. Children and adolescents aged 5–17 years spent on average nearly one and a half hours per day watching TV and close to half an hour a day using the internet for non-homework purposes. In addition, boys spent over half an hour playing video games, whereas girls spent only 8 minutes. Homework represented the smallest portion of digital media usage at an average of only 6 minutes per day, rising to 17 minutes for 15–17-year-olds. Toddlers and pre-schoolers (aged 2–4 years) spent almost one and a half hours watching TV, DVDs or playing video games. More recent research shows that digital media usage has increased substantially, especially for entertainment and information purposes (Alcorn, et al., 2015; Sensis, 2016).

About half (51%) of all 5–17-year-olds had at least one type of digital media other than a smartphone (e.g. TV, computer, or game console) in their bedroom. Close to one in 6 toddlers (2–4 years) also had access to digital media in their bedrooms. Of the 15–17-year-olds, three-quarters had some kind of digital media in their bedroom and this was associated with them spending an extra 2 hours per week using digital media compared with those who did not have any in their bedroom (2017b).

As at 30 June 2016, there were 22 million mobile handset subscribers in Australia. At that time the total Australian population was 24.1 million. It is estimated that over a third of all children aged 5–14 years own a mobile phone. Ownership increases with age — about three-quarters (76%) of 12–14-year-olds own a mobile phone, compared with 2% of 5–8-year-olds. Children mainly use their mobile phones to contact family (60%) rather than friends (36%). Less than 10% of children use their mobile phone to access the internet, although an increasing number of people aged 18 years and over are becoming exclusively mobile. At December 2014, about 2.1 million Australians, or 12% of the population, did not have a fixed-line telephone or fixed internet connection. Instead, they primarily used a mobile phone for voice communications, messages and internet access at home.

As shown in Table 10.5, the smartphone is now the most popular internet enabled device, overtaking laptops which have lost some appeal. (ABS, 2016a; Australian Communications and Media Authority [ACMA], 2015; Sensis, 2016).

Mobile phones are also very important for older children, being used by over 75% of 12–14-year-olds and increasing to over 90% of 15–17-year-olds. The use of fixed-line phones is the least preferred means of communication for 15–17-year-olds, behind instant messaging on a mobile or computer, mobile voice and email on a computer (Rutherford, Bittman & Biron, 2010).

The mobile phone has also influenced the way many young people in particular manage and conduct their lives, especially through the growth of smartphone usage. At June 2015, about 80% of Australians, including adolescents aged 14–17 years, owned or used a smartphone regularly (ACMA, 2016; Drumm & Swiegers, 2015). For example, one study found that 94% of mobile phone owners aged 18–29 years take photos with their phones, 68% record videos with their phones, 65% email on their phones and 45% do banking on their phones. Many people aged 30 and over also use their phones for these activities, but younger people are substantially more likely to do all these (and more) on their mobiles than older adults. Young people are also much more likely to engage in 'just-in-time' information-seeking activities on their phone than are older adults (Lenhart, 2013).

Table 10.5 Australian device ownership, 2017

Device ownership	Total 2017	Male	Female	18–29	30–39	40–49	50–64	65+
Laptop	59%	59%	59%	51%	59%	64%	66%	55%
Smartphone	81%	83%	80%	99%	96%	88%	75%	47%
iPad or other tablet	45%	41%	48%	16%	42%	51%	64%	50%
Desktop	51%	50%	52%	26%	45%	53%	67%	66%
Internet-enabled TV	28%	26%	29%	20%	39%	38%	27%	16%
iPod Touch or similar device	14%	13%	15%	5%	16%	17%	18%	13%
Wearable device like an Apple Watch or Fitbit	10%	9%	11%	4%	16%	13%	12%	6%
None of the above	<1%	0%	<1%	0%	0%	0%	0%	<1%

Source: Sensis Social Media Report 2017 (2017, 22 June). *How Australian people and businesses are using social media*. p.9.

Uptake of the smartphone has also seen rapid growth in its use for buying or selling and a diverse range of social networking and other communication activities. This is occurring in all age groups, but especially among those who rely exclusively on this device for their internet access (ACMA, 2015).

Some 5 years ago, whenever we travelled on a bus, tram or train, it was common to see other passengers with their heads buried in a newspaper, novel or textbook, passively reading and consuming content. This is now a rare sight. Now, more than ever, these same people are glued to their smartphone, actively checking their social media sites, reading email, gaming, watching the news or a viral YouTube video, checking the weather forecast, booking concert tickets, and so on.

Many people also seem to have become dependent on their smartphones. These devices are now integral to how Australians live, organise and enjoy their lives, whether socially, professionally or personally. Researchers have found that more than half the population check their smartphone within 15 minutes of waking, interacting continuously throughout the day without being prompted until disconnecting and switching off for the night. More than 80% of the population can't last an hour after waking before checking their smartphones and about one-third of the population checks within 5 minutes of waking (Drumm & Swiegers, 2015).

Generation	Rank 1st	2nd	3rd	4th
Trailing Millennials Age 14–25	Using the internet	Listening to music	Watching television (on any device)	Playing video games (on any device)
Leading Millennials Age 26–31	Using the internet	Watching television (on any device)	Listening to music	Playing video games (on any device)
Xers Age 32–48	Watching television (on any device)	Using the internet	Reading books (in any format)	Listening to music
Boomers Age 49–67	Watching television (on any device)	Using the internet	Reading books (in any format)	Listening to music
Matures Age 68+	Watching television (on any device)	Using the internet	Reading books (in any format)	Reading newspapers (either print or online)

Figure 10.62 Ranking of preferred sources of media entertainment by generation

Source: Alcorn, et al. (2015). *Media Consumer Survey 2015: Australian media and digital preferences* (4th ed.). Deloitte Australia report. p. 17.

Internet access and activity

In 2014–15, 86% (7.7 million) of all Australian households had internet access, with 96% having wifi access within the home. Almost every household with children under 15 years of age had access to the internet at home (97%), as compared to 82% of households without children under 15 years of age. Households with older persons (aged 65 years or over) had the lowest proportion of internet access (at 51%). The proportions of males and females accessing the internet are almost even, at 84% and 85% respectively (ABS, 2016b).

Research shows that over 80% of Australians use the internet daily (Sensis, 2016). Overall, internet activity tends to be highest amongst people under 35 years, especially adolescents aged between 15–24 years. When asked about specific use at home other than for emailing and general browsing, the four most popular online activities are paying bills or banking online (72%), social networking (72%), purchasing goods and services (61%) and entertainment such as listening to music or watching videos or movies online (60%), (ABS, 2016b).

There are, however, age differences in internet activity. According to research by the Australian Bureau of Statistics (2016b), those aged 15–17 years old most commonly went online for social networking (91%), followed by entertainment and formal education activities (73% for both). For those aged 65 years and over, the most common activities online were the same as for all internet users — banking (50%) and social networking (43%).

Research also shows that the many Australians with a smartphone look at it more than 30 times a day on average. This suggests an ongoing need for checking-in, messaging with friends, reading the news and perhaps a growing fear of missing out on something if not connected. As shown in Figure 10.66 on the next page, younger Australians are the most digitally connected mobile users, checking their smartphone on average 56 times a day and 5% checking more than 200 times a day.

How children aged 5–14 years use the internet tends to change with age. At a young age, children treated the internet more as a source of entertainment. As they get older, they begin to see the internet more as place for accessing information and socialising.

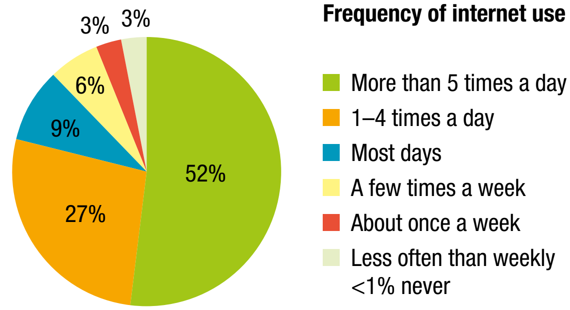

Figure 10.63 Frequency of internet use in Australia.

Source: Sensis Social Media Report 2017 (2017, 22 June). *How Australian people and businesses are using social media.* p. 6.

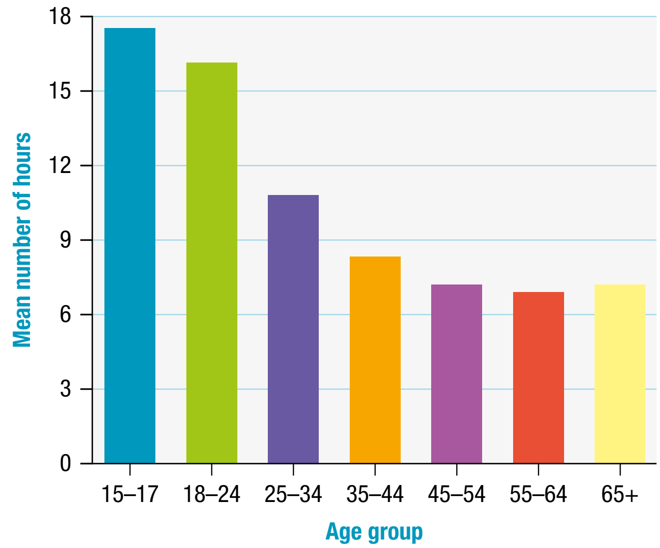

Figure 10.64 Internet users — mean number of hours by age group, 2014–15

Source: Australian Bureau of Statistics (2016). *8146.0 — Household use of information technology, Australia, 2014–15.*

Figure 10.65 Australians tend to check their smartphones more than 30 times a day on average.

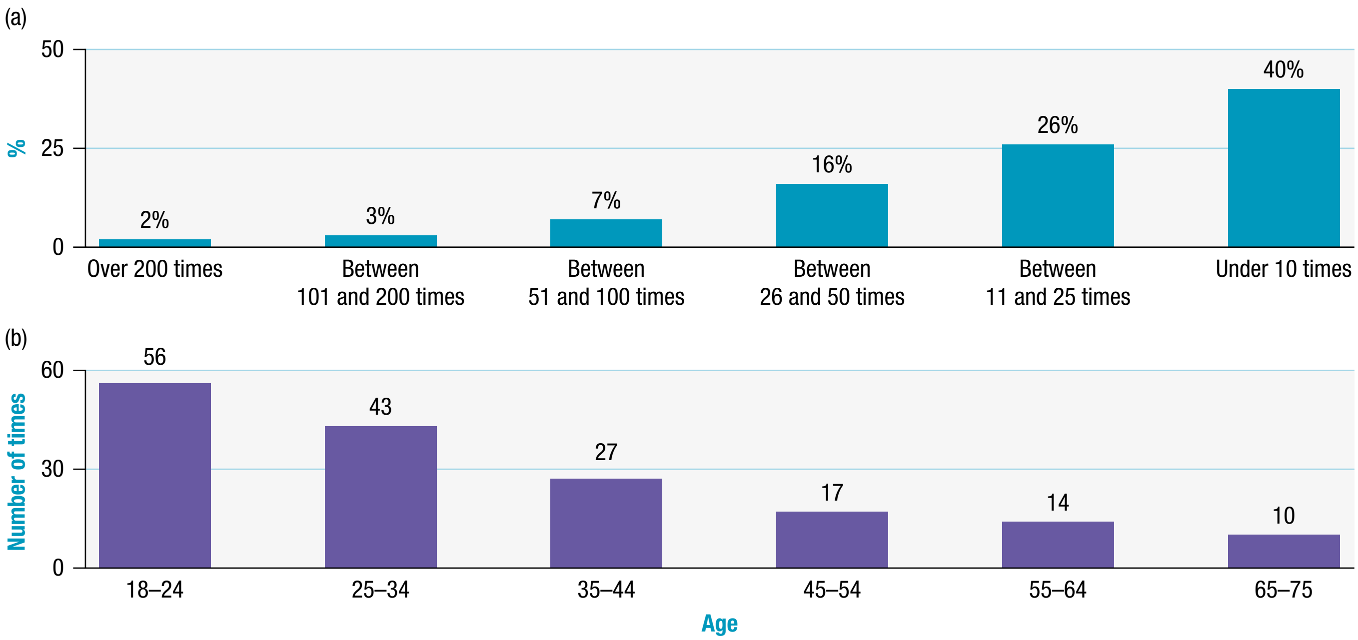

Figure 10.66 (a) The frequency of smartphone usage; (b) Number of times smartphone is checked each day by age group

Source: Drum, J., & Swiegers, M. (2015). *Mobile Consumer Survey 2015 — The Australian Cut: Life's smarter than you think*. Deloitte Australia report. p. 26.

Social media activity

The most dramatic and rapid recent change in the past decade has been in the growing number of Australians using **social media** — websites and applications ('apps'), such as Facebook, Instagram and online blogs, that allow social networking and sharing of information. As shown in Figure 10.67 and Tables 10.6 and 10.7, we use social media often and whenever and wherever we can — at home, school, work, when commuting, socialising, and so on.

A study of Australian internet users found that nearly 50% of people aged 18 years and older who have internet access use social media daily, rising to 87% in the 18–29 age group (Sensis Social Media Report, 2016).

Among users aged 18+, Facebook is by far the most commonly used social media platform (by 95% of social media users who have a profile), followed by Instagram (31%), LinkedIn (24%), Twitter (19%), Pinterest (11%), and Google+ (10%). Facebook users can spend the equivalent of over a full working day using it each week, averaging 12.5 hours on the site, which compares to 8.5 hours in 2014 and 2015 (Sensis, 2016). Adolescents aged 14–17 years also prefer Facebook (90%), followed by Instagram (58%) and Snapchat (57%). Many also use Skype (34%) (eSafety Commissioner, 2016).

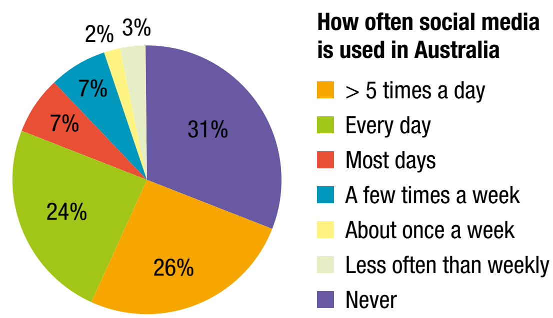

Figure 10.67 Frequency of use of social networking sites in Australia

Source: Sensis Social Media Report 2017 (2017, 22 June). *How Australian people and businesses are using social media*. p. 12.

Table 10.6 Australian social networking times, 2017

When we socially network	Male	Female	18–29	30–39	40–49	50–64	65+
First thing in the morning	58%	56%	79%	58%	44%	43%	46%
Commuting	19%	17%	28%	17%	21%	10%	3%
When working	22%	19%	46%	14%	12%	9%	5%
Breaks	53%	41%	81%	54%	38%	18%	15%
Lunchtime	50%	44%	79%	56%	33%	22%	19%
In the evening	72%	70%	83%	66%	68%	68%	61%
Last thing before going to bed	40%	37%	65%	42%	30%	19%	12%

Source: Sensis Social Media Report 2017 (2017, 22 June). *How Australian people and businesses are using social media*. p. 14.

Table 10.7 Australian locations for social media use, 2017

Locations where social media is used	Total	Male	Female	18–29	30–39	40–49	50–64	65+
At home	**96%**	96%	96%	98%	97%	92%	95%	98%
At work	**35%**	38%	32%	46%	43%	40%	22%	3%
On public transport	**43%**	47%	39%	72%	43%	44%	19%	14%
Restaurants/bars/parties	**33%**	36%	30%	55%	35%	28%	14%	9%
In the car	**37%**	38%	36%	67%	40%	28%	14%	9%
At sporting events	**16%**	17%	14%	17%	21%	13%	17%	3%
At school or college	**18%**	20%	16%	48%	11%	2%	7%	1%
At the gym	**9%**	9%	9%	17%	16%	3%	2%	2%
In the cinema	**5%**	4%	7%	9%	7%	4%	2%	2%

Source: Sensis Social Media Report 2017 (2017, 22 June). *How Australian people and businesses are using social media*. p. 28.

LEARNING ACTIVITY 10.34

Analysis of data on patterns of media access and use

1. Consider the data in Figure 10.62 on page 552 on generational differences in preferred sources of entertainment. Draw three conclusions from the data.
2. Describe the age-related patterns evident in figures 10.64 and 10.66.
3. Refer to the data in Tables 10.6 and 10.7 and draw a conclusion on sex and age similarities or differences in when and where social networking usually occurs.
4. Use the data in this section to prepare a one or two sentence profile of a 'typical' internet and social media user in Australia.

Positive and negative influences

Clearly, research studies show that Australians of all ages use traditional and new media technologies frequently and in a variety of ways. Generally, usage is for three main purposes — as a source of information (including education and commercial), for entertainment and for social networking and communication. As the new media technologies continue to become embedded within homes and schools, psychologists have become increasingly interested in the positive and negative influences on individual and group behaviour, particularly of children.

Television

Of all the media forms, watching TV continues to be popular, regardless of the device used. As shown in Figure 10.62 on page 552, most people place it in their top three for entertainment. It also continues to be influential in the lives of both children and adults, despite changes in the way it is watched. For example, growing numbers are watching it through mobile devices, often while multitasking using social media.

Among children, 1 in 8 aged 3–4 years and 1 in 6 aged 6–7 years have a television set in their own bedroom. Some watch many hours of television each day, but the amount is influenced by parental control, time available, socio-economic factors such as the parents' occupations, income levels, educational backgrounds and cultural backgrounds (Alcorn, et al., 2015; Rutherford, Bittman & Biron, 2010; Screen Australia, 2013).

A number of Australian and international studies have found that watching television has no significant benefit for children under two years of age, nor does it have any other positive or negative influence. This is mainly because of their limited ability to attend to and cognitively process the onscreen information (Anderson & Pempak, 2005; Smith, Cowie & Blades, 2011). Although many parents believe that children under two years of age can develop their verbal language skills from watching television, research shows that infants are more likely to learn far more new words from their adult caregivers than from television (Krcmar, Grela & Lin, 2007; Zack, et al., 2009).

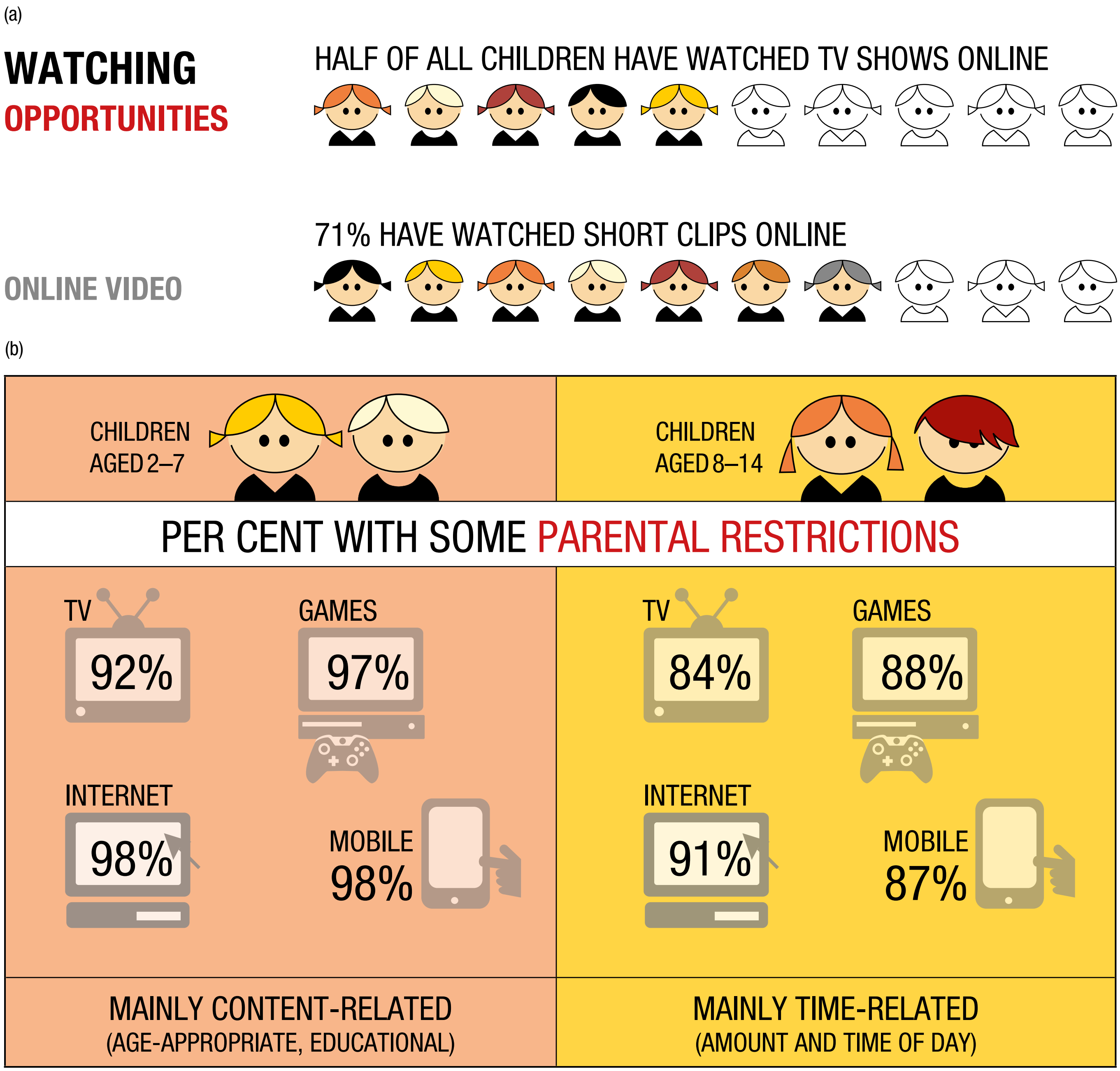

Figure 10.68 (a) Many children now watch TV shows online but (b) parents control what children watch.

Source: Screen Australia (2013, May). *Did you know?*. Retrieved from www.screenaustralia.gov.au/research/

Young children over the age of 2 years are more able to interact with what they see on the screen; for example, by clapping hands and imitating behaviours. By the age of five years, children can watch television effectively, even when they are in an environment where they can be easily distracted. Consequently, the content of what is being watched can be influential.

As they get older, children tend to watch television for entertainment but research studies have found that they do not passively sit there and take in everything. They make a number of choices about what they will watch, when they will watch it and how much attention they will give it. They show a lot of interest in content they understand which is funny or fascinating. They like character movement, animation, sound effects, and children's or women's voices. Violence does not have to be present to keep them interested. As shown in Figure 10.69, the majority of children aged 2–12 years 'like best' programs made for them.

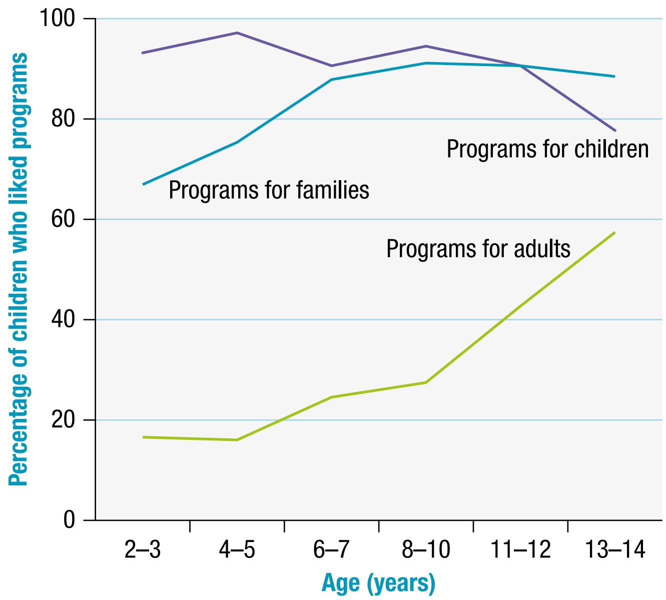

Figure 10.69 Children's TV program preferences

Source: Screen Australia (2013). *Child's play: Issues in Australian children's television 2013* (Report). p. 4.

Television can affect the behaviour and psychological development of children with the views of reality that it depicts and the messages it conveys about how other people in the world act and react. As we get older we become increasingly able to distinguish between fact and fantasy in television programs and to recognise the subtle range of fact and fiction in many programs. But people can hang on to early beliefs while false stereotypes and other misconceptions about the world can persist through adulthood (Gunter & McAleer, 1997; Lemish, 2007).

Figure 10.70 Young children over the age of two years can understand TV program content.

Generally, many psychologists believe television has a huge potential to positively influence the behavioural and psychological development of children. For example, various television programs can have the potential to enhance information-processing skills and increase general knowledge. Through television, children can be taught many positive concepts and introduced to issues of morality. However, relatively few programs use their capacity to influence children positively so public attention has become focused on the negative aspects of television.

Television programs in general include a large number of violent interactions. In particular, aggressive incidents (physical and verbal) occur in all aspects of television — in movies, dramas, comedies, cartoons, news, music videos, trailers and advertisements. This means that a child might see thousands of examples of aggressive behaviour each year. Furthermore, a significant amount of the televised violence to which children may be exposed is either glamorised (e.g. an action hero portrays it) or trivialised (e.g. it is shown as entertaining, or the consequences for the victim are ignored) (Rutherford, Bittman & Biron, 2010).

The potential effects of observing violence provide the most controversial and widely researched topic in psychology with regard to television. Although there is conflicting evidence on the effects of observing violence, public opinion tends to blame television for the increasing prevalence of violence in our society.

What does research indicate about the effects of violence upon children? According to the Australian Psychological Society (2013):

- exposure to violent television can and does influence children's feelings, attitudes and behaviour
- it is generally agreed that prolonged exposure to television violence is one of a number of factors which lead to children being more likely to display aggressive behaviour in both the short term and the long term
- some children enjoy, and develop an appetite for, viewing violent material
- viewing violence on television leads to immediate distress and fear in many children
- many children retain longer-term recurrent disturbing memories from viewed violence
- exposure to media violence can contribute to beliefs that aggression is an acceptable and effective behaviour, can induce fear and anxiety and the belief that the world is 'a mean and scary place'
- continual exposure to media violence increases the likelihood that children will be desensitised to real violence
- age and gender are important influences on the nature of the effects, with younger children likely to be more susceptible to learning from TV
- the social context of viewing is important in determining the effects of exposure to violent television; for example, if an adult helps the child interpret and critique the viewed material, the negative effects are lessened.

Figure 10.71 According to the Australian Psychological Society (2013), exposure to violent television can and does influence children's feelings, attitudes and behaviour.

eBook*plus*

Weblink
Disney stereotypes 3 m 40 s

eGuide*plus*

Weblink
- TED talk on how TV affects the child's brain 16 m 11 s

Although various studies suggest that there is a significant link between television violence and aggressive behaviour, a direct causal link has not been established. Factors that need to be considered when investigating the effects of television violence include whether the violence appears to be realistic (as opposed to the unrealistic violence of cartoons), whether the violence seems to be warranted or justified, and the situation in which the violence occurs. The characteristics of the observer are also important; for example, some children may be more likely to become aggressive and may therefore be more easily influenced by observing violence.

Before television was around, some people still behaved aggressively. Every behaviour has many determinants, and to say that one single factor such as television causes a certain behaviour would be simplifying the issue too much. Television is no longer the only media source of violent examples, and children can observe aggressive behaviours in other media, including when playing video games.

Video games

The advent of video games raised new questions about the potential impact of media violence, since the video game player ('gamer') is an active participant rather than merely a viewer. This means that a player is directly *responsible* for aggressive, sometimes extremely aggressive, actions.

It has been estimated that over 95% of adolescents aged 12–17 engage in video gaming — on a computer, on consoles such as Wii, Playstation and Xbox, or on portable devices such as Gameboys, smartphones and tablets. In one survey, half of all young adolescents reported playing a video game 'yesterday', and those who played every day typically did so for an hour or more. Consequently, most studies on influences of violent video game playing have focused on older children and adolescents (APA, 2015).

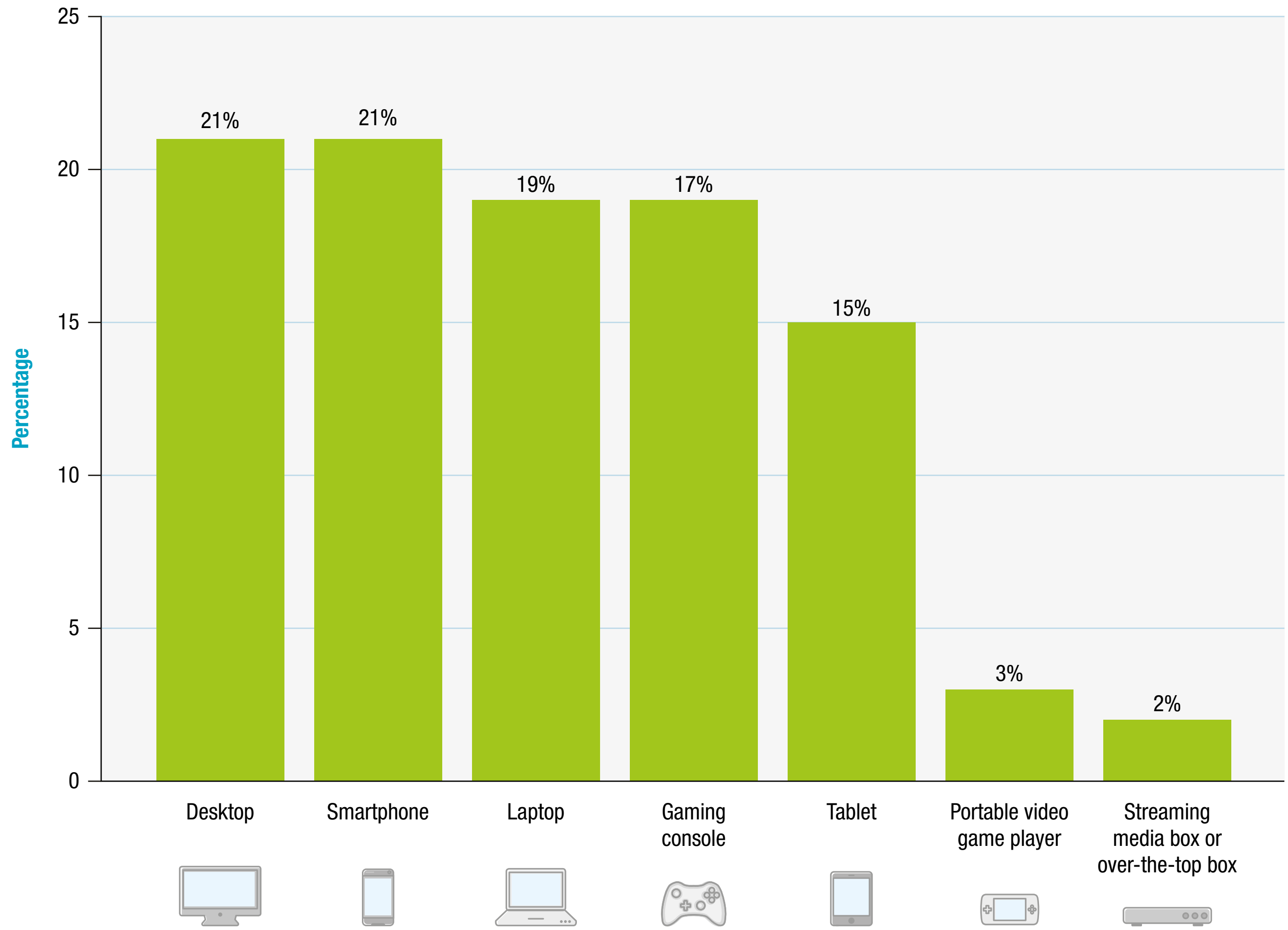

Figure 10.72 Preferred devices for gaming

Source: Alcorn, N., Buchanan, L., Smith, J. & Gregory, L. (2015). Media Consumer Survey 2015: Australian media and digital preferences (4th ed.). Deloitte Australia report. p. 38.

In a meta analysis of studies on violent video game playing in different cultures, American psychologist Craig Anderson and his colleagues (2010) concluded that exposure to violent video games is a 'causal risk factor' for increased aggressive behaviour, increased aggressive thoughts, increased aggressive emotions, decreased empathy and decreased prosocial behaviour.

These findings are similar to results from studies on television violence but exposure to game violence is viewed as more serious because of the interactive nature of video game violence. In particular, the player is encouraged to identify with an avatar, which then engages in violent actions at the command of the player (Rutherford, Bittman & Biron, 2010).

Other researchers have found that violent video game playing does not necessarily translate into violent behaviour in the real world (Jerabeck & Ferguson, 2013). In addition, researchers who have evaluated studies reporting a link between video game violence and real life violence have found that many of these studies did not control for potential confounding variables such as the mental health condition and family environment of participants. In addition, children and adolescents who are already at risk for aggressive and violent behaviour may be more likely to choose to play violent video games (Ferguson, 2011).

Overall, the results of research studies suggest that, as with viewing of television violence, there can be negative influences of video game violence but, for most children and adolescents, it may be only one of a number of factors contributing to violent behaviour.

There is no single factor that can drive someone toward violence or aggression, but violent video games could be one risk factor and not necessarily a causal factor.

According to an American Psychological Association (2015) task force that reviewed more than 150 research studies on violent video game use, there is considerable research evidence linking violent video game playing to violent behaviour (but insufficient evidence to link the games to actual criminal violence). The conclusions of this task force included:

- Research demonstrates a consistent relation between violent video game use and increases in aggressive behaviour, aggressive cognitions and aggressive affect and decreases in prosocial behaviour, empathy and sensitivity to aggression.
- The recent research demonstrates that the above effects may persist over some time spans.
- Higher amounts of video game use are associated with higher levels of aggression and other adverse outcomes.

Another concern about video games is that game playing may result in social isolation and inhibit development of important social interaction skills. However, being a player does not mean being a loner, even if the player has a video gaming addiction. Many games are now designed to promote cooperative play or competitive multiplayer activities. Time spent playing games often means time spent socially interacting. As many as three-quarters of children and adolescents actually play these games with other people, whether online or in person (Lenhart et. al., 2008). However, much research still needs to be conducted on whether online social interaction through gaming has the same potential benefits as the interpersonal interactions we have in real life.

Of course, numerous video games do not have any violence whatsoever and many of these games can have positive influences; for example, educational games and community-oriented games in which people address issues and solve problems. Many of these games involve thinking about social, moral and ethical issues, and decision making about how a virtual community, city or nation should be run (Greitemeyer, Osswald & Brauer, 2010). Some of the less complex games played by young children can help the development of fine motor skills and coordination. They can also contribute to development of digital literacy when the child is confident about their use of the technology.

eGuide*plus*

Weblinks

- Top 10 violent video games 9 m 4 s
- Professors discuss effects of violent video games 32 m 48 s

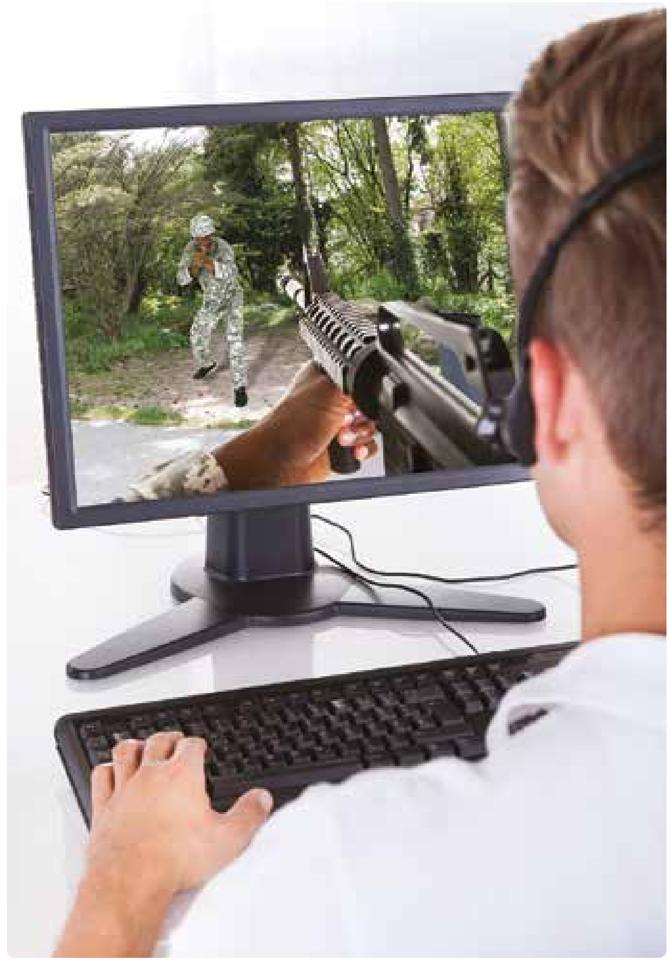

Figure 10.73 The player is an active participant in violent video games rather than a passive viewer.

Social media

Social media plays a significant role in the lives of many Australians. Research indicates that about 70% of internet users have a social media profile. For many, social media is a regular part of everyday life. About 1 in 4 people aged 18 years and over use it more than five times a day, mainly from their smartphones, to keep their 'finger on the pulse' and get a real-time perspective of what is happening around them. Research also indicates that 82% of adolescents aged 14–17 years are active social media users, as are 34% of children aged 8–13 years (eSafety Commissioner, 2016; Sensis, 2016).

As shown in Table 10.8, there are many reasons given for using social media, but nearly all users primarily see it as a way to keep in touch with friends or family. Other prominent reasons across age groups and the generations include accessing and sharing information, and for entertainment purposes.

Table 10.8 Reasons for using social media

Reason	Generation					
	Total	Trailing Millennials (14–25 years)	Leading Millennials (26–31 years)	Xers (32–48 years)	Boomers (49–67 years)	Matures 68 years+
Keep up with friends/family network	81%	77%	75%	78%	91%	92%
Keep up to date on breaking news	36%	39%	44%	37%	29%	37%
Entertainment value	35%	28%	36%	35%	37%	35%
As a distraction from my daily routine	34%	38%	29%	34%	22%	29%
Share photos/videos	27%	21%	24%	24%	37%	29%
Inform people of what I'm doing	21%	18%	28%	25%	16%	22%
Connecting with colleagues	20%	17%	25%	19%	21%	23%
To find out where my friends are so we can meet in person	10%	13%	8%	6%	11%	15%
Build my professional network	9%	6%	10%	13%	5%	5%

Question: *What are your top three reasons for using social networks?*

Source: Alcorn et al. (2015). Media Consumer Survey 2015: Australian media and digital preferences (4th ed.). Deloitte Australia report. p. 44.

Facebook and other social media have changed how we socially interact, particularly among younger people. The data on social media usage shown in Table 10.8 above suggest an important positive influence in fostering and supporting social networking and communication. Social media helps people stay connected with friends and family, regardless of geographical distance and other physical constraints. For shy and introverted people it can help overcome barriers to connectivity with others as it enables friendships and communication behind the security or safety of a screen. Research has found that many people (67%) report that social media has strengthened relationships with family and friends rather than weakened those relationships (18%) (Fox & Rainie, 2014). Table 10.9 below shows data on the upside of social media use reported by Australian young people aged 8–17 years.

Table 10.9 Upside of social media use reported by 8–17-year-olds

Keeping connected to friends and family	76%
Entertainment	69%
Keeping up to date	45%
Planning social life	30%
Self-expression	26%

Source: eSafety Commissioner (2016). *Research insights: Young and social online.* Canberra: Office of the Children's eSafety Commissioner.

As with video gaming, concerns have been expressed about a negative influence of social media on social skills due to the absence of face-to-face contact. It has also been suggested that social media sites can make it more difficult for us to distinguish between the meaningful relationships we foster in the real world, and the numerous casual relationships formed through social network sites. By focusing so much of our time on these less meaningful relationships, our most important connections with other people may weaken (Jung, 2015). There is a lack of research evidence to support this and much research remains to be done. Table 10.10 below shows Australian research findings on the downside of social media use reported by young people aged 8–17 years. 'Fear of missing out' has been investigated by the Australian Psychological Society (2015) and it was found to be a potential cause of stress. Many adolescents become concerned, for example, that people with whom they are connected may be having more rewarding experiences than they are.

Table 10.10 Downside of social media use reported by 8–17-year-olds

Nasty comments	45%
Inappropriate or hurtful content	36%
Nothing	30%
Feeling I have to keep checking it	23%
Fear of missing out on good times I see others having	18%

Source: eSafety Commissioner (2016). *Research insights: Young and social online*. Canberra: Office of the Children's eSafety Commissioner.

Another positive influence of social media is its educational benefits. For example, as well as promoting digital literacy, it provides a means of accessing and exchanging a diverse range of information through tools such as Wikis, blogs and discussion forums that can promote learning in engaging ways. But social media can also negatively impact on learning, especially when it is a distractor or time waster at critical times. For example, studies have found that middle school, senior school and university students who checked Facebook at least once during a 15-minute study period achieved lower grades that students who did not (Rosen, 2011).

Social media is also increasingly used as an agent to influence and change our behaviour in targeted ways. Individuals, groups and organisations can create content and use social media to reach wide audiences virtually anywhere in the world. For example, people have used it for social and political meetings, to gain support and funds for a cause or election to a position of power, to protest, as a major organising or recruiting tool for a political or social movement, to initiate change of government, and so on.

Table 10.11 Personal information shared on main social media account by Australian 8–17 year-olds

Personal information	'Kids' (8–13 years)	'Teens' (14–17 years)
Photo of face	47%	58%
Last name	27%	45%
Real age	21%	38%
School/photo of uniform	19%	27%
Phone number/address	6%	9%

Source: eSafety Commissioner (2016). *Research insights: Young and social online.* Canberra: Office of the Children's eSafety Commissioner.

The social media profile of young people has caused significant problems for some when they sought employment. It is now common practice for job recruiters, employers and human resources managers to check social media postings of job applicants before shortlisting (see Box 10.10 opposite). Many applicants have been overlooked for jobs because of unfavourable postings and other personal information in their profiles (Jobvite, 2014). Young people aged 12–17 are becoming increasingly aware of the potential negative consequences of personal information they have posted and many now take steps to shape their reputation, manage their networks, and mask information they do not want others to know. For example, one study found that 74% of young adolescent social media users have deleted people from their network or friends list (Madden et al., 2013).

Other potential negative influences of social media include adverse consequences that may be associated with loss of privacy, identity theft and cyber safety (including cyberbullying) issues. For example, a recent study by the Australian Government Office of the Children's eSafety Commissioner (2016) found that in the 12 months to June 2016 young social media users aged 8–17 years were cyberbullied (27%), exposed to inappropriate content (26%) or contacted by strangers (14%).

These potential consequences have also influenced young people to better manage their online identities. One American study of young adolescents, for example, found that 45% have removed their name from photos that have been tagged to identify them, 31% have deleted or deactivated an entire profile or account and 19% have posted updates, comments, photos, or videos that they later regretted sharing (Madden et al., 2013). Many more, however, have not taken any of these actions.

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Weblinks
TED talks on social media 12 m 46 s, 16 m 24 s

Figure 10.74 The internet gives access to numerous social network sites.

BOX 10.10 How job recruiters use social media

Job recruiters, human resource managers and employers are increasingly using social media to look for or review potential employees. One major survey of recruiters' use of social media involved over 1500 employers. Ninety-three per cent reported that they will review a job candidate's social profile when making their appointment decision and 55% reported that they have reconsidered a candidate based on their social profile, with 61% of those reconsiderations being negative.

The following table shows what recruiters look for in a candidate on social networking sites.

Criteria	Percent of recruiters
Work experience in the industry	97%
Length of service in the industry	96%
Work-related skills	95%
Mutual contacts	93%
Work-related posts	88%
Examples of written or design work	83%
Fits organisational culture	80%
Communication skills	36%

The table below shows recruiters' attitudes to information posted at candidates' sites.

Criteria	Attitude (%)		
	Postive	Neutral	Negative
Swearing and obscenities	5	22	63
Written communication skills	3	24	66
References to illegal drugs	2	7	83
Sex-related posts	1	17	70
Voluntary/charitable activities	65	25	2
Politically-related posts	2	69	17
Alcohol-related posts	2	43	44
Gun-related posts	2	32	51
Discriminatory comments	1	1	31

Source: Based on Jobvite (2014). 2014 *Social recruiting survey.* Retrieved from https://timedotcom.files.wordpress.com/2014/09/jobvite_socialrecruiting_survey2014.pdf

Advertising

The average TV viewer will probably see more than 20 000 advertisements a year. Those who are also active internet users will see many more in banners and pop-ups. In fact, it is virtually impossible to avoid exposure to advertisements wherever we are and whatever we are doing, whether online or not.

Many advertisements are intended to have a positive influence by providing a public service or helping to protect us from harm. For example, some warn about the dangers of drink driving, speeding, cigarette smoking, exposure to the sun, coward punches, illegal drugs and not having an escape plan if living in a bushfire-prone area. Other advertisements advise us to watch out for possible signs of diseases, cancers or terrorist activity. Still others inform us about new or improved products, services, health benefits of this or that, ways to improve our lives, and so on, usually at an affordable cost or cheaper than an alternative. Nonetheless, a great deal of advertising, though often intrusive or annoying, is beneficial by being informative and educational. A lot of what we see and hear is true, but some is intentionally misleading or false.

Much advertising is directed at children because children represent a major market segment. Many of these products are unhealthy foods and drinks that are high in fat, salt and/or sugar content and can therefore have a major effect on children's lifestyles. The increasing use of new media has meant that large sums of money spent targeting children through television and newspaper advertising have been transferred to the internet and digital media such as game apps.

Figure 10.75 This type of advertising can have a positive influence.

Psychologists have raised concerns about the negative influence of children's advertisements because children under the age of about eight years struggle to understand the persuasive intent of an advertisement — its 'sales pitch'. They tend to believe that everything they see in advertisements is true. Due to their lack of experience, children under the age of eight have less resistance to advertisements and lack the understanding to defend themselves against the persuasive intent (Rutherford, Bittman & Biron, 2010).

In addition, as you should now be aware, preschool children have difficulty distinguishing fantasy from reality and make-believe from lying. Many preschoolers cannot tell when a television program ends and an advertisement begins, and many actually prefer certain advertisements. Many do not understand the difference between a program designed to entertain and a commercial designed to sell. This is made especially difficult when celebrities and fictional characters are used to promote products. Research studies with web-based advertisements have found that that 6- to 8-year-old children also have difficulties distinguishing these types of advertisements from a core program and other onscreen content (Moondoore et al., 2009).

When producing an advertisement that targets children, a key objective is to give the child a good reason to nag a parent for the product. Children's requests for products they have seen advertised are sometimes called 'pester power' and can lead to family arguments and conflict. Many parents believe that a child's desire for products can make them materialistic by suggesting that the means to a happier life lies in buying consumer goods. This is a particular concern in Asian collectivist cultures where people still emphasise communal values over individual possessions (Smith, Cowie & Blades, 2011).

There has also been considerable concern about the idealised life images and stereotypes that are created and perpetuated by advertisements, especially TV advertisements. For example, advertisements have tended to cultivate certain standards that define physical attractiveness and portray gender stereotypes in ways that can affect a healthy self-image and create feelings of inadequacy, especially in adolescent girls. However, significant changes have occurred in this regard in recent years, with advertisers having become more sensitive to stereotyping population groups. In particular, the image of women in advertisements has changed significantly so that men and women tend to be portrayed equally.

Although there is some government regulation over advertising, such as for products that cannot be advertised on TV during children's viewing times, advertising remains a very prominent occurrence in our lives. Most psychological research has focused on *how* advertisements try to influence and how we cognitively process their content rather than specific behavioural influences. In particular, researchers have analysed advertisements and other persuasive communication techniques and identified three main components they have in common: a source of the message (*who*), a message (*what*) and a target audience (to *whom*). Each of these components has been studied intensively and it has been found that their respective characteristics combine to determine the effectiveness of any type of persuasive communication strategy. In sum, the impact of an advertisement is determined by *who* says *what* to *whom* and the individual who is watching.

Figure 10.76 Advertisements often present idealised images and stereotypes.

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Weblink

TED talk on Muslim and Middle Eastern stereotypes in the media
6 m 34 s

LEARNING ACTIVITY 10.35

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Word copy of table

Summarising media influences

Complete the table below to summarise positive and negative influences of various media.

Type of media	Positive influence	Negative influence
television		
video games		
social media		
advertising		

LEARNING ACTIVITY 10.36

Reflection

Comment on what role parents should play in a young child's usage of digital media. In what way(s), if at all, should the parental role change for older children?

CHAPTER SUMMARY

- **SOCIAL INFLUENCES ON BEHAVIOUR**
  - Social influence
  - What is a group?
  - Status and social power within groups
    - Types of social power
  - Influence of status and social power within groups
    - Zimbardo's Stanford Prison Experiment
      - Ethical issues in Zimbardo's experiment
  - Obedience
    - Milgram's experiments on obedience
      - Ethical issues in Milgram's experiments
    - Factors affecting obedience
      - Social proximity
      - Legitimacy of authority figures
      - Group pressure
  - Conformity
    - Asch's experiments on conformity
      - Ethical issues in Asch's experiment
    - Factors affecting conformity
      - Group size
      - Unanimity
      - Informational influence
      - Normative influence
      - Culture
      - Social loafing
      - Deindividuation
  - Influences on helping behaviour
    - Situational factors
      - Noticing the situation
      - Interpreting the situation
      - Taking responsibility for helping
    - Social factors
      - Reciprocity norm
      - Social responsibility norm
    - Personal factors
      - Empathy
      - Mood
      - Competence
  - Influences on reluctance to help
    - Diffusion of responsibility
    - Audience inhibition
    - Cost–benefit analysis
  - Bullying
    - What is bullying?
      - Types of bullying
      - Cyberbullying vs bullying in person
    - Effects of bullying on individuals
    - Sex differences in bullying
    - Causes of bullying
  - Influences of media on behaviour
    - Patterns of media access and use
    - Positive and negative influences
      - Television
      - Video games
      - Social media
      - Advertising

KEY TERMS

Asch p. 512
audience inhibition p. 538
bullying p. 541
bystander effect p. 526
competence p. 532
conformity p. 512
cost–benefit analysis p. 539
culture p. 517
cyberbullying p. 543
deindividuation p. 520
diffusion of responsibility p. 536
empathy p. 529
group p. 493
group pressure p. 509
informational influence p. 517
legitimacy of authority figure p. 508
Milgram p. 505
mood p. 531
normative influence p. 517
obedience p. 504
power p. 495
pro-social behaviour p. 523
reciprocity norm p. 528
role p. 498
social influence p. 492
social loafing p. 519
social media p. 554
social norm p. 528
social power p. 495
social proximity p. 507
social responsibility norm p. 528
status p. 495
unanimity p. 516
Zimbardo p. 498

LEARNING CHECKLIST

Complete the self-assessment checklist below, using ticks and crosses to indicate your understanding of this chapter's key knowledge (a) before and (b) after you attempt the chapter test on pages 569–73. Use the 'Comments' column to add notes about your understanding.

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Word copy of checklist

Key knowledge I need to know about social influences on behaviour	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Social influence			
What a group is (and is not)			
Status (within a group)			
Social power (within a group)			
• Types of social power			
Influence of status and social power within groups			
• Zimbardo's SPE			
– Ethical issues			
Obedience			
• Milgram's experiments			
– Ethical issues			
• Factors affecting obedience			
– Social proximity			
– Legitimacy of authority figures			
– Group pressure			
Conformity			
• Asch's experiments			
– Ethical issues			
• Factors affecting conformity			
– Group size			
– Unanimity			
– Informational influence			
– Normative influence			
– Culture			
– Social loafing			
– Deindividuation			

Key knowledge I need to know about social influences on behaviour	Self-assessment of key knowledge I understand *before* chapter test	Self-assessment of key knowledge I need to do more work on *after* chapter test	Comments
Influences on helping behaviour			
• Situational factors			
– Noticing the situation			
– Interpreting the situation			
– Taking responsibility for helping			
• Social factors			
– Reciprocity norm			
– Social responsibility norm			
• Personal factors			
– Empathy			
– Mood			
– Competence			
Influences on reluctance to help			
• Diffusion of responsibility			
• Audience inhibition			
• Cost–benefit analysis			
Bullying			
– Types of bullying			
– Cyberbullying vs bullying in person			
• Effects of bullying on individuals			
• Sex differences in bullying			
• Causes of bullying			
Influences of media on behaviour			
• Patterns of media access and use			
• Positive and negative influences			
– Television			
– Video games			
– Social media			
– Advertising			

CHAPTER 10 TEST

SECTION A — Multiple-choice questions

Choose the response that is **correct** or that **best answers** the question.
A correct answer scores 1, an incorrect answer scores 0.
Marks will **not** be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Question 1

The term social influence describes

A. someone's behaviour when they socially interact with others.
B. the way in which someone interacts with others in different social situations.
C. the influence of someone's personal thoughts and feelings on how they can best behave in a group.
D. how the presence or actions of others can affect someone's behaviour.

Question 2

An individual's ability to control or influence someone else's behaviour is best described as

A. power.
B. status.
C. a role.
D. pro-social behaviour.

Question 3

Which of the following is not a characteristic of a group?

A. There are two or more people.
B. There is interaction between members.
C. Some members have a different group goal.
D. Different members can influence one another.

Question 4

The importance of an individual's position or standing in a group, as viewed by members of the group, is best described as

A. power.
B. status.
C. peer pressure.
D. peer influence.

Question 5

Which of the following is a source of power in a group?

A. having information that group members need
B. low status
C. having the ability to be punished by others in the group
D. a loss of individuality

Question 6

A key finding of the Zimbardo Stanford Prison Experiment is that

A. power can be used to influence someone else's behaviour but status cannot.
B. status can be used to influence someone else's behaviour but power cannot.
C. role expectations can lead people to behave differently from the way in which they would normally behave.
D. all participants in the experiment did their best to behave as the experimenter wanted them to behave.

Question 7

Research studies have found that disobedience during warfare is rarer among those ordered to kill from a distance with a missile than close-up with a knife. These results suggest that _____ may influence obedience.

A. friendship
B. legitimacy of the authority figure
C. social proximity
D. group pressure

Question 8

If someone in a group has legitimate power, then they have the _____ to direct or influence the behaviour of other group members.

A. social skills
B. right
C. expertise
D. information

Question 9

Which of the following behaviours best describes conformity?

A. following the commands of someone in authority
B. adjusting one's actions so that they are consistent with those of group members
C. giving an incorrect answer when all other group members give the correct answer
D. giving the correct answer when all other group members give an incorrect answer

Question 10

As group size increases, conformity by an individual to the group's behaviour tends to

A. stay the same.
B. decrease.
C. increase.
D. increase, but only up to a group size of four.

Question 11

Jake conforms because he wants to be liked and accepted by the group. This is an example of conforming due to

A. normative influence.
B. unanimity.
C. informational influence.
D. culture.

Question 12

Lim is taking up surfing. She buys a surfboard with two fins rather than one fin on the advice of a surfer friend.

This is an example of conformity due to

A. normative influence.
B. unanimity.
C. informational influence.
D. culture.

Question 13

Obedience involves

A. following the commands of someone in authority.
B. choosing to do as the rest of the group does, even when not in agreement with the group.
C. exerting power and influence over someone.
D. exerting power and status over someone.

Question 14

An analysis of the results of Asch-type experiments in many different countries found that

A. people in North America and Western Europe show the highest levels of conformity to group pressure.
B. people in collectivist cultures are less likely to conform to group pressure than people in individualistic cultures.
C. people in individualist cultures are less likely to conform to group pressure.
D. people in all cultures seldom conform to group pressure.

Question 15

The results of Milgram-type experiments that have been conducted in many different countries with participants from various kinds of backgrounds indicate that

A. most people refuse to be obedient when they become distressed.
B. there are significant sex differences in obedience.
C. there are significant age differences in obedience.
D. obedience in a Milgram-type experimental situation seems to occur regardless of sex or age.

Question 16

In one experiment on obedience, 22 hospital nurses were telephoned one at a time throughout the day by an unknown 'doctor' who ordered them to give a 'patient' an obvious overdose of a drug. All but one nurse complied without delay (until they were intercepted on their way to the patient).

Although not all nurses are so compliant, these nurses probably obeyed due to

A. ethical issues involved in disobeying a doctor.
B. the doctor's legitimate authority over them.
C. the social proximity of the doctor.
D. group pressure to obey.

Question 17

Samir is upset by an unfair request by a teacher to clean up the classroom, but obeys the teacher despite being upset. The teacher then makes the same request to Sara and Luke who refuse to obey. When Samir observes this, he also decides to disobey and stops cleaning.

Samir's change of mind about complying with the teacher's request is best explained by

A. ethical issues that are involved when teachers make unfair requests of students.
B. the realisation that the teacher is not a legitimate authority figure.
C. the social proximity of Sara and Luke.
D. the presence of group support.

Question 18

Which of the following examples involves bullying?

A. A year 10 student keeps picking on a year 7 boy who annoys him.
B. A teacher gives one week's detention to a student who has seriously misbehaved.
C. A girl verbally abuses another student who shut the door on her fingers.
D. A boy tells another student that he'll 'dob him in' if he doesn't return the DVD he believes was stolen from him.

Question 19

Oscar is driving to a fancy dress party wearing a Superman outfit. While waiting at a red traffic light, he sees an elderly lady collapse on the footpath. Although Oscar is competent in first aid and has plenty of time to help, he drives off when the traffic light turns green because he is afraid he will look 'stupid' to other motorists and pedestrians if he gets out and helps.

Oscar's failure to help is best explained by

A. anti-social thoughts.
B. the social responsibility norm.
C. audience inhibition.
D. bystander intervention.

Question 20

A car accident that occurs at a busy intersection during peak hour is witnessed by several pedestrians. No-one is injured, but it is not until 45 minutes later that the police arrive to redirect traffic and clear the road. The police did not arrive earlier because no-one reported the accident.

The failure of anyone to report the accident is best explained by

A. bystander intervention.
B. diffusion of responsibility.
C. deindividuation.
D. the social responsibility norm.

Question 21

Sam was bullied throughout primary school and knows what it feels like to be bullied. During lunchtime, she sees a student being bullied by others. She immediately reports this to the teacher on playground duty and the teacher stops the bullying.

Sam's motivation for helping is best explained by

A. her noticing the incident.
B. her sex.
C. her empathy.
D. the reciprocity norm.

Question 22

Dominic decides not to stop and help an elderly lady with a flat tyre because stopping to help will make him late for a job interview and he may get his suit dirty. As Dominic drives past, he feels a bit guilty but consoles himself with the understanding that since the lady is a stranger, he will probably never see her again.

Dominic's failure to stop and help is best explained by

A. social norms.
B. social influence.
C. shift in attention.
D. cost–benefit analysis.

Question 23

The reciprocity norm explains helping in terms of

A. mutual respect.
B. giving because we received.
C. having and not having.
D. not wanting to owe anything to anybody.

Question 24

Social norms are best described as

A. rules.
B. laws.
C. instinctive ways of behaving.
D. known ways of behaving.

Question 25

Being in a good mood typically increases the likelihood of helping, whereas being in a bad mood

A. can increase the likelihood of helping.
B. can decrease the likelihood of helping.
C. can increase or decrease the likelihood of helping.
D. has no effect on the likelihood of helping.

SECTION B

Answer **all** questions in the spaces provided. Write using black or blue pen.

Question 1 (2 marks)

When we obey an order from someone in a uniform we are most likely influenced by the ______________________ of this authority figure; whereas when we obey an order from someone because 'everyone else' is obeying, then we are most likely influenced by ______________________.

Question 2 (2 marks)

What are two characteristics that distinguish cyberbullying from other types of bullying?

Question 3 (4 marks)

Describe a positive and a negative influence of two different types of digital media on behaviour. Ensure you name the media types.

Question 4 (3 marks)

According to Latane and Darley (1968), what three key factors associated with a specific situation in which help is needed are required before someone considers providing help?

Question 5 (2 marks)

Explain how being drunk in a large group or crowd can increase the likelihood of someone engaging in anti-social behaviour.

Question 6 (2 marks)

Jack is jogging to the local gym where he usually works out four or five times a week. He is feeling good because his dad just rang him on the mobile to tell him that he can go to Lorne for 'schoolies' week. Shortly after the call, Jack spots a middle-aged man struggling to push his broken-down car to the side of a moderately busy street. It seems to Jack that the car has a flat battery or has run out of petrol. Jack chuckles to himself because he drives an even older model of the car and believes that it is a 'heap of rubbish'.

Explain whether Jack is likely to help the man push his car off the road. Ensure you refer to two key personal factors that can influence helping behaviour.

Question 7 (2 marks)

Four drivers of other vehicles stop and help someone trapped in their car following a collision. The drivers work cooperatively in administering first aid and to safely remove the trapped person from the car before emergency services arrive.

Explain whether or not the four drivers are a group, with reference to two distinguishing features of a group.

Question 8 (3 marks)

Explain how power and status affected the behaviour of the 'mock guards' and 'mock prisoners' in Zimbardo's Stanford Prison Experiment.

eBook*plus*

The answers to the multiple-choice questions are in the answer section at the back of this book and in eBookPLUS.
The answers to the Section B questions are in eBookPLUS.

MULTIPLE CHOICE ANSWERS

Chapter 2

Multiple choice

1 C	**2** A	**3** D	**4** B	**5** B
6 C	**7** B	**8** A	**9** D	**10** A
11 B	**12** B	**13** D	**14** C	**15** C
16 C	**17** D	**18** A	**19** A	**20** C
21 D	**22** B	**23** D	**24** C	**25** A
26 B	**27** B	**28** B	**29** C	**30** D

Chapter 3

Multiple choice

1 B	**2** C	**3** D	**4** A	**5** C
6 D	**7** A	**8** B	**9** D	**10** A
11 C	**12** A	**13** A	**14** B	**15** B
16 A	**17** D	**18** C	**19** B	**20** A
21 C	**22** B	**23** D	**24** A	**25** C

Chapter 4

Multiple choice

1 C	**2** C	**3** B	**4** A	**5** B
6 D	**7** A	**8** D	**9** D	**10** A
11 C	**12** A	**13** C	**14** A	**15** D

Chapter 5

Multiple choice

1 D	**2** B	**3** A	**4** B	**5** D
6 C	**7** A	**8** B	**9** B	**10** A
11 C	**12** A	**13** C	**14** D	**15** C

Chapter 6

Multiple choice

1 C	**2** B	**3** D	**4** C	**5** A
6 A	**7** C	**8** C	**9** B	**10** B
11 C	**12** A	**13** A	**14** D	**15** A
16 B	**17** B	**18** D	**19** D	**20** C

Chapter 7

Multiple choice

1 C	**2** C	**3** A	**4** D	**5** C
6 A	**7** B	**8** D	**9** D	**10** B
11 B	**12** A	**13** B	**14** C	**15** C
16 D	**17** B	**18** D	**19** B	**20** C

Chapter 8

Multiple choice

1 A	**2** C	**3** A	**4** D	**5** D
6 C	**7** B	**8** C	**9** A	**10** D

Chapter 9

Multiple choice

1 B	**2** D	**3** A	**4** A	**5** D
6 A	**7** D	**8** D	**9** C	**10** A
11 B	**12** D	**13** C	**14** B	**15** C
16 A	**17** D	**18** A	**19** B	**20** A
21 C	**22** B	**23** B	**24** B	**25** C

Chapter 10

Multiple choice

1 D	**2** A	**3** C	**4** B	**5** A
6 C	**7** C	**8** B	**9** B	**10** D
11 A	**12** C	**13** A	**14** C	**15** D
16 B	**17** D	**18** A	**19** C	**20** B
21 C	**22** D	**23** B	**24** D	**25** C

GLOSSARY

4P Factor model describes four influences on mental health and occurrence or re-occurrence of a mental disorder: *predisposing risk factors*, *precipitating risk factors*, *perpetuating risk factors*, *protective factors*

ablation disabling, destroying or removing selected brain tissue followed by an assessment of subsequent changes in behaviour

abstract thinking in Piaget's theory, a way of thinking that does not rely on being able to see, visualise, experience or manipulate in order to understand something

accommodation in Piaget's theory, changing a pre-existing mental idea to fit new information

accommodation in visual perception, a depth cue involving the automatic focusing of the lens in the eye to adjust shape in response to changes in the distance of view from an object

actor–observer bias the tendency to attribute one's own behaviour to external or situational factors, while attributing others' behaviour to internal or personal factors

adaptation in Piaget's theory, taking in, processing, organising and using new information in ways to adjust to change

adaptive behaviour any behaviour that enables the individual to adjust to the environment appropriately and effectively; compare with *maladaptive behaviour*

adaptive plasticity ability of the brain to compensate for lost function and/or to maximise remaining functions following injury

addiction a condition in which someone feels a recurring urge to use a substance or engage in an activity despite potentially harmful consequences

adoption study research using children who have been adopted (and therefore have no genetic similarity to their adoptive parents); compare with *twins study*

affective component of an attitude in the tri-component model of attitudes, the emotional reactions or feelings an individual has towards an object, person, group, event or issue

Ames room illusion a perceptual misinterpretation involving a trapezium-shaped room which appears rectangular when viewed through a peephole using only one eye and people appear small or large, depending on where they stand in the room

animism in Piaget's theory, the belief that everything which exists has some kind of consciousness

anxiety a state of arousal involving unpleasant feelings of apprehension or uneasiness that something is wrong or something bad is about to happen

anxiety disorder a mental disorder characterised by persistent feelings of tension, distress, nervousness and apprehension or fear about the future, with a negative effect

assimilation in Piaget's theory, taking in new information and fitting it into a pre-existing mental idea

association area a region of the brain's cerebral cortex that lies outside sensory and motor areas and which is believed to be involved in more complex functions that require integration of information from different cortical areas

attachment in psychology, the emotional bond which forms between an infant and another person, usually their main caregiver

attitude an evaluation a person makes about an object, person, group, event or issue

attribution the process by which people explain the causes of their own and other people's behaviour; also used to refer to the explanation

atypical behaviour when the individual acts in ways that are unusual for them; compare with *typical behaviour*

atypical development development that differs in a significant way from what is usual or appropriate; compare with *typical development*

audience inhibition not doing something because of a fear of appearing foolish in the presence of others

autonomic nervous system a self-regulating sub-division of the peripheral nervous system that connects the central nervous system to the body's internal organs and glands, providing feedback to the brain about their activities

autonomy in Erikson's theory, an individual's sense of being able to act independently and the feelings of self-control, self-confidence, self-reliance and competence which accompany this

axon a single, tubelike, extension that transmits neural information to other neurons or cells

axon terminal structure at the end of an axon collateral

behaviour any observable action made by a living person (or animal)

behavioural component of an attitude in the tri-component model of attitudes, the way in which an attitude is expressed through our actions (or how we might behave should the opportunity arise)

beneficence in relation to research ethics, the potential benefits of the research to participants or the wider community

binocular depth cue a depth (or distance) perception cue requiring the use of both eyes

biopsychosocial model a way of describing and explaining how biological, psychological and social factors combine and interact to influence an individual's behaviour and mental processes; sometimes called the *biopsychosocial approach* or *theory*

blind spot a small area on the retina at the back of the eye where there are no photoreceptors so light cannot be detected

brain an intricate network of cells that plays a vital role in processing information received through nerve pathways from the body and in directing actions within the body

brain hypothesis a belief that mental processes are located in the brain

brain injury any brain damage that impairs normal functioning of the brain, either temporarily or permanently

brain plasticity the ability of the brain to change in response to experience; also called *neuroplasticity*

brain versus heart debate an issue on whether the brain or heart is the location of or structure primarily responsible for human mental processes

brightness constancy the tendency to perceive an object as maintaining its level of brightness in relation to its surroundings, despite changes in the amount of light being reflected from the object to the retina

Broca's area area in the brain's frontal lobe with a crucial role in speech production

bullying when an individual or group with more power repeatedly and intentionally causes hurt or harm to another person or group of people who feel helpless to respond

bystander effect the tendency for individuals to be less likely to help another person in need when other bystanders are present, or believed to be present, as compared to when they are alone, and, the greater the number of bystanders, the less likely any one of them is to help

case study an intensive, in-depth investigation of some behaviour or event of interest in an individual, group, organisation or situation

catastrophic thinking negative thinking in which an object or situation is perceived as being far more threatening, dangerous or insufferable than it really is and will result in the worst possible outcome

central nervous system the brain and spinal cord

centration in Piaget's theory, the cognitive ability to focus on only one quality or feature of an object or event at a time

cerebellum the cauliflower-shaped structure located at the base of the brain that looks like a mini-brain

cerebral cortex outer layer of the brain involved in complex mental abilities, sensory processing and voluntary behaviours

cerebral hemisphere two almost-symmetrical brain areas running from the front to the back of the brain

cerebrum largest and most complex part of the brain with the cerebral cortex as its outer layer

classical conditioning a simple form of learning which occurs through repeated association of two (or more) different stimuli or 'events'

classification in Piaget's theory, the cognitive ability to organise objects or events into categories based on common features that set them apart from other categories

closure the perceptual tendency to mentally 'close up', fill in or ignore gaps in a visual image and to perceive objects as complete

cognitive behavioural therapy (CBT) a 'talking therapy' based on the assumption that the way people feel and behave is largely a product of the way they think

cognitive component of an attitude in the tri-component model of attitudes, the beliefs we have about an object, person, group, event or issue

cognitive distortion an inaccurate thought, belief or attitude

cognitive intervention generally refers to a strategy that attempts to change the way in which someone thinks

collectivist culture emphasises interests of the entire group ahead of those of the individual; compare with *individualistic culture*

computerised tomography (CT) neuroimaging technique that uses x-ray equipment to scan the brain at different angles and produce scans showing structure only; also called *computerised axial tomography* (*CAT*)

conclusion a decision about what the results obtained from a research study mean

cone photoreceptor in the retina of the eye that responds to high levels of light and is primarily responsible for night vision, colour vision and detecting fine details

conformity the tendency to adjust one's thoughts, feelings or behaviour in ways that are in agreement with those of a particular individual or group, or with accepted standards about how a person should behave in certain situations (social norms)

confounding variable a variable other than the independent variable that may have an unwanted effect on the dependent variable which can be confused with that of the independent variable

conservation in Piaget's theory, understanding that certain properties of an object can remain the same even when its appearance changes

contact hypothesis proposes that certain types of contact between members of different groups can reduce prejudice between them

context the setting, situation or environment in which an event occurs; in visual perception, the setting in which a perception is made

contralateral relating to the opposite side, as when the motor cortex in the left hemisphere controls voluntary movements on the right side of the body

control group the group in an experiment who is not exposed to the independent variable; used for comparison with the experimental group

convenience sampling sampling procedure involving selection of participants who are readily available; also called *opportunity sampling*

convergence a visual perception depth cue involving the inward turning of the eyes to focus on nearby objects

cornea transparent, convex-shaped (curved outwards) covering which protects the eye and helps to focus light rays onto the retina at the back of the eye

cortical lobe one of four anatomical divisions of the cerebral cortex; each of which is associated with various functions

cost–benefit analysis weighing up the personal and social costs of doing something against the benefits of doing it

counterbalancing systematically changing the order of treatments or tasks for participants in a 'balanced' way to 'counter' the unwanted effects on performance of any one order

critical period a specific period during which an organism's development is most vulnerable to the deprivation or absence of certain environmental stimuli or experiences; compare with *sensitive period*

cross-sectional study research method involving selection and comparison of groups of participants on one or more variables of interest at a single point in time

culture the way of life of a particular community or group that sets it apart from other communities and groups

cyberbullying *bullying* carried out using any type of digital technology

data information collected through research

debriefing process of explaining key features of a research investigation to participants after its conduct, including wellbeing checks where appropriate

deindividuation the loss of individuality, or the sense of anonymity, that can occur in a group situation

delusion a fixed, false belief that is held with absolute certainty, even when there is strong factual evidence that does not support it

dendrite thin extension of a neuron that receives information from neighbouring neurons and transmits it to the soma

dependent variable the variable in an experiment the researcher chooses to measure in order to assess the effect(s) of the independent variable(s)

depression lasting and continuous, deeply sad mood or loss of pleasure

depth cue source of information from the environment (external cue) or from within the body (internal cue) that assists perception of how far away objects are and therefore to perceive depth; often classified as *binocular* or *monocular*

depth perception the ability to accurately estimate the distance of objects and therefore perceive the world in three dimensions

descriptive statistics used for analysing, organising, summarising and presenting results; compare with *inferential statistics*

despair in Erikson's theory, an individual's sense that their life has been meaningless and empty

development psychological or physical change that occurs over time

diffusion of responsibility the belief that, in a situation where help is required and others are present, responsibility is spread across the whole group, leading each individual to feel less responsible for helping than when alone because they assume that someone else will take on the responsibility of helping

direct discrimination when a person treats, or proposes to treat, another person unfavourably because of a personal characteristic protected by the law; compare with *indirect discrimination*

discrimination positive or negative behaviour that is directed towards a social group and its members

disorganised attachment a type of insecure attachment characterised by inconsistent or odd and contradictory behaviours by an infant when separated or reunited with a caregiver

dizygotic (fraternal) twins non-identical twins developing from two separate ova that are independently fertilised; also called *fraternal twins*; compare with *dizygotic twins*

dopamine reward system a neural pathway in the brain that, when stimulated, results in pleasurable effects

double-blind procedure ensures neither the participants nor the researcher interacting with them knows which participants are in an experimental or control group; compare with *single-blind procedure*

doubt in Erikson's theory, an individual's lack of belief in their capabilities to do something well, to control themselves and the world in which they live

egocentrism in Piaget's theory, the tendency to perceive the world solely from one's own point of view

electrical stimulation of the brain stimulation or detection of electrical activity in the brain using an electrode; used to activate or inhibit neuronal function

emotional state how an individual is feeling at a point in time

empathy the ability to identify with and understand another person's feelings or difficulties

environment generally, the physical context or situation in which an event occurs; in relation to the nature–nurture debate, all the experiences, objects and events to which we are exposed throughout our entire lifetime; also referred to as *nurture*

ethics standards that guide individuals to identify good, desirable or acceptable behaviour

ethics committee a group who independently review research proposals to ensure it meets all relevant ethical requirements

experiment a research method in which a researcher tests whether one variable(s) influences or causes a change to another variable(s) under strictly controlled conditions

experimental group the group in an experiment who is exposed to the independent variable

experimenter effect an unwanted influence on the results produced by the person carrying out the research

explicit prejudice prejudice that is consciously held and deliberately thought about; compare with *implicit prejudice*

external validity the extent to which the results obtained for a study can be generalised to the population from which the sample was drawn or to other people in other settings over time

extraneous variable any variable other than the independent variable that can cause a change in the independent variable and therefore affect the results in an unwanted way

faculty in *phrenology*, a mental ability, personality characteristic or behaviour

figure–ground in visual perception, organising visual information by perceptually dividing a visual scene into a 'figure', which stands out from the 'ground', which is its surroundings

flavour perceptual experience produced by a combination of taste and other sensations

forebrain a collection of upper level structures that include the hypothalamus, thalamus and cerebrum; involved in complex cognitive processes, emotion and personality

fraternal twins non-identical twins developing from two separate ova that are independently fertilised; also called *dizygotic twins*

frontal lobe one of four critical lobes located in the upper forward half of a cerebral hemisphere

functional magnetic resonance imaging (fMRI) neuroimaging technique that detects and records brain activity by measuring oxygen consumption across the brain and produces colour images of brain structure, activity and function

functional neuroimaging a brain scanning technique, such as *PET* and *fMRI*, that produces an image showing some aspect of brain structure, activity and function; compare with *structural neuroimaging*

fundamental attribution error when explaining someone's behaviour, the tendency to overestimate the influence of personal factors and underestimate the impact of situational factors; behaviour is attributed to internal rather than external factors

gambler's fallacy the mistaken belief that in a series of independent chance events, future events can be predicted from past ones

gambling any activity in which something of value is put at risk in the hope of obtaining something of higher value

gambling disorder persistent and recurring maladaptive gambling behaviour that disrupts everyday personal, family and/or vocational activities

generalisation a decision about how widely the findings of a research study can be applied, particularly to other members of the population from which the sample was drawn

generativity in Erikson's theory, an individual's concern with others beyond their immediate family, specifically, future generations, and the nature of the society and world in which those generations will live

Gestalt principles of visual perception organising the features of a visual scene to perceive a whole, complete form

glial cell a cell in the nervous system that provides support for neuronal function

goal-directed behaviour purposeful behaviour

group any collection of two or more people who interact with and influence one another and who share a common purpose

guilt in Erikson's theory, a negative feeling formed by an individual when something they have done or want to do is considered 'wrong'

gustatory cortex areas of the brain's cerebral cortex that receive and process information for taste perception

gustatory hairs fine hairs that extend from the taste receptors into taste pores, thereby connecting taste pores to taste receptors

gustatory perception taste perception

hallucination a perceptual experience during which the individual sees, hears, feels, tastes or smells something that is not actually present in reality

halo effect a cognitive bias in which the impression formed about one quality of a person influences beliefs and expectations about the person in other qualities

heart hypothesis a belief that mental processes are located in the heart

height in the visual field the perceptual tendency to visually perceive objects located closer to the horizon as being more distant than objects located further from the horizon

hemispheric specialisation the idea that one hemisphere has specialised functions or exerts greater control over a particular function

heredity transmission of characteristics from biological parents to their offspring via genes at the time of conception; also referred to as *nature*

hindbrain a collection of lower level brain structures that include the cerebellum, medulla and pons

hypothalamus helps maintain the body's internal environment by regulating release of hormones and influences various other behaviours

idealistic thinking in Piaget's theory, comparing oneself and others to a perfect standard and striving towards being like that ideal

identical twins twins developing from a single ovum that splits into two after fertilisation; also called *monozygotic twins*

identity in Erikson's theory, the overall image an individual has of themself

illusion of control the mistaken belief that the outcomes of random, unpredictable events can be influenced or controlled by one's thoughts or actions

implicit prejudice prejudice that is unconsciously held so the individual is unaware of it; compare with *explicit prejudice*

imprinting a type of learning in which a very young animal fixes its attention on or attaches to the first object with which it has visual, auditory or tactile experience and thereafter follows that object and seems to form an attachment to that object

independent groups an experimental research design for which each participant is randomly allocated to one of two (or more) entirely separate ('independent') conditions ('groups'); also called *between participants*

independent variable variable that is manipulated in order to test its effects on the dependent variable

indirect discrimination when treating everybody the same way disadvantages someone because of a personal characteristic; compare with *direct discrimination*

individual participant differences the unique combination of personal characteristics, abilities and backgrounds each participant brings to an experiment

individualistic culture emphasises interests of the individual ahead of the entire group; compare with *collectivist culture*

industry in Erikson's theory, the sense of being busy, productive and a competent worker

inferential statistics used for interpreting and giving meaning to results; compare with *descriptive statistics*

inferiority in Erikson's theory, an individual's feelings of being less adequate than others in their achievements, skills and abilities

informational influence when a response results from a need for direction and information on what to do in a specific situation when uncertain about how to behave

ingroup any group to which an individual belongs or with which an individual identifies; compare with *outgroup*

initiative in Erikson's theory, an individual's ability to plan, think for themself and carry out various kinds of activities with purpose

integrity in Erikson's theory, an individual's sense of satisfaction with their achievements in life and a belief that the experiences and events in one's life have been useful, valuable, meaningful and worthwhile

intergroup contact a strategy to reduce prejudice by increasing contact between groups who are prejudiced against each other

internal validity the extent to which the results obtained for a study are actually due to the variable(s) that was tested or measured and not some other factor

interneuron relays information between sensory and motor neurons

interposition a visual perception depth cue based on the principle that an object which partially covers another is closer than the object it covers and the covered object is further away; also called *overlap*

interpretation in perception, the process of assigning meaning to incoming sensory information is so that it can be understood

interview when a researcher asks questions to obtain self-report data

intimacy in Erikson's theory, the ability to share with and care about another person without fear of losing oneself in the process

iris the coloured part of the eye consisting of a ring of muscles that expand or contract to change the size of the pupil and control the amount of light entering the eye

isolation in Erikson's theory, the sense of being alone without anyone to share one's life with or care for

justice in relation to research ethics, the use of fair procedures and ensuring fair distribution of the costs and benefits of the research

labelling the process of classifying and naming a mental disorder following a diagnosis

lens a transparent, flexible, convex structure located immediately behind the pupil which plays a major role in focusing light onto the retina

linear perspective a visual perception depth cue based on the apparent convergence of parallel lines as they recede into the distance

magnetic resonance imaging (MRI) neuroimaging technique that uses magnetic fields to vibrate atoms in the brain's neurons and generate a computer image showing brain structure only

maladaptive behaviour behaviour that interferes with the person's ability to adjust to the environment appropriately and effectively; compare with *adaptive behaviour*

mania an elevated mood involving intense elation or irritability

matched participants an experimental research design for which each participant in one condition 'matches' a participant in the other condition(s) on one or more participant variables of relevance; also called *matched groups*

maturation the genetically predetermined orderly and sequential developmental changes which occur in the nervous system and other bodily structures

mean the arithmetical average of all the individual scores in a set of scores

measure of central tendency score that indicates the central value of a set of scores

measure of variation score that indicates how widely scores are distributed or spread around the central point; also called *variability*

medulla continuation of the spinal cord, connecting it to the brain; controls bodily functions required for survival

mental disorder a mental health state that involves a combination of thoughts, feelings and/or behaviours which impair the ability to function effectively in everyday life; also called *psychological disorder* or *mental illness*

mental health a state of wellbeing in which an individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community

mental health problem a mental health concern that interferes with functioning but is usually less severe and of a shorter duration than a *mental health disorder*

mentally healthy being in a generally positive state of mental wellbeing, having the ability to cope with and manage life's challenges, working productively, striving to fulfil one's goals and potential, and having a sense of connection to others and the community in general

mere exposure effect the increase in liking for an attitude, object, person, group, event or issue as a result of being repeatedly exposed to it

midbrain connects upper and lower brain areas and houses structure involved with movement, processing of visual, auditory and tactile sensory information, sleep and arousal

mind–body problem the issue of whether our mind and body are distinct, separate entities or whether they are one and the same thing

mistrust in Erikson's theory, an individual's sense of the world as unreliable and unpredictable, which makes them anxious, insecure, fearful and suspicious

model a general explanation of a set of observations about behaviour and/or mental processes which seem to be related; also called *theory*

modern prejudice form of prejudice which tends to be subtle, hidden and expressed in ways more likely to be accepted within the majority group; compare with *old-fashioned prejudice*

monocular depth cue a depth perception cue requiring the use of only one eye

monozygotic (identical) twins identical twins developing from a single ovum that splits into two after fertilisation; compare with *dizygotic twins*

mood overall feeling that colours a person's perception of the world and influences how they approach and go about daily life

mood disorder a mental disorder involving a disabling disturbance in emotional state, from the extreme sadness of depression to the extreme elation of mania

motivation processes within an organism which activate behaviour that is directed towards achieving a particular goal

motor neuron carries messages from the central nervous system to the cells in skeletal muscles, organs and glands to stimulate activity

Müller-Lyer illusion a *visual illusion* in which one of two lines of equal length, each of which has opposite shaped ends, is incorrectly perceived as being longer than the other

myelin white, fatty substance covering an axon

myelination growth and development of white, fatty myelin around axons

naturalistic observation when the researcher views behaviour of interest in the natural, 'real life' environment where it would ordinarily occur

negative symptom a symptom of a psychotic disorder that is characterised by the absence or elimination of certain thoughts, feelings or behaviours

neuroimaging a technique that captures a picture of the brain

neuron individual nerve cell that receives, processes and/or transmits information to other cells

non-standardised research procedures (including instructions) that are not the same for all participants (except for exposure to the independent variable by participants in the experimental group)

normative influence occurs when a response is guided by one or more social norms for a particular situation

obedience following the commands of someone with authority, or the rules or laws of our society

object permanence in Piaget's theory, understanding that an object still exists even if it cannot be seen, heard or touched

observational study collection of data by carefully watching and recording behaviour as it occurs

occipital lobe one of the four critical lobes located in the rearmost area of each cerebral hemisphere

old-fashioned prejudice a form of prejudice in which members of the majority group openly reject minority group members and their views towards the minority group are obvious and recognisable to others; compare with *modern prejudice*

operant conditioning a kind of learning through which we tend to repeat behaviour that has a desirable consequence (e.g. a reward), and tend not to repeat behaviour that has an undesirable consequence (e.g. punishment)

operationalising defining a variable in terms of the specific procedures or actions used to measure it

optic chiasm point where the axons of ganglion cells in the optic nerve cross

optic nerve carries visual information from the retina to the primary visual cortex

order effect when a participant's response relevant to the dependent variable is influenced by the specific order in which an experimental task is presented rather than the independent variable

outgroup any group to which an individual does not belong or identify; compare with *ingroup*

papillae small bumps on the surface of the tongue that contain taste buds

parasympathetic nervous system a sub-division of the autonomic nervous system that helps to maintain the internal body environment in a steady, balanced state of normal functioning; calms or restores the body to the normal state of functioning after an extreme emotion subsides or a threat has passed

parietal lobe one of four critical lobes located in the upper back area of the brain between the frontal and occipital lobes

Parkinson's disease a progressive neurological disorder characterised by both motor and non-motor symptoms

past experience personal experiences throughout an individual's life, including everything that is learned intentionally and unintentionally through experience

perception process by which meaning is given to incoming sensory information

perceptual constancy in relation to visual perception, the tendency to perceive an object as remaining stable and unchanging despite any changes that may occur to the image cast on the retina

perceptual distortion an inconsistency, or 'mismatch', between a perceptual experience and physical reality

perceptual set the predisposition to perceive something in accordance with expectations of what it is

peripheral nervous system carries information to and from the central nervous system

perpetuating risk factor in the *4P Factor model*, a risk factor that maintains or prolongs the occurrence of a specific mental disorder

personal attribution an explanation of behaviour based on the characteristics of the person involved, such as their personality, ability, attitude, motivation, mood or effort; sometimes called *dispositional*

personality an individual's unique pattern of thoughts, feelings and behaviour that are relatively stable over time and across situations

personality disorder a mental disorder involving inflexible and maladaptive personality characteristics that interfere with functioning or cause significant personal distress

person perception the mental processes used to form impressions and draw conclusions about the personal characteristics of other people

phobia excessive, persistent and unreasonable fear of an object or situation

photoreceptor a light-sensitive visual receptor cell in the eye; see *rods and cones*

phrenology the study of the relationship between the skull's surface features and a person's personality and behavioural characteristics

pictorial cue a visual perception depth cue that can be represented pictorially on a two-dimensional surface

placebo an inactive substance or fake treatment that is like the independent variable treatment but which has no known effect

placebo effect occurs when there is a change in a participant's behaviour due to their belief that they are receiving some kind of experimental treatment and they respond in accordance with that belief, rather than to the effect of the IV

plasticity in relation to the brain, the ability of the brain to change in response to experience; also called *neuroplasticity*

pons hindbrain structure involved in sleep, dreaming, arousal from sleep and control of breathing and coordination of some muscle movements

population the entire group of research interest from which a sample is drawn

positive symptom a symptom of a psychotic disorder that occurs in addition to how the individual usually thinks, feels or behaves

positron emission tomography (PET) neuroimaging technique that produces colour images of brain structure, activity and function

power an individual's (or group's) ability to control or influence the thoughts, feelings or behaviour of another person (or group)

precipitating risk factor in the *4P Factor model*, a risk factor that increases susceptibility to and contributes to the occurrence of specific mental disorder

predisposing risk factor in the *4P Factor model*, a risk factor that increases susceptibility to or vulnerability to developing a mental disorder

prejudice holding a negative attitude towards the members of a group, based solely on their membership of that group

pre-operational stage the second stage in Piaget's theory (2–7 years) when children become increasingly able to mentally represent objects and experiences

primary auditory cortex receives and processes sounds from both ears

primary data information collected directed by the researcher (or through others) for their own purpose; compare with *secondary data*

primary motor cortex initiates and controls voluntary movements

primary somatosensory cortex receives and processes bodily sensory information

primary visual cortex receives and processes visual information from the eyes

principle of readiness in developmental psychology, inability to perform a behaviour development on maturation until the necessary bodily structures are sufficiently developed

problem gambling behaviour characterised by difficulties in limiting money and/or time spent on gambling, which leads to negative consequences for the gambler, for others or for the community

pro-social behaviour everyday acts of helping others, as well as helping that involves personal cost to the helper

protective factor in the *4P Factor model*, enhances and safeguards mental health, and reduces the likelihood that a mental disorder will develop or re-occur; compare with *risk factor*

proximity in relation to visual perception, the tendency to perceive parts of a visual image which are positioned close together as belonging together in a group; also called *nearness*

pseudoscience fake or false science

psychology the scientific study of human thoughts, feelings and behaviour

psychosis a mental health condition characterised by major disturbances in thoughts, perceptions, emotions and behaviour, including difficulty in distinguishing reality from self-generated perceptions

psychosocial crisis in Erikson's theory, a social dilemma or problem an individual faces in adjusting to society involving a struggle between two opposing tendencies, one of which comes from internal personal needs and the other from the demands of society

psychosocial development in Erikson's theory, change involving both psychological processes taking place within the individual ('psycho') and their experiences with other people ('social')

psychotic a mental health state associated with the experience of psychosis or many symptoms of a psychotic disorder

psychotic disorder a mental health disorder characterised by psychosis; for example, schizophrenia

pupil an opening in the iris that helps to control the amount of light entering the eye

***p* value** the probability level, expressed statistically, at which chance is likely to have operated on the results obtained from research

qualitative data data (information) involving the 'qualities' or characteristics of a participant's experience of what is being studied

quantitative data numerical information on the 'quantity' or amount of what is being studied

questionnaire a written set of questions designed to collect self-report data

random allocation procedure used to assign participants to experimental and control groups (or conditions) so that each one has a genuinely equal chance of being placed in any of the groups; ensures uniform distribution of participant characteristics; also called *random assignment*

random sampling sampling procedure that ensures every member of the population of research interest has a genuinely equal chance of being selected as a participant and thereby helps achieve a *representative sample*

rating scale fixed-response questions or statements for which participants rank each item by selecting from a number of choices

reception the process of detecting and responding to incoming sensory information

receptive field the area of space in which a sensory receptor can respond to a stimulus or the specific area of sensitivity of a receptor cell where a stimulus will affect its activity

reciprocity norm a social norm that we should do for others what they would do for us or what we would expect them to do

relative size the perceptual tendency to visually perceive the object that produces the largest image on the retina as being closer and the object that produces the smallest image as being further away (when objects are expected to be the same size)

reliability the extent to which a measure produces results that are consistent, dependable and stable

repeated exposure being exposed to an object, person, group, event or issue repeatedly

repeated measures an experimental research design for which each participant is in both the experimental and control conditions; also called *within participants*

replication generally refers to the reproducibility and repeatability of a research investigation and its results

representative sample a sample that is approximately the same as the population from which it is drawn in every important participant variable

rerouting when an undamaged neuron that has lost a connection with an active neuron seeks a new active neuron and connects with it instead

research hypothesis a testable prediction of the relationship between two or more variables

research merit research that is worthwhile and conducted appropriately to achieve the aims

research method a particular way of conducting a research study or investigation to collect data on a topic (question or problem) of interest

respect for human beings in relation to research ethics, when the researcher takes account of the rights, beliefs, perceptions and cultural backgrounds of all participants

reticular formation area of the brain that helps screen incoming information, alerts higher brain centres to important information, helps maintain consciousness, and regulates arousal and muscle tone

retina layer of neural tissue at the back of the eye that receives and absorbs light, and processes images for transmission to the brain

retinal disparity a visual perception depth cue based on the difference (disparity) of the two retinal images

reversibility in Piaget's theory, the cognitive ability to mentally follow a sequence of events or line of reasoning back to its starting point

risk factor in the *4P Factor model*, increases the likelihood that a mental disorder will develop, or increase in severity or duration when it occurs, or will hinder recovery from a disorder; compare with *protective factor*

rod photoreceptor in the eye's retina that responds to very low levels of light; primarily responsible for night vision

role the behaviour adopted by an individual or assigned to them that influences the way in which they function or act in different situations and life in general

role confusion in Erikson's theory, an individual's sense of not knowing who they are, where they belong, to whom they belong or where they are headed in life

sample smaller group of research participants selected from a larger group (population) of research interest

sampling process of selecting participants from a population of research interest

schema in Piaget's theory, a mental idea of what something is and how to act on it

secondary data information collected by someone other than the original user who did so for their own purpose; compare with *primary data*

self-report a participant's written or spoken responses to questions, statements or instructions presented by the researcher

self-serving bias when judging ourselves, the tendency to take the credit for our successes and attribute failures to situational factors

self-stigma when an individual accepts the negative views and reactions of others, internalises them, and applies them to themselves; see also *social stigma*

sensation process by which our sensory receptors and sense organs detect and respond to sensory information that stimulates them

sensitive period a period of time when an individual's development is more responsive to certain types of environmental experiences or learning; compare with *critical period*

sensorimotor stage the first stage in Piaget's theory (0–2 years), when infants explore and learn about the world primarily through their senses and motor activities

sensory neuron receives sensory information from both the external and internal environments and carries it *to* the central nervous system

shame in Erikson's theory, an individual's sense of humiliation and embarrassment

shape constancy the tendency to perceive an object as maintaining its shape despite any change in shape of the image of the object on the retina

similarity the tendency to perceive parts of a visual image that have similar features, such as size, shape, texture or colour, as belonging together in a unit, group or 'whole'

single-blind procedure ensures participants do not know whether they are in an experimental or control group; compare with *double-blind procedure*

situational attribution an explanation of behaviour based on factors external to the person involved, such as the actions of another person, some aspect of the environment, the task, luck and fate

size constancy in visual perception, recognising that an object's actual size remains the same, even though the size of the image it casts on the retina changes

social cognition how individuals interpret, analyse, remember and use information to make judgments about others in different social situations

social influence the effects of the presence or actions of others, either real or imagined, on the way people think, feel and behave

social learning theory an approach to describing and explaining learning that emphasises the importance of the social environment in which the learning occurs as we watch others and also see the consequences of how they think, feel or behave

social loafing the tendency of an individual to make less effort when involved in a group activity than when working alone

social media websites and applications that allow social networking and sharing of information

social norm a standard that governs what people should or should not do in different social situations

social power use of power in a social interaction to control or influence another person (or group)

social proximity the closeness between two or more people, either in physical distance or in the closeness of their relationship

social responsibility norm a *social norm* prescribes that we should help those who need help because it is our responsibility or duty to do so

social stigma the negative attitudes and beliefs held in the wider community that lead people to fear, reject, avoid and discriminate against people with a mental disorder; see also *self-stigma*

soma part of the nueron that integrates neural information received from dendrites and sends it to the axon (as an action potential); also called a *cell body*

somatic nervous system a sub-division of the peripheral nervous system that carries sensory and motor information *to and from* the central nervous system

spatial neglect neurological disorder whereby individuals are unable to notice anything either on their left or right side; also called *hemispatial neglect* and *visual neglect*

spinal cord a long, thin bundle of nerve tissue that extends from the base of the brain to the lower back, connecting the brain to the peripheral nervous system

split-brain surgery cutting the main band of nerve tissue (corpus callosum) connecting the two hemispheres

sprouting growth of additional branches on axons or dendrites to enable new connections with other neurons

stagnation in Erikson's theory, an individual's sense of feeling bored, inactive, overly concerned with their own personal needs and comforts and their lack of personal growth

standard deviation statistic that summarises how far scores within a set of scores spread out, or 'deviate', from the mean for those scores

standardised instructions in research, when directions and explanations given to all participants in each condition are identical in terms of what they state and how they are given

standardised procedures in research, when techniques for observing and measuring responses are the same for all participants, except for variations associated with exposure to the independent variable in an experiment

status the importance of an individual's position in the group, as perceived by members of the group

stereotype a collection of beliefs that we have about the people who belong to a certain group, regardless of individual differences among members of that group

stereotyping process of grouping or 'fitting' people into a category based on what is known about them

stigma a sign of social unacceptability or desirability, often involving shame or disgrace; see also *self-stigma* and *social stigma*

Strange Situation a test to measure infant attachment relationships

stratified sampling a sampling procedure which involves dividing the population to be sampled into different subgroups (*strata*), then selecting a separate sample from each subgroup (or *stratum*) in the same proportions as they occur in the population of interest

structural neuroimaging a brain scanning technique, such as *CT* and *MRI*, that produces an image showing structure and anatomy; compare with *functional neuroimaging*

superordinate goal a goal that cannot be achieved by any one group alone and overrides other existing goals which each group might have

support group a group who interact on the basis of common interests or experiences to provide mutual support

sustained contact ongoing contact with someone, either directly or indirectly

symbolic thinking in Piaget's theory, the cognitive ability to use symbols such as words and pictures to represent objects that are not physically present

sympathetic nervous system a sub-division of the autonomic nervous system that arouses the body for vigorous activity or to deal with a stressful or threatening situation

synaesthesia perceptual experience in which stimulation of one sense involuntarily produces additional unusual experiences in another sense

synaptic pruning 'pruning' of weak or unused synaptic connections in the brain

synaptogenesis formation of new synapses between the brain's neurons

tastant the dissolved chemical molecules in the mouth that can be tasted

taste bud structure containing taste receptors

taste pore connects the surface of the tongue to taste receptors within taste buds (via gustatory hairs)

taste receptor sensory receptor that detects the chemical molecules that enable taste; sometimes called *gustatory cell*

temperament a characteristic way of reacting to people, objects and events

temporal lobe one of the four critical lobes, located in the lower, central area of the brain, above and around the top of each ear

texture the property of food or beverage that is felt in the mouth and contributes to flavour

texture gradient a visual perception depth cue based on the extent to which fine detail can be perceived in a surface

thalamus relay station in the brain for incoming sensory information (except smells)

theory a general explanation of a set of observations about behaviour and/or mental processes which seem to be related; also called *mode*

transduction converting incoming sensory information into a form which can travel along neural pathways to the brain

transformation in Piaget's theory, understanding that something can change from one state to another

transmission when sensory information is carried along a neural pathway

traumatic brain injury a type of acquired brain injury caused by a blow to the head or by the head being forced to move rapidly forward or backward

tri-component model of attitudes an explanation of attitudes in terms of three related components — affective, behavioural and cognitive — that comprise any attitude

trust in Erikson's theory, an individual's sense of the world as a safe, caring, orderly and predictable place

twins study research using identical (monozygotic) and/or non-identical/fraternal (dizygotic) twins; compare with *adoption study*

'two-hit' hypothesis an explanation of schizophrenia in terms of two events — genetic vulnerability and environmental stress — that must occur in that order

typical behaviour when an individual's behaviour occurs as it usually does at most times; compare with *atypical behaviour*

typical development when development proceeds as is usual or appropriate when compared with others of the same age, sex or culture; compare with *atypical development*

unanimity complete agreement among group members

validity the extent to which a measure accurately measures what it claims to have measured; see also *internal validity* and *external validity*

variable something in which individuals, animals or objects differ among themselves, can change in amount or kind, and is measurable

visual illusion a consistent perceptual misinterpretation of real sensory information whenever that sensory information is viewed

visual perception principle 'rule' applied to visual information to assist organisation and interpretation of the information in consistent and meaningful ways

visual sensory system the complete network of physiological structures involved in vision

Wernicke's area area of the brain's temporal lobe involved in speech production and comprehension

REFERENCES

Aboud, F.E. (2003). The formation of in-group favoritism and out-group prejudice in young children: Are they distinct attitudes? *Developmental Psychology, 39*, 48–60.

Ainsworth, M.D.S. (1982). Attachment: Retrospect and prospect. In C.M. Parkes & J. Stevenson-Hinde (Eds.), *The place of attachment in human behaviour* (pp. 3–30). New York: Basic Books.

Ainsworth, M.D.S. (1983). Patterns of infant–mother attachment as related to maternal care. In D. Magnusson & V. Allen (Eds.), *Human development: An interactional perspective* (pp. 35–55). New York: Academic Press.

Ainsworth, M.S., Blehar, M.C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Oxford, UK: Erlbaum.

Ajzen, I., & Fishbein, M. (2002). Attitudes and the attitude behaviour relation: Reasoned and automatic processes. In W. Stroebe & M. Hewstone (Eds.), *European Review of Social Psychology,11,* (pp. 1–33). New York: John Wiley & Sons.

Akechi, H., Senju, A., Uibo, H., Kikuchi,Y., Hasegawa, T., & Hietanen, J.K. (2013). *Attention to eye contact in the west and east: Autonomic responses and evaluative ratings. PLOS ONE 8*(3). Retrieved from http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0059312

Alaei, R., & Rule, N.O. (2016). Accuracy of perceiving social attributes. In J.A. Hall, M. Schmid Mast, & T.V. West (Eds.), *The Social Psychology of Perceiving Others Accurately* (pp. 125–142). Cambridge University Press.

Alcorn, N., Buchanan, L., Smith, J., & Gregory, L. (2015). Media Consumer Survey 2015: Australian media and digital preferences (4th ed.). Deloitte Australia report. https://www2.deloitte.com/content/dam/Deloitte/au/Documents/technology-media-telecommunications/deloitte-au-tmt-media-consumer-survey-2015-100815.pdf

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington DC: Author.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, Virginia: Author.

American Psychological Association (2013, November). Television and video violence. *Psychology: Science in Action*. Retrieved from http://www.apa.org/action/resources/research-in-action/protect.aspx

American Psychological Association (2015). *Technical report on the review of the violent video game literature.* (APA Task Force on Violent Media). Retrieved from http://www.apa.org/pi/families/violent-media.aspx

American Psychological Association (2017). *Research with animals in psychology* (Pamphlet). Retrieved from https://www.apa.org/research/responsible/research-animals.pdf

Anderson, D., & Pempek, T. (2005). Television and very young children. *American Behavioural Scientist, 48*(5), 505–522.

Andrewes, D.G. (2001). *Neuropsychology: From theory to practice*. New York: Psychology Press.

Aronson, E. (1988). *The Social Animal* (5th ed.). New York: W.H. Freeman.

Aronson, E. (2008). *The social animal* (10th ed.). New York: Worth/Freeman.

Aronson, E. (2011). *The Social Animal* (11th ed.). New York: Worth/Freeman.

Aronson, E., Wilson, T.D., & Akert, R.M. (1999). *Social psychology* (3rd ed.). New York: Longman.

Aronson, E., Wilson, T.D., & Akert, R.M. (2002). *Social psychology* (4th ed.). New York: Longman.

Asch, S.E. (1955). Opinions and social pressure. *Scientific American, 193*, 31–35.

Australian Bureau of Statistics (2016). *3101.0 — Australian Demographic Statistics, Jun 2016*. Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/0/1CD2B1952AFC5E7ACA257298000F2E76?OpenDocument

Australian Bureau of Statistics (2017a). *Mobile handset subscribers* (8153.0 — Internet Activity, Australia, June 2016). Retrieved April 22, 2017 from http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/8153.0Main%20Features5June%202016?opendocument&tabname=Summary&prodno=8153.0&issue=June%202016&num=&view=

Australian Bureau of Statistics (2017b). *Households with internet access at home* (8146.0 — Household use of information technology, Australia, 2014–15). Retrieved April 22, 2017 from http://abs.gov.au/ausstats/abs@.nsf/mf/8146.0

Australian Communications and Media Authority (2016). *Aussie teens and kids online* (Research snapshots). Retrieved April 24, 2017 from http://www.acma.gov.au/theACMA/engage-blogs/engage-blogs/Research-snapshots/Aussie-teens-and-kids-online

Australian Human Rights Commission (2017). *Our work: Sex discrimination*. Retrieved from https://www.humanrights.gov.au/our-work/sex-discrimination/about-sex-discrimination

Australian Institute of Family Studies (2017). *Sports betting and advertising* (Australian Gambling Research Centre Discussion Paper No. 4 — November 2014). Retrieved from https://aifs.gov.au/agrc/publications/sports-betting-and-advertising/introduction

Australian Institute of Health and Welfare (2016). *Mental Health Service in Brief 2016*. Retrieved from http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129557392

Australian Institute of Health and Welfare (2017). *Australia's welfare: Child wellbeing (0–14).* Retrieved from http://aihw.gov.au/australias-welfare/2015/child-wellbeing/

Australian Psychological Society (2007). *Code of ethics*. Melbourne, Vic.: Author.

Azari, N.P., & Seitz, R.J. (2009). *Brain plasticity and recovery from stroke*. Brain Injury Resource Foundation. Retrieved from http://www.birf.info/home/library/rehab/reh-brainpl.html

Bachman, G., & Zakahi, W.R. (2000). Adult attachment and strategic relational communication: Love schemas and affinity-seeking. *Communication Reports, 13*(1), 11–19.

Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, New Jersey: Prentice Hall.

Baron, R.A., & Byrne, D. (1991). *Social psychology — Understanding human interaction* (6th ed.). Needham Heights, Massachusetts: Allyn & Bacon.

Bartoshuk, L.M. (1989). Taste: robust across the age span? *Annals of the New York Academy of Sciences*, *561*(1), 65–75.

Bartoshuk, L.M. (2000). Comparing sensory experiences across individuals: Recent psychophysical advances illuminate genetic variation in taste perception. *Chemical Senses, 25*, 447–460.

Bartoshuk, L.M. (2015a). *Variation in sensation and affect: We live in 'different taste worlds'*. Retrieved from https://gustavus.edu/events/nobelconference/2010/bartoshuk.php; and http://www.pbs.org/safarchive/3_ask/archive/qna/3294_peppers.html

Batson, C.D. (1991). *The altruism quest.* Hillsdale, New Jersey: Lawrence Erlbaum.

Batson, C.D. (1995). Prosocial motivation: Why do we help others? In A. Tesser (Ed.), *Advanced social psychology* (pp. 333–381). Boston, Massachusetts: McGraw-Hill.

Batson, C.D. (1998). Altruism and prosocial behaviour. In D.T. Gilbert, S.T. Fiske & G. Lindzey (Eds.), *Handbook of Social Psychology* (4th ed.), *Vol. 2* (pp. 282–315). New York: McGraw-Hill.

Batson, C.D., & Moran, T. (1999). Empathy-induced altruism in a prisoner's dilemma. *European Journal of Social Psychology, 29*(7), 909–924.

Batson, C.D., Sager, K., Garst, E., & Kang, M. (1997). Is empathy-induced helping due to self-other merging? *Journal of Personality and Social Psychology, 73,* 495–509.

Bennett, A.J. (2012). *Animal research: The bigger picture and why we need psychologists to speak out*. Retrieved from http://www.apa.org/science/about/psa/2012/04/animal-research.aspx

Bergland, C. (2015). *The cerebellum deeply influences our thoughts and emotions*. Retrieved March 15, 2017 for https://www.psychologytoday.com/blog/the-athletes-way/201503/the-cerebellum-deeply-influences-our-thoughts-and-emotions

beyondblue (2015b). *Depression — What causes depression?* Retrieved from http://www.beyondblue.org.au/the-facts/depression/what-causes-depression

beyondblue (2016b). *Statistics and references: Depression*. Retrieved from https://www.beyondblue.org.au/about-us/research-projects/statistics-and-references

beyondblue (2016d). *The facts: Depression — Treatments for depression*. Retrieved from https://www.beyondblue.org.au/the-facts/depression/treatments-for-depression

Black. D.W. (2015). The natural history of antisocial personality disorder. *Canadian Journal of Psychiatry, 60*(7), 309–314.

Black, D.W., Gunter, T., Loveless, P., Allen, J., & Sieleni, B. (2010). Antisocial personality disorder in incarcerated offenders: Psychiatric comorbidity and quality of life. *Annals of Clinical Psychiatry*, *22*(2), 13–20.

Blakemore, C. (1977). *Mechanics of the mind*. New York: Cambridge University Press.

Blandini, F., & Armentero, M.T. (2012). Animal models of Parkinson's disease. *FEBS Journal, 279*, 1156–1166.

Błaszczyk, J.Z. (2106). Parkinson's disease and neurodegeneration: GABA-Collapse hypothesis. *Frontiers in Neuroscience, 10, (*Article 269). Retrieved from http://journal.frontiersin.org/article/10.3389/fnins.2016.00269/full#h2

Bodamer (1947). Cited in Andrewes, D. (2001). *Neuropsychology — From theory to practice*. East Sussex, United Kingdom: Psychology Press.

Bond, R., & Smith, P.B. (1996). Culture and conformity: A meta-analysis of studies using Asch's (1952b, 1956) line judgement task. *Psychological Bulletin, 119*(1), 111–137.

Bootzin, R.R., Bower, G.H., Zajonc, R.B., & Hull, E. (1986). *Psychology today: An introduction* (6th ed.). New York: Random House.

Bouchard, T.J. Jr., & McGue, M. (1981). Familial studies of intelligence: a review. *Science, 212*(4498), 1055–1059.

Bove, D., Bove, R.M., Caccavale, S., Bravaccio, C., Marino, M., & La Montagna, M. (2016). Adolescence, imperceptible boundary between normality and pathology: a literature review, *Minerva Pediatrica*, *68*(2), 148–151.

Bowlby, J. (1988). *A Secure Base: Parent–child attachment and healthy human development*. New York: Basic Books.

Boyce, J.M., & Shone, G.R. (2006). Effects of ageing on smell and taste. *Postgraduate Medical Journal, 82*(966), 239–241.

Brain Foundation (2017). *Disorders: Parkinson's Disease.* Retrieved from http://brainfoundation.org.au/disorders/parkinsons-disease

Brain Injury Australia (2015). *About acquired brain injury*. Retrieved from http://www.braininjuryaustralia.org.au/index.php?option=com_content&view=article&id=2&Itemid=3

Brain Injury Australia (2017a). *Brain injury: What is brain injury?* Retrieved from http://www.braininjuryaustralia.org.au/brain-injury-2/

Brain Injury Australia (2017b). *Resources: Publications.* Retrieved from http://www.braininjuryaustralia.org.au/resource-category/brain-injury-australia-publications/

Breedlove, S.M., Watson, N.V., & Rosenzweig, M.R. (2010). *Biological psychology — An introduction to behavioral, cognitive, and clinical neuroscience* (6th ed.). Sunderland, Massachusetts: Sinauer.

Brewer, W.J., Wood, S.J., Phillips, L.J., Francey, S.M., Pantelis, C., Yung, A.R., . . . McGorry, P.D. (2006). Generalized and specific cognitive performance in clinical high-risk cohorts: a review highlighting potential vulnerability markers for psychosis. *Schizophrenia Bulletin, 32*(3), 538–555.

Broome, M.R., Johns, L.C., Valli, I., Woolley, J.B, Tabraham, P., Brett, C., . . . McGuire, P.K. (2007). Delusion formation and reasoning biases in those at clinical high risk for psychosis. *British Journal of Psychiatry: Supplement, 51*, 38–42.

Brown, S., & Kelly, G. (2012). *Issues and inequities facing people with ABI in the criminal justice system: A paper prepared for the Victorian Coalition of ABI Service Providers*. Retrieved from http://diverge.org.au/pdf/brown_kelly_2012.pdf

Bukatko, D. 2008. *Child and adolescent development: A chronological approach*. Boston, Massachusetts: Houghton Mifflin.

Bullying. No way! (2016a). *What is bullying?: Online bullying*. Retrieved April 23, 2017 from https://bullyingnoway.gov.au/WhatIsBullying/Pages/Online-bullying.aspx

Bullying. No way! (2017a). *What is bullying?: Facts and figures*. Retrieved August 3, 2017 from https://bullyingnoway.gov.au/WhatIsBullying/FactsAndFigures

Bullying. No way! (2017d). *Perspectives on bullying. (What is bullying?: What is bullying? — Definition of bullying).* Retrieved August 3, 2017 from https://bullyingnoway.gov.au/WhatIsBullying/DefinitionOfBullying/Pages/Perspectives-on-bullying.aspx

Burton, L., Westen, D., & Kowalski, R. (2012). *Psychology: Australian and New Zealand edition* (3rd ed.). Milton, Qld: Wiley.

Carmichael, D.A., Down, M.P., Shillcock, R.C., Eagleman, D.M., & Simner, J. (2015). Validating a standardised test battery for synesthesia: Does the Synesthesia Battery reliably detect synesthesia? *Consciousness and Cognition, 33*, 375–385.

Celesia, G.G. (2012). Alcmaeon of Croton's observations on health, brain, mind, and soul. *Journal of the history of neurosciences , 21*(4), 409–426.

Centre for Neuro Skills (2017). *Brain injury: Frontal lobes.* Retrieved from https://www.neuroskills.com/brain-injury/frontal-lobes.php

Chan, M.M., & Kane-Martinelli, C. (1997). The effect of color on perceived flavor intensity and acceptance of foods by young adults and elderly adults. *Journal of the American Dietetic Association, 97*, 657–659.

Charlesworth, R. (2014). *Understanding child development*. Belmont, California: Wadsworth.

Choi, I., Nisbett, R.E., & Norenzayan, A. (1999). Causal attribution across cultures: Variation and universality. *Psychological Bulletin, 125*, 47–63.

Cialdini, R.B., & Trost, M. (1998). Social influence: Social norms, conformity and compliance. In D. Gilbert, S.T. Fiske & G. Lindzey (Eds.), *Handbook of social psychology: Vol. 2* (4th ed.) (pp. 151–192). Boston, Massachusetts: McGraw-Hill.

Cohen, P., Brown, J., & and Smailes, E. (2001). Child abuse and neglect and the development of mental disorders in the general population. *Development and Psychopathology*, *13*(4), 981–999.

Copolov, D.L., Seal, M.L., Maruff, P., Ulusoy, R., Wong, M.T., Tochon-Danguy, H.J., & Egan, G.F. (2003). Cortical activation associated with the experience of auditory hallucinations and perception of human speech in schizophrenia: a PET correlation study. *Psychiatry Research Neuroimaging, 122*, 139–152.

Costa, P.T., & McCrae, R.R. (1994). Set like plaster? Evidence for the stability of adult personality. In T.F. Heatherton & J.L. Weinberger (Eds.), *Can Personality Change?* Washington DC: American Psychological Association.

Cowen, P.J., & Browning, M. (2015). What has serotonin to do with depression? *World Psychiatry. 14*(2), 158–160.

Crockenberg, S. & Litman, C. (1991). Effects of maternal employment on maternal and two year old child behaviour. *Child Development, 61*, 930–953.

Crocker, J., Major, B., & Steele, C.M. (1998). Social stigma. In D.T. Gilbert, S.T. Friske & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed.), *Vol. 2* (pp. 504–553). Boston, Massachusetts: McGraw-Hill.

Cross, D., Shaw, T., Hearn, L., Epstein, M., Monks, H., Lester, L., & Thomas, L. (2009). *Australian covert bullying prevalence study (ACBPS).* Child Health Promotion Research Centre, Edith Cowan University, Perth. Retrieved from http://docs.education.gov.au/system/files/doc/other/australian_covert_bullying_prevalence_study_executive_summary.pdf

Curtiss, S. (1977). *Genie: A psycholinguistic study of a modern-day wild child*. New York: Academic Press.

Dacey, J., & Travers, J. (1991). *Human development across the lifespan*. Dubuque, Iowa: Wm. C. Brown.

Dale, G., & Arnell, K.M. (2014). *Lost in the forest, stuck in the trees: Dispositional global/local bias is resistant to exposure to high and low spatial frequencies. PLOS ONE 9*(7).e98625. Retrieved from https://doi.org/10.1371/journal.pone.0098625

Davidoff, J., Fonteneau, E., & Fagot, J. (2008). Local and global processing: Observations from a remote culture. *Cognition, 108*, 702–709.

Debernardi, A., Sala, E., D'Aliberti, G., Talamonti, G., Franchini, A.F., & Collice, M. (2010). Alcmaeon of Croton. *Neurosurgery. 66*(2), 247–252.

Delwiche, J.F. (2012). You eat with your eyes first. *Physiology and Behavior, 107*, 502–504.

Department of Education and Training (2017a). *What is bullying?* Retrieved from http://www.education.vic.gov.au/about/programs/bullystoppers/Pages/what.aspx

Department of Education and Training (2017b). *The impact of bullying.* Retrieved from http://www.education.vic.gov.au/about/programs/bullystoppers/Pages/impact.aspx

Deregowski, J.B. (1989). Real space and represented space: Cross-cultural perspectives. *Brain and Behavioural Sciences, 12*, 51–119.

Devlin, A.M., Cross, J.H., Harkness, W., Chong, W.K., Harding, B., Vargha-Khadem, F., & Neville, B.G.R. (2003). Clinical outcomes of hemispherectomy for epilepsy in childhood and adolescence. *Brain, 126*, 556–566.

Dickins, M., & Thomas, A. (2016a). Gambling in culturally and linguistically diverse communities in Australia (AGRC Discussion Paper No. 7). Melbourne: Australian Gambling Research Centre, Australian Institute of Family Studies.

Dickins, M., & Thomas, A. (2016b). Is it gambling or a game? Simulated gambling games: Their use and regulation (AGRC Discussion Paper No. 5). Melbourne: Australian Gambling Research Centre, Australian Institute of Family Studies.

Diener, E. (1980). Deindividuation: The absence of self-awareness and self-regulation in group members. In P.B. Paulus (Ed.), *Psychology of group influence* (pp. 209–242). Hillsdale, New Jersey: Lawrence Erlbaum.

Di Michele, F., Luchetti, S., Bernardi, G., Romeo, E., & Longone, P. (2013). Neurosteroid and neurotransmitter alterations in Parkinson's disease. *Frontiers in Neuroendocrinology, 34*(2), 132–142.

Dodd, M.L., Klos, K.J., Bower, J.H., Gedya, Y.E., Josephs, K.A., Ahlskog, J.E. (2005). Pathological gambling caused by drugs to treat Parkinson's Disease. *Archives of Neurology, 62*, 1377–1381.

Donaldson, M. (1979). *Children's Minds*. Glasgow: Fontana/Collins.

Dovidio, J.F. (1984). Helping behaviour and altruism: An empirical and conceptual overview. In L. Berkowitz (Ed.), *Advances in Experimental & Social Psychology: Vol. 17* (pp. 361–427). New York: Academic Press.

DuBose, C., Cardello, A.V., & Maller, O. (1980). Effects of colourants and flavourants on identification, perceived flavour intensity, and hedonic quality of fruit-flavoured beverages and cake. *Journal of Food Science, 45*(5), 1393–1399.

Duffy, V.B., Hayes, J.E., Davison, A.C., Kidd, J.R., Kidd, K.K., & Bartoshuk, L.M. (2010). Vegetable intake in college-aged adults is explained by oral sensory phenotypes and TAS2R38 genotype. *Chemosensory Perception, 3*, 137–148.

Eagly, A.H. (2009). The his and hers of prosocial behavior: An examination of the social psychology of gender. *American Psychologist, 64*(8), 644–658.

Eagly, A.H. & Crowley, M. (1986). Gender and helping behavior: A meta-analytic review of the social psychological literature. *Psychological Bulletin, 100*(3), 283–308.

Earle, T. (2013). *How psychologists and counsellors can assist clients with gambling problems.* Australian Psychological Society website. Retrieved from https://www.psychology.org.au/community/public-interest/gambling/

Ekman, P., & Friesen, W.V. (1969). The repertoire of nonverbal behavior: Categories, origins, usage, and coding. *Semiotica, 1*(1), 49–98.

Elder, G.H. Jnr. (1998). The life course as developmental theory. *Child Development, 69*, 1–12.

Elkind, D. (1971). *A sympathetic understanding of the child six to sixteen*. Boston, Massachusetts: Allyn & Bacon.

Epstein, H.T. (1986). Stages in human brain development. *Developmental Brain Research*, *30*, 114–119.

Erikson, E.H. (1963). *Childhood and society.* (2nd ed.). New York: W.W. Norton.

eSafety Commissioner (2016). *Research insights: Young and social online.* Canberra: Office of the Children's eSafety Commissioner. Retrieved April 26, 2017 from https://www.esafety.gov.au/about-the-office/research-library

Eysenck W.M., & Keane T.M. (2000) *Cognitive psychology: A student's handbook.* (4th ed.). East Sussex, UK: Psychology Press.

Fazio, R.H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In M.P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23, pp. 75–109). San Diego: Academic Press

Feingold, A. (1992). Good-looking people are not what we think. *Psychological Bulletin, 111*(2), 304–341.

Ferguson, C.J. (2011). Video games and youth violence: A prospective analysis in adolescents. *Journal of Youth and Adolescence*, *40*(4), 377–391.

Fernández-Vázquez, R., Hewson, L., Fisk, I., Vila, D.H., Mira, F.J.H., Vicario, I.M., & Hort, J. (2014). Colour influences sensory perception and liking of orange juice. *Flavour, 3*(1). Retrieved from http://www.flavourjournal.com/content/pdf/2044-7248-3-1.pdf

Fox, S., & Rainie, L. (2014). *The web at 25 in the U.S*. Retrieved from http://www.pewinternet.org/2014/02/27/the-web-at-25-in-the-u-s/

Frank, M.J., Samanta, J., Moustafa, A.A., & Sherman, S.J. (2007). Hold your horses: Impulsivity, deep brain stimulation, and medication in Parkinsonism. *Science*, *318*(5854), 1309–1312. Retrieved from http://www.cogsci.bme.hu/~ktkuser/KURZUSOK/Parkinson/Frank%20DBS%20Science2007.pdf

Fuller, A. (1998). *From surviving to thriving — Promoting mental health in young people*. Melbourne: ACER Press.

Fuller et al., (1997). In A. Fuller (1998). *From surviving to thriving — Promoting mental health in young people*. Melbourne: ACER Press.

Gainsbury, S. (2014). Interactive gambling: A discussion paper (AGRC Discussion Paper). Melbourne: Australian Gambling Research Centre.

Garety, P.A., Hemsley, D.R., & Wessely, S.M. (1991). Reasoning in deluded schizophrenic and paranoid patients: Biases in performance on a probabilistic inference task. *Journal of Nervous and Mental Disease, 179*(4), 194–201.

Gazzaniga, M.S., & Heatherton, T.F. (2006). *Psychological science: Mind, brain, and behavior* (2nd ed.). New York: W.W. Norton.

Gazzaniga, M.S., & Heatherton, T.F. (2006). *Psychological science* (2nd ed.). New York: W.W. Norton.

Gervai, J. (2009). Environmental and genetic influences on early attachment. *Child and Adolescent Psychiatry and Mental Health, 3*(25). Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2753321/pdf/1753-2000-3-25.pdf

Getzfield, A.R. (2006). *Essentials of abnormal psychology*. Hoboken, New Jersey: Wiley.

Gilovich, T., Keltner, D., Chen, S., & Nisbett, R.E. (2013). *Social psychology* (3rd ed.). New York: W.W. Norton.

Gleitman, H., Fridlund, A.J., & Reisberg, D. (2004). *Psychology* (6th ed.). New York: W.W. Norton.

Golbe, L.I., Mark, M.H., & Sage, J.I. (2014). *Parkinson's Disease Handbook — A guide for patients and their families.* New York: American Parkinson Disease Association. Retrieved from: http://www.apdaparkinson.org/uploads/files/MP51919AmParkinsonHBK-vaU.pdf

Goodenough, F. L. (1932). Expression of the emotions in a blind-deaf child. *Journal of Abnormal and Social Psychology, 27*(3), 328–333.

Gordon, R., & Chapman, M. (2014). *Brand community and sports betting in Australia*. Victoria, Australia: Victorian Responsible Gambling Foundation. Retrieved from https://www.responsiblegambling.vic.gov.au/__data/assets/pdf_file/0012/18003/Research-report-Brand-community-and-sports-betting-in-Australia.pdf

Gottesman, I.I. (1991). *Schizophrenia genesis: The origins of madness*. New York: Freeman

Gray, P. (2007). *Psychology* (5th ed.). New York: Worth.

Greitemeyer, T., Osswald, S., & Brauer, M. (2010). Playing prosocial video games increases empathy and decreases schadenfreude, *Emotion*, *10*(6), 1528–3542.

Griezel, L., Finger, L.R., Bodkin-Andrews, G.H., Craven, R.G., & Yeung, A.S. (2012). Uncovering the structure of and gender and developmental differences in cyberbullying. *Journal of Educational Research, 105*(6), 442–455.

Grison, S., Heatherton, T.F., & Gazzaniga, M.S. (2015). *Psychology in your life*. New York: W.W. Norton.

Gross, A.E., & Latane, J.G. (1974). Receiving help, reciprocation and interpersonal attraction. *Journal of Applied Social Psychology, 4*, 210–223.

Gross, C.G. (1995). Aristotle on the brain. *The Neuroscientist, 1*(4), 245–250.

Gross, C.G. (2007). The discovery of motor cortex and its background. *Journal of the History of the Neurosciences*, *16*, 320–331.

Grotevant, H.D. (1992). Assigned and chosen identity components: A process perspective on their integration. In G.R. Adams, T.P. Gullotta & R. Montemayor (Eds.), *Adolescent identity formation* (pp. 73–90). Newbury Park, California: Sage.

Guggisberg, A. G., & Mottaz, A. (2013). Timing and awareness of movement decisions: does consciousness really come too late? *Frontiers in Human Neuroscience, 7*(385), 1–11.

Gunaydin, G., Selcuk, E., & Zayas, V. (2016). Impressions based on a portrait predict, 1-month later, impressions following a live interaction. *Social Psychological and Personality Science, 8*(1), 36–44.

Gunter, B., & McAleer, J. (1997). *Children and television* (2nd ed.). London; New York: Routledge.

Hankinson, R.J. (Ed.). (2008). *The Cambridge companion to Galen*. Cambridge: Cambridge University Press.

Hare, S. (2015). Study of Gambling and Health in Victoria, Victoria, Australia: Victorian Responsible Gambling Foundation and Victorian Department of Justice and Regulation.

Harlow, H.F., Harlow, M.K., & Hansen E.W. (1963). The maternal affectional system of rhesus monkeys. In H. Rheingold (Ed.), *Maternal behaviour in mammals* (pp. 254–281). New York: John Wiley & Sons.

Hart, J. Jnr, Berndt, R.S., & Caramazza, A. (1985). Category-specific naming deficit following cerebral infarction. *Nature*, *316*, 439–440.

Harter, S. (1990). Self and identity development. In S.S. Feldman & G.R. Elliot (Eds.), *At the threshold: The developing adolescent* (pp. 352–387). Cambridge, Massachusetts: Harvard University Press.

Harvey, O.J. (2004). Email correspondence to John Grivas and Linda Carter from O.J. Harvey, 29 November 2004.

Healey, J., Dowson, M., & Nelson, G. (2006). *Adolescents' experiences, perceptions and attitudes towards bullying*. [Electronic version]. Australian Association for Research in Education 2005 Conference Papers. Retrieved from http://handle.uws.edu.au:8081/1959.7/36319

Heiman, G.W. (2002). *Research methods in psychology* (3rd ed.). Boston, Massachusetts: Houghton Mifflin.

Herculano-Houzel, S., & Lent, R. (2005). Isotropic fractionator: A simple, rapid method for the quantification of total cell and neuron numbers in the brain. *Journal of Neuroscience, 25*(10), 2518–2521.

Hertz, M.F., Donato, I., & Wright, J. (2013) Bullying and suicide: A public health approach (Editorial). *Journal of Adolescent Health*, *53*, S1–S3.

Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology, 53*, 575–604.

Hewstone, M., Stroebe, W., & Jonas, K. (Eds.). (2008). *Introduction to social psychology: A European perspective* (4th ed.). Oxford, UK: Blackwell.

Hing, N. (2014). Sports betting and advertising (AGRC Discussion Paper No. 4). Melbourne: Australian Gambling Research Centre.

Horstman, J. (2012). *The Scientific American healthy aging brain: The neuroscience of making the most of your mature mind*. San Francisco: Jossey-Bass.

Hudson, W. (1960). Pictorial depth perception in subcultural groups in Africa. *Journal of Social Psychology, 52*, 183–208.

Huffman, K. (2002). *Psychology in Action* (6th ed.). New York: John Wiley & Sons.

Huffman, K. (2012). *Psychology in action* (10th ed.). New York: John Wiley & Sons.

Hunter Institute of Mental Health (2017). *What is mental health?* Retrieved from http://www.himh.org.au/home/our-resources/what-is-mental-health

Hyde, W.K., Byrd, A.L., Votruba-Drzal,E., Hariri, A.R., & Manuck, S.B. (2014). Amygdala reactivity and negative emotionality: Divergent correlates of antisocial personality and psychopathy traits in a community sample. *Journal of Abnormal Psychology, 123*(1), 214–224.

Ingham, A.G., Levingen, G., Graves, J., & Peckham, V. (1974). The Ringelmann effect: Studies of group size and group performance. *Journal of Experimental Social Psychology, 10*, 371–384.

Ingvar, D.H., & Franzén, G. (1974). Abnormalities of cerebral blood flow distribution in patients with chronic schizophrenia. *Acta Psychiatrica Scandinavica, 50*, 425–462.

Inhelder, B., & Piaget, J. (1958; orig. 1955). *The growth of logical thinking from childhood to adolescence.* London: Routledge and Kegan Paul.

Institute of Neurological Sciences (2017). *The Glasgow Structured Approach to Assessment of the Glasgow Coma Scale: What is GCS*. Retrieved from http://www.glasgowcomascale.org/

Isen, A.M., Clark, M., & Schwartz, M.F. (1976). Duration of the effect of good mood on helping: Footprints on the sands of time. *Journal of Personality and Social Psychology, 34*, 385–393.

Izard, C.E. (1971). The *face of emotion*. New York: Appleton-Century Crofts.

Jerabeck, J.M., & Ferguson, C.J. (2013). The influence of solitary and cooperative violent video game play on aggressive and prosocial behaviour. *Computers in Human Behavior*, *29*(6), 2573–2578.

Jobvite (2014). *2014 Social recruiting survey*. Retrieved from https://timedotcom.files.wordpress.com/2014/09/jobvite_socialrecruiting_survey2014.pdf

Jones, E.E., & Nisbett, R.E. (1971). *The actor and the observer: Divergent perceptions of the causes of behaviour*. Morristown, New Jersey: General Learning Press.

Joseph. J., & & Leo, J.L. (2006). Genetic relatedness and the lifetime risk for being diagnosed with schizophrenia: Gottesman's 1991 Figure 10 reconsidered. *Journal of Mind and Behavior, 27*(1), 73–90.

Jung, B. (2015, May 29). *The negative effect of social media on society and individuals*. Retrieved from http://smallbusiness.chron.com/negative-effect-social-media-society-individuals-27617.html

Kahn, C.H. (2013*). Plato and the post-Socratic dialogue: The return to the philosophy of nature.* Cambridge, UK: Cambridge University Press.

Kail, R., & Bisanz, J. (1992). The information processing perspective on cognitive development in childhood and adolescence. In R.J. Sternberg & C.A. Bergs (Eds.), *Intellectual Development*. New York: Cambridge University Press.

Kaplan, P.S. (2004). *Adolescence*. Boston, Massachusetts: Houghton Mifflin.

Kassin, S. (1995). *Psychology*. Boston, Massachusetts: Houghton Mifflin.

Kassin, S., Fein, S., & Markus, H.R. (2008). *Social psychology* (7th ed.). Boston, Massachusetts: Houghton Mifflin.

Kavanagh, D.J. (1992). Recent developments in expressed emotion and schizophrenia. *British Journal of Psychiatry*, *160*, 601–620.

Kempton, M.J., Stahl, D., Williams, S.C., & DeLisi, L.E. (2010). Progressive lateral ventricular enlargement in schizophrenia: a meta-analysis of longitudinal MRI studies. *Schizophrenia Research, 120*, 54–62.

Kendler, K.S., Kessler, R.C., Walters, E.E., MacLean, C., Neale, M.C., Heath, C., & Eaves, L.J. (1995). Stressful life events, genetic liability, and onset of an episode of major depression in women. *American Journal of Psychiatry, 152*, 833–842.

Kendler, K.S., Myers, J., & Prescott, C.A. (2005). Sex differences in the relationship between social support and risk for major depression: A longitudinal study of opposite-sex twin pairs. *American Journal of Psychiatry, 162*(2), 250–256.

Kolb, B., & Whishaw, I.Q. (2003). *Fundamentals of human neuropsychology* (5th ed.). New York: Worth.

Kolb, B., & Whishaw, I.Q. (2014). *An introduction to brain and behaviour* (4th ed.). New York: Worth.

Krcmar, M., Grela, B., & Lin, K. (2007). Can toddlers learn vocabulary from television? An experimental approach. *Media Psychology, 10*(1), 41–63.

Kring, A.M., & Johnson, S.J. (2102). *Abnormal psychology* (12th ed.). New York: Wiley.

Kruger, J., Wirtz, D., & Miller, D.T. (2005). Counterfactual thinking and the first instinct fallacy. *Journal of Personality and Social Psychology, 88*(5), 725–735.

Lashley, K. (1963) Brain mechanisms in intelligence: A quantitative study of injuries to the brain. New York: Dover.

Lemish, D. (2007). *Children and television: A global perspective*. Malden, Massachusetts: Blackwell.

Lenhart, A., Kahne, J., Middaugh, E., Macgill, A., Evans, C., & Vitak, J. (2008). *Teens, video games and civics*. Retrieved from http://www.pewinternet.org/2008/09/16/teens-video-games-and-civics/

Lerner, M.J. (1980). *The belief in a just world: A fundamental delusion*. New York: Plenum Press.

Levinson, D.F., & Nichols, W.E. (2017). *Genetics of brain function: Major depression and genetics*. Stanford Medicine. Retrieved from http://depressiongenetics.stanford.edu/mddandgenes.html

Li, K., & Malhotra, P.A. (2015). Spatial neglect. *Practical Neurology, 15*, 333–339.

Li, Q. (2006). Cyberbullying in schools: A research of gender differences. *School Psychology International, 27*(2), 157–170.

Liepert, L., Bauder, H., Miltner, W.H.R., Taub, E., & Weiller, C. (2000), Treatment-induced cortical reorganization after stroke in humans, *Stroke, 31*, 1210–1216. Retrieved from http://stroke.ahajournals.org/content/31/6/1210.full

Lodge, D.J., & Grace, A.A. (2011). Developmental pathology, dopamine, stress and schizophrenia. *International Journal of Developmental Neuroscience, 29*(3), 207–213.

Loehlin, J.C. (1992). *Genes and environment in personality development.* Newbury Park, California: Sage.

Lord, C.G. (1997). *Social psychology*. Fort Worth: Harcourt Brace.

Lorenz, K. (2002). *On aggression*. London: Routledge.

Lykken, D.T. (1982, September). Fearlessness: Its carefree charm and deadly risks. *Psychology Tod*ay, 20–28.

Macmillan, M. (2017). *Phineas Gage Information: Questions*. Retrieved from https://www.uakron.edu/gage/questions.dot

Madden, M., Lenhart, A., Cortesi, S., Gasser, U., Duggan, M., Smith, A., & Beaton, M. (2013). *Teens, social media, and privacy*. Retrieved from http://www.pewinternet.org/2013/05/21/teens-social-media-and-privacy/

Maguire, E.A., Gadian, D.G., Johnsrude, I.S., Good, C.D., Ashburner, J., Frackowiak, R.S.J., & Frith, C.D. (2000). Navigation-related structural change in the hippocampi of taxi drivers. *Proceedings of the National Academy of Sciences of the United States of America, 97*(8), 4398–4403.

Maguire E.A., Spiers, H.J., Good, C.D., Hartley, T., Frackowiak, R.S., & Burgess, N. (2003). Navigation expertise and the human hippocampus: a structural brain imaging analysis. *Hippocampus,13*(2), 250–259.

Main, M., & Solomon, J. (1986). Discovery of an insecuredisorganized/disoriented attachment pattern. In T. Brazelton & M. Youngman (Eds.), *Affective development in infancy* (pp. 95–124). Norwood, New Jersey: Ablex.

Malim, T. (1997). *Social psychology* (2nd ed.). London: Macmillan.

Matsumoto, D. (2000). *Culture and psychology: People around the world*. Belmont, California: Wadsworth.

Maynard, T.M., Sikich, L., Lieberman, J.A., & LaMantia, A. (2001). Neural development, cell-cell signaling, and the 'two-hit' hypothesis of schizophrenia. *Schizophrenia Bulletin, 27*(3), 457–476.

McCrickerd, K., Chambers, L., Brunstrom, J.M., & Yeomans, M.R. (2012). Subtle changes in the flavour and texture of a drink enhance expectations of satiety. *Flavour, 1*(20). Retrieved from http://www.flavourjournal.com/content/1/1/20

McGarrigle, J., & Donaldson, M. (1974). Conservation accidents. *Cognition, 3*, 241–350. In M. Walker et al. (1994), *Psychology* (2nd ed.) (p. 415). Milton, Qld: John Wiley & Sons.

McGue, M., Bouchard, T.J. Jnr, Iacono, W.G., & Lykken, D.T. (1993). Behavioural genetics of cognitive ability: A life-span perspective. In R. Plomin & G.E. McClearn (Eds.), *Nature, nurture and psychology* (pp. 59–76). Washington, DC: American Psychological Association.

McMahon, C.A., Barnett, B., Kowalenko, M.N., & Tennant, C.C. (2006). Maternal attachment state of mind moderates the impact of postnatal depression on infant attachment. *Journal of Child Psychology and Psychiatry, 47*, 660–669.

Mednick, S.A., Watson, J.B., Huttunen, M., Cannon, T.D., Katila, H., Machon, R., . . . Wang, X. (1998). A two-hit working model of the etiology of schizophrenia. In M.F. Lenzenweger & R.H. Dworkin (Eds.), *Origins and development of schizophrenia: Advances in experimental psychopathology* (pp. 27–66). Washington: American Psychological Association.

Meins, E. (2011). Emotional development and attachment relationships. In A. Slater & G. Bremner. *An introduction to developmental psychology* (2nd ed.) (pp. 183–217). Chichester, West Sussex, U.K.: Blackwell.

Mennella, J.A, Jagnow, C.P., & Beauchamp, G.K. (2001). Prenatal and postnatal flavor learning by human infants. *Pediatrics, 107*(6). Retrieved from http://pediatrics.aappublications.org/content/107/6/e88.long

Meyer, J.P., & Mulherin, A. (1980). From attribution to helping: An analysis of the mediating effects of affect and expectancy. *Journal of Personality and Social Psychology, 39*(2), 201–210.

Middlemist, R.D., Kowles, E.S., & Matter, C.F. (1976). Personal space invasions in the lavatory: suggestive evidence for arousal. *Journal of Personality and Social Psychology*, *33*(5), 541–546.

Miller, D.T., & Ross, M. (1975). Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin, 82*(2), 213–225.

Miller, J., Shepherdson, P., & Treyena, D. (2011). Effects of clock monitoring on electroencephalographic activity: Is unconscious movement initiation an artifact of the clock? *Psychological Science, 22*, 103–109.

Miller, P.M., & Lisak, D. (1999). Associations between childhood abuse and personality disorder symptoms in college males. *Journal of Interpersonal Violence*, *14(*6), 642–656.

Mirsky, A.F., Bieliauskas, L.A., French, L.M., Van Kammen, D.P., Jönsson, E., & Sedvall, G. (2000). A 39-year followup of the Genain quadruplets. *Schizophrenia Bulletin, 26*(3), 699–708.

Mita, T.H., Dermer, M., & Knight, J. (1977). Reversed facial images and the mere-exposure hypothesis. *Journal of Personality and Social Psychology, 35*(8), 597–601.

mnd Australia (2017a).*Get informed: Wh*at is MND? http://www.mndaust.asn.au/Get-informed/What-is-MND.aspx

mnd Australia (2017b). *Get informed: Information resources — More facts* about MND http://www.mndaust.asn.au/Get-informed/Information-resources.aspx

Moghaddam, F.M., Taylor, D.M., & Wright, S.C. (1993). *Social psychology in cross-cultural perspective*. New York: Freeman.

Moondoore, A., Blades, M., Oates, C., & Blumberg, F. (2009). Young children's ability to recognise advertisements in web page designs. *British Journal of Developmental Psychology, 27*(1), 71–83.

Morris, C.G. (1990). *Contemporary psychology and effective behaviour* (7th ed.). Glenview, Illinois: Scott, Foresman/ Little, Brown Higher Education.

Myers, D.G. (1990). *Social psychology* (3rd ed.). New York: McGraw-Hill.

Myers, D.G. (2007). *Psychology* (8th ed.). New York: Worth.

National Centre Against Bullying (2015). *Bullying for parents: Bullying hurts brochure*. Retrieved March 28, 2017 from https://www.ncab.org.au/bullying-advice/bullying-for-parents/bullying-hurts-brochure/

National Centre Against Bullying (2017a). *Bullying in Australia.* Retrieved April 23, 2017 from https://www.ncab.org.au/

National Centre Against Bullying (2017b). *Bullying for parents: Definition of bullying*. Retrieved March 28, 2017 from https://www.ncab.org.au/bullying-advice/bullying-for-parents/definition-of-bullying/

National Centre Against Bullying (2017c). *Bullying for parents: Types of bullying*. Retrieved April 2, 2017 from https://www.ncab.org.au/bullying-advice/bullying-for-parents/types-of-bullying/

National Centre Against Bullying (2017d). *Bullying for parents: Signs of bullying*. Retrieved April 29, 2017 from https://www.ncab.org.au/bullying-advice/bullying-for-parents/signs-of-bullying/

National Centre Against Bullying (2017e). *Bullying for schools: Issue of bullying in school*. Retrieved April 29, 2017 from https://www.ncab.org.au/bullying-advice/bullying-for-schools/issue-of-bullying-in-school/

National Health and Medical Research Council (2007). *National statement on ethical conduct in human research 2007 (Updated May 2015)*. Canberra: Australian Government.

National Human Genome Research Institute (2017). *Education — All about the Human Genome Project (HGP)*. Retrieved from https://www.genome.gov/10001772/all-about-the--human-genome-project-hgp/

National Seniors Australia (2017). *Work and careers*. Retrieved from http://nationalseniors.com.au/be-informed/work-and-careers

Neisser, U. (Ed.) (1998). *The rising curve: Long-term gains in IQ and related measures*. Washington, D.C.: American Psychological Association.

Nelson, C.A. (1999). Neural plasticity and human development. *Current Directions in Psychological Science*, *8*(2), 42–45.

NICHD Early Child Care Research Network. (1997). Familial factors associated with the characteristics of non-maternal care for infants. *Journal of Marriage and Family, 59(2)*, 389–408.

Nickerson, R.S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology, 2*(2), 175–220.

Niethammer, M., Feigin, A., & Eidelberg, D. (2012). Functional neuroimaging in Parkinson's Disease. *Cold Spring Harbor Perspectives in Medicine, 2*(5). Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3331691/

O'Brien, P.G., Kennedy, W.Z., & Ballard, K.A. (2007). *Psychiatric mental health nursing: An introduction to theory and practice*. Sudbury, Massachusetts: Jones & Bartlett.

Office of The Australian Information Commissioner (2017). *What is covered by privacy*. Retrieved from http://www.oaic.gov.au/privacy/what-is-covered-by-privacy

Öhman, A. (2010). Fear. In G. Fink (Ed.), *Stress consequences: Mental, neuropsychological and socioeconomic*. (pp. 82–86). San Diego: Elsevier.

Ohtsuka, K., & Maddern, R. (1999). Youth gambling in Australia (1996–97). In G. Coman (Ed.), *National Association for Gambling Studies Practitioners conference proceedings, Adelaide 1998* (pp. 175–183). Kew, Australia: National Association for Gambling Studies.

Organisation for Economic Co-operation and Development (2007). *Understanding the brain: The birth of a learning science*. Paris: Author.

Palha, J.A., Santos, N.C., Marques, F., Sousa, J., Bessa, J., Miguelote, R., Sousa, N., & Belmonte-de-Abreu, P. (2012). Do genes and environment meet to regulate cerebrospinal fluid dynamics? Relevance for schizophrenia. *Frontiers in Cellular Neuroscience, 6*(31), 1–8. Retrieved from http://journal.frontiersin.org/article/10.3389/fncel.2012.00031/abstract

Parkinson's Australia (2017a). *Description, incidence and theories of causation* (Information sheet). Retrieved from http://www.parkinsons.org.au/information_sheets

Parkinson's Australia (2017b). *Mobility and Parkinson's* (Information sheet). Retrieved from http://www.parkinsons.org.au/information_sheets

Parkinson's Australia (2017c). *Surgery for Parkinson's* (Information sheet). Retrieved from http://www.parkinsons.org.au/information_sheets

Parkinson's Victoria (2015). *So . . . I've got Parkinson's . . . What's that?* (Booklet). Retrieved from http://www.parkinsons.org.au/publications/newly-diagnosed.pdf, retrieved 20 February 2015.

Parton, A., Malhotra, P., & Husain, M. (2004). Hemispatial neglect. *Journal of Neurology, Neurosurgery & Psychiatry, 75*, 13–21.

Penfield, W., & Jasper, H.H. (1954). *Epilepsy and the functional anatomy of the human brain*. Boston, Massachusetts: Little, Brown.

Perry, S. (2011). *A matter of taste*. Retrieved from Society for Neuroscience website http://www.brainfacts.org/sensing-thinking-behaving/senses-and-perception/articles/2011/a-matter-of-taste/

Pettigrew, T.F. (1998). Intergroup contact theory. *Annual Review of Psychology*, *49*, 65–85.

Piqueras-Fiszman, B., Giboreau, A., & Spence,C. (2013). Assessing the influence of the color of the plate on the perception of a complex food in a restaurant setting. *Flavour*, *2*(24). Retrieved from http://www.flavourjournal.com/content/2/1/24

Plomin, R., Corley, R., Caspi, A., Fulker, D.W., & DeFries, J.C. (1998). Adoption results for self-reported personality — Not much nature or nurture? *Journal of Personality and Social Psychology, 75*, 211–218.

Plomin, R., DeFries, J.C., Knopik, V.S., & Neiderhiser, J.M. (2012). *Behavioral Genetics* (6th ed.). London: Worth.

Popp, A.M., Peguero, A.A., Day, K.R., & Kahle, L.L. (2014). Gender, bullying victimization, and education. *Violence and Victims, 29*(5), 843–856.

Price, R.H., & Crapo, R.H. (1999). *Cross-cultural perspectives in introductory psychology*. Belmont, California: Wadsworth.

Productivity Commission (2010). *Gambling*, Report no. 50, Canberra. Retrieved from http://www.pc.gov.au/inquiries/completed/gambling-2009/report/gambling-report-volume1.pdf

Psychology Board of Australia (2017a). *Endorsement*. Retrieved from http://www.psychologyboard.gov.au/Endorsement.aspx

Psychology Board of Australia (2017b). *General registration*. Retrieved from http://www.psychologyboard.gov.au/Registration/General.aspx

Ramachandran, V.S. & Hubbard, E.M. (2003). The phenomenology of synaesthesia. (2003). *Journal of Consciousness Studies, 10*(8), 49–57.

Rawal, S., Hayes, J.E., Wallace, M.R., Bartoshuk, L.M., & Duffy, V.B. (2013). Do polymorphisms in the TAS1R1 gene contribute to broader differences in human taste intensity? *Chemical Senses, 38*(8), 719–728.

Rickwood, D., Blaszczynski, A., Delfabbro, P., Dowling. D., & Heading, K. (2010). *The psychology of gambling* (APS Review Paper Final November 2010). Melbourne, Victoria: Australian Psychological Society. Retrieved from https://www.psychology.org.au/publications/statements/gambling/

Rigby, K. (2014). How teachers address cases of bullying in schools: a comparison of five reactive approaches. *Educational psychology in practice: Theory, research and practice in educational psychology*, *30*(4). Retrieved from http://www.ncab.org.au/Assets/Files/how%20teachers%20address%20cases%20of%20bullying%20Rigby%202014.pdf

Rigby, K. (2015). *The prevalence of school bullying*. Retrieved from http://www.kenrigby.net/01-The-prevalence-of-school-bullying

Risen, J., & Gilovich, T. (2007). Informal logical fallacies. In R.J. Sternberg, H.L. Roediger III & D.F. Halpern. *Critical thinking in psychology* (pp. 110–130). New York: Cambridge University Press.

Rosen, L.D. (2011). *Social networking's good and bad impacts on kids*. Retrieved from American Psychological Association website http://www.apa.org/news/press/releases/2011/08/social-kids.aspx

Rosenhan, D.L. (1973). On being sane in insane places. *Science, 179*, 250–258.

Rosenthal, R., & Fode, K.L. (1963). The effect of experimenter bias on the performance of the albino rat. *Behavioral Science, 8*, 183–89.

Royal Australian & New Zealand College of Psychiatrists (2017a). *Psychiatrists and psychologists: what's the difference?* Retrieved from https://www.yourhealthinmind.org/psychiatry-explained/psychiatrists-and-psychologists

Royal Australian & New Zealand College of Psychiatrists (2017b). *Mental health advice: Mental illnesses and disorders — Depression*. Retrieved from https://www.yourhealthinmind.org/mental-illnesses-disorders/depression/treatment

Royal Australian & New Zealand College of Psychiatrists (2017c). *Treatments and medications: Electroconvulsive therapy*. Retrieved from https://www.yourhealthinmind.org/treatments-medication/ect

Royal Australian & New Zealand College of Psychiatrists (2017d). *Mental health advice: Mental illnesses and disorders – Schizophrenia* https://www.yourhealthinmind.org/mental-illnesses-disorders/schizophrenia

Royal Australian & New Zealand College of Psychiatrists (2017e). *Mental health advice: Mental illnesses and disorders – Schizophrenia: Treatments of schizophrenia*. Retrieved from https://www.yourhealthinmind.org/mental-illnesses-disorders/schizophrenia/treatment-of-schizophrenia

Rutherford, L., Bittman, M., & Biron, D. (2010). *Young children and the media: A discussion paper* in. West Perth: Australian Research Alliance for Children and Youth. Retrieved from http://www.aracy.org.au/publications-resources/command/download_file/id/169/filename/Young_Children_and_the_Media.pdf

Salovey, P., Mayer, J.D., & Rosenhan, D.L. (1991). Mood and healing: Mood as a motivator of helping and helping as a regulator of mood. In M.S. Clark (Ed.), *Prosocial behaviour* (pp. 215–237). Newbury Park, California: Sage.

SANE Australia (2017a). *Self-stigma* [SANE News, Winter 2013]. Retrieved June 2, 2017 from https://www.sane.org/images/PDFs/SANE-News-Winter-2013.pdf

SANE Australia (2107b). *Mental health and illness: Schizophrenia* (Facts and guides). Retrieved from https://www.sane.org/mental-health-and-illness/facts-and-guides/schizophrenia

Santrock, J.W. (1992). *Life span development* (4th ed.). Dubuque, Iowa: Wm. C. Brown.

Scarborough, J. (2013). *Galen and the gladiators*. Retrieved from http://www.academia.edu/3614775/Galen_and_the_Gladiators_Episteme_5_1971_98-111_revised_with_an_Epilogue_2013

Schacter, D.L., Gilbert, D.T., & Wegner, D.M. (2009). *Psychology*. New York: Worth.

Schizophrenia Fellowship (2017). *What exactly is schizophrenia: Facts to enable you to understand schizophrenia* (August 2014). Retrieved from http://www.schizophrenia.org.au/what-exactly-is-schizophrenia-facts-to-enable-you-to-understand-schizophrenia/

Schrank, J. (2012). *Taste: your brain on food.* Retrieved from http://www.slideshare.net/JeffSchrank/taste-your-brain-on-food

Schroeder, D.A., Penner, L.A., Davidio, J.F., & Piliavin, J.A. (1995). *The Psychology of helping and altruism: Problems and puzzles*. New York: McGraw-Hill.

Screen Australia (2013). *Child's play: Issues in Australian children's television 2013* (Report). Retrieved May 2, 2017, from https://www.screenaustralia.gov.au/getmedia/4187bfcc-7c40-47d8-86f6-3e10e523853d/Report-childs-play.pdf?ext=.pdf

Seay, B., Alexander, B.K., & Harlow, H.F. (1964). Maternal behaviour of socially deprived rhesus monkeys. *Journal of Abnormal and Social Psychology, 69*, 345–354.

Seeman, P. (2011). All roads to schizophrenia lead to dopamine supersensitivity and elevated dopamine D2(high) receptors. *CNS Neuroscience & Therapeutics, 17*(2), 118–132.

Segall, M.H., Campbell, D.T., & Herskovits, M.J. (1966). *The influence of culture on visual perception.* Indianapolis, Indiana: Bobbs-Merrill.

Segall, M.H., Dasen, P., Berry, J., & Poortinga, Y. (1990). *Human behaviour in global perspective*. New York: Pergamon.

Sensis Social Media Report 2016 (2016, 1 June). *How Australian people and businesses are using social media*. Retrieved from https://www.sensis.com.au/asset/PDFdirectory/Sensis_Social_Media_Report_2016.PDF

Sherif, M. (1966). *In common predicament: Social psychology of intergroup conflict and cooperation*. Boston, Massachusetts: Houghton Mifflin.

Shermer, D.Z., & Levitan, C.A. (2014). Red hot: the crossmodal effect of color intensity on piquancy. *Multisensory Research, 27*, 207–223.

Sigelman, C.K., & Rider, E.A. (2012). *Life-span human development* (7th ed.). Belmont, California: Wadsworth.

Simner, J., & Carmichael, D.A. (2015). Is synaesthesia a dominantly female trait? *Cognitive Neuroscience, 6*(2–3), 68–76.

Slater, A., Johnson, S.P., & Muir, D. (2011). The scope and methods of developmental psychology. In A. Slater & G. Bremner. *An introduction to developmental psychology* (2nd ed.) (pp. 3–41). Chichester, West Sussex, UK: Blackwell.

Smith, A., Walker, M.L., & Myers, G. (1988). Hemispherectomy and diaschisis: Rapid improvement in cerebral functions after right hemispherectomy in a six year old child. *Archives of Clinical Neuropsychology*, *3*, 1–8.

Smith, E.R., & Mackie, D.M. (2000). *Social psychology* (2nd ed.). Philadelphia, Pennsylvania: Psychology Press.

Smith, P.B., & Bond, M.H. (1998). *Social psychology across cultures* (2nd ed.). Boston, Massachusetts: Allyn & Bacon.

Smith, P.K., Cowie, H., & Blades, M. (2011).*Understanding children's development* (5th ed.). Chichester, UK: John Wiley & Sons.

Spear, L. (2010). *Behavioural neuroscience of adolescence*. New York: Norton.

Spence, C. (2010). The multisensory perception of flavour. *The Psychologist, 23*, 720–723.

Spence, C. (2015). On the psychological impact of food colour, *Flavour, 4*(21). Retrieved from http://www.flavourjournal.com/content/4/1/21

Spence, C., & Shankar, M.U. (2010). The influence of auditory cues on the perception of, and responses to, food and drink. *Journal of Sensory Studies, 25*(3), 406–430.

Springer, S.P., & Deutsch, G. (1998). *Left brain right brain — Perspectives from cognitive neuroscience*. New York: W.H. Freeman & Co.

Spurzheim, G. (1827). *Outlines of phrenology*. London: Treutel, Wurz & Richter. Retrieved from http://www.historyofphrenology.org.uk/texts/spz_outlines.html

Stangor, C. (2004). *Research methods for the behavioural sciences* (2nd ed.). Boston, Massachusetts: Houghton Mifflin.

Stirling, J. (2002). *Introducing neuropsychology*. East Sussex, UK: Psychology Press.

Stroufe, B., Chaikin, A., Cook, R., & Freeman, V. (1977). The effects of physical attractiveness on honesty: A socially desirable response. *Personality and Social Psychology Bulletin, 3*, 345–353.

Sue, D., Sue, D.W., & Sue, S. (2006). *Understanding abnormal behaviour* (8th ed.). Boston, Massachusetts: Houghton-Mifflin.

Swami, V., & Furnham, A. (2008). The psychology of physical attraction. Hove, East Sussex: Psychology Press.

Sweatt, J.D. (2106). Neural plasticity and behavior — sixty years of conceptual advances. *Journal of Neurochemistry, 139*(2),179–199.

Synapse (2016). *Acquired brain injury: The facts (5th ed.).* Retrieved from http://synapse.org.au/support-services/publications/publication-archive/acquired-brain-injury-the-facts.aspx

Tavris, C. & Wade, C. (1995). *Psychology in Perspective*. New York: Harper Collins.

Thomas, A., Chess, S., & Birch, H.G. (1970). The origin of personality. *Scientific American, 223*(2), 102–109.

Thomas & Chess (2009). *Temperament as behavioural style*. Retrieved from https://www.youtube.com/watch?v=mgXwCqzh9B8

Thompson, R.E. (2000). *The brain — A neuroscience primer* (3rd ed.). New York: Worth.

Tritsch, N.X., Ding, J.B., & Sabatini, B.L. (2012). Dopaminergic neurons inhibit striatal output through non-canonical release of GABA. *Nature, 490*(7419). 262–266.

Vander Zanden, J.W. (1981). *Social psychology*. New York: Random House.

Vaughan, B., Gove, F.L., & Egeland, B. (1980). The relationship between out-of-home care and the quality of infant–mother attachment in an economically disadvantaged population. *Child Development, 51*, 971–975.

Vaughan, G.M., & Hogg, M.A. (2002). *Introduction to social psychology* (3rd ed.). Sydney: Prentice Hall.

VicHealth (2014). *Findings from the 2013 survey of Victorians' attitudes to race and cultural diversity*. Melbourne: Victorian Health Promotion Foundation.

Victorian Curriculum and Assessment Authority (2017). *VCE Psychology: Advice For Teachers, 2016*. Retrieved from http://www.vcaa.vic.edu.au/Pages/vce/studies/psychology/psychoindex.aspx

Wade, C., & Tavris, C. (1990). *Psychology*. New York: Harper Collins.

Wang, J., Iannotti, R.J., & Nansel, T.R. (2009). School bullying among US adolescents: Physical, verbal, relational, and cyber. *Journal of Adolescent Health, 45*(4), 368–375.

Ward, J., & Mattingley, J.B. (2006). Synaesthesia: an overview of contemporary findings and controversies. *Cortex. 42*(2), 129–136

Watson, E. (2013). *We eat with our eyes: Flavor perception strongly influenced by food color, says DDW*. Retrieved from http://www.foodnavigator-usa.com/R-D/We-eat-with-our-eyes-Flavor-perception-strongly-influenced-by-food-color-says-DDW

Weeks, D., & James, J. (1995). *Eccentrics: A study of sanity and strangeness.* New York: Villard.

Wicker, A.W. (1969). Attitudes versus actions: The relationship of verbal and overt behavioural responses to attitude objects. *Journal of Social Issues, 25*, 41–78.

Woodworth, R.S., & Schlosberg, H. (1954). *Experimental psychology*. New York: Holt, Rinehart, and Winston.

World Health Organization (2017a). *Mental health: strengthening our response* (Fact sheet Updated April 2016). Retrieved from http://www.who.int/mediacentre/factsheets/fs220/en/

World Health Organization (2017b). *Mental disorders* (Fact sheet — Reviewed April 2016). Retrieved from http://www.who.int/mediacentre/factsheets/fs396/en/

Wren, K. (1999). *Social Influences*. London: Routledge.

Yildrim, F.B., & Sarikcioglu, L. (2007). Marie Jean Pierre Flourens (1794–1867): an extraordinary scientist of his time. *Journal of Neurology Neurosurgery and Psychiatry, 78*(8), 852.

Young, K. (2010). *Signs of internet addiction*. The Center for Internet Addiction Recovery. Retrieved June 19, 2010 from http://www.netaddiction.com

Young, K. (2017). *Signs of internet addiction*. The Center for Internet Addiction. Retrieved from www.netaddiction.com

Zack, E., Barr, R., Gerhardstein, P., Dickerson, K., & Meltzoff, A. (2009). Infant imitation from television using novel touch screen technology. *British Journal of Developmental Psychology, 27*(1), 13–26.

Zampini, M., & Spence, C. (2012). Assessing the role of visual and auditory cues in multisensory perception of flavor. In M.M. Murray and M.T. Wallace (Eds.), *The neural bases of multisensory processes* (Ch. 37). Boca Raton, Florida: CRC Press. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK92852/

Zellner, D.A., Siemers, E., Teran, V., Conroy, R., Lankford, M., Agrafiotis, A., Ambrose, L., & Locher, P. (2011). Neatness counts. How plating affects liking for the taste of food. *Appetite, 57*(3), 642–648.

Zimbardo, P.G. (1972). In D. Dempsey & P.G. Zimbardo (1978). *Psychology and you*. Glenview, Illinois: Scott, Foresman.

Zimbardo, P.G. (1975). *Psychology and life*. Glenview, Illinois: Scott, Foresman.

Zimbardo, P.G. (2013). *The SPE: What it Was, Where it Came From, and What Came Out of It*. Retrieved June 15, 2013, from http://www.prisonexp.org

Zimbardo, P.G. (2017a). *Stanford Prison Experiment: A simulated study on the psychology of imprisonment: The story — 2. Setting up*. Retrieved March 31, 2017 from http://www.prisonexp.org/setting-up

Zimbardo, P.G. (2017b). *Stanford Prison Experiment: A simulated study on the psychology of imprisonment: More information*. Retrieved March 31, 2017 from official website at http://www.prisonexp.org/setting-up

Zimmerman, J.A. (2004). *Science of the kitchen: Taste and texture*. Retrieved May 18, 2015, from http://forums.egullet.org/topic/44502-taste-texture-part-two/

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