

# ATARNotes

## PSYCHOLOGY 3&4

ATARNotes October 2024 Lecture Series

Presented by:

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# What to Expect in this Lecture

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## Topics to be covered

- Unit 3: Neurotransmission + stress
- Unit 4: Sleep + mental wellbeing
- Scientific Skills
- Exam advice

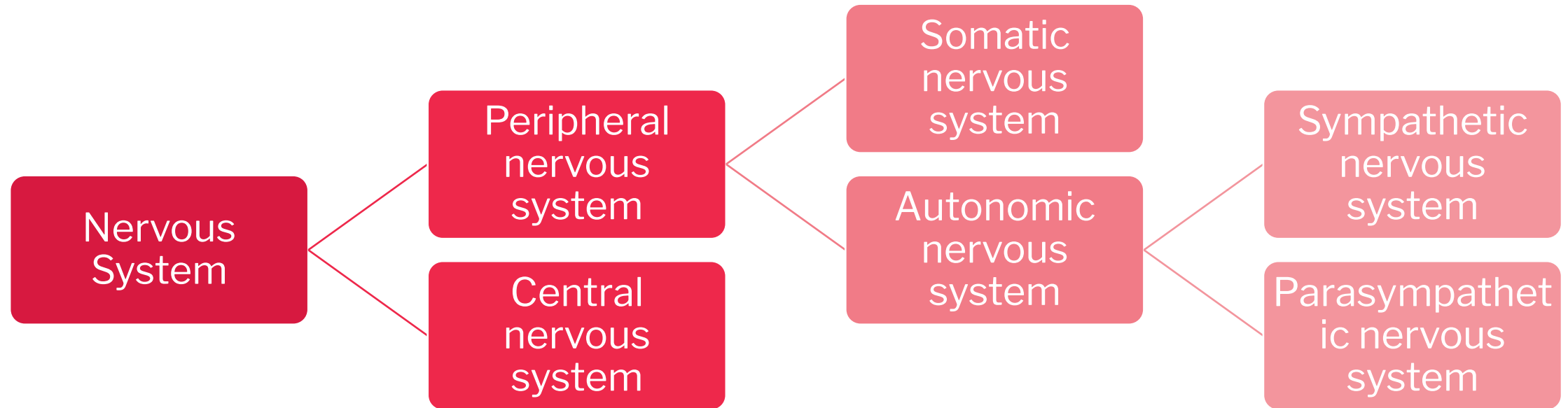


# PART ONE

## UNIT 3

# Neurotransmission

# Divisions of the Nervous System



## Question 4 (11 marks)

Serena was sitting in the garden and playing when she felt something crawl onto her leg. She saw that it was a bee and brushed it away. Shortly after, she involuntarily kicked out her leg and then felt a stinging sensation that made her scream loudly in pain. She realised that she had been stung by a bee.

- a. Identify the division of the nervous system and the type of response involved when Serena brushed the bee off her leg. 2 marks

### Question 4a.

Marks	0	1	2	Average
%	38	19	43	1.1

Division \_\_\_\_\_

Response \_\_\_\_\_

Given that Serena brushing away the bee was a voluntary action, the correct response identified the somatic nervous system as the division of the nervous system and a voluntary/conscious/controlled response. Students needed to read the scenario carefully to ensure they did not confuse the event in question with Serena's later action of kicking out her leg.

- b. In terms of nervous system functioning, name and explain Serena's response when she kicked out her leg. 3 marks

### Question 4b.

Marks	0	1	2	3	Average
%	23	16	19	42	1.8

One mark was awarded for correctly naming the spinal reflex (or reflex/reflex arc/reflexive response). The additional two marks were awarded if the response demonstrated knowledge of the fundamental elements of the spinal reflex as applied to the scenario, including that it is governed by a spinal sensory-motor circuit involving the sensation of the sting being detected by sensory neurons that relay to the spinal cord, which then (via interneurons) sends a signal via motor neurons to initiate an automatic/unconscious motor response (kicking out the leg), prior to registration of the conscious awareness of pain/danger (response bypasses/precedes consciousness).

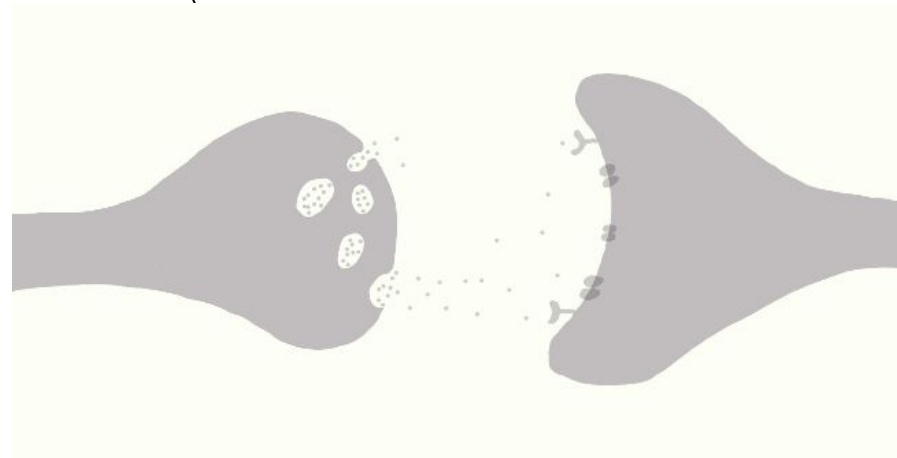
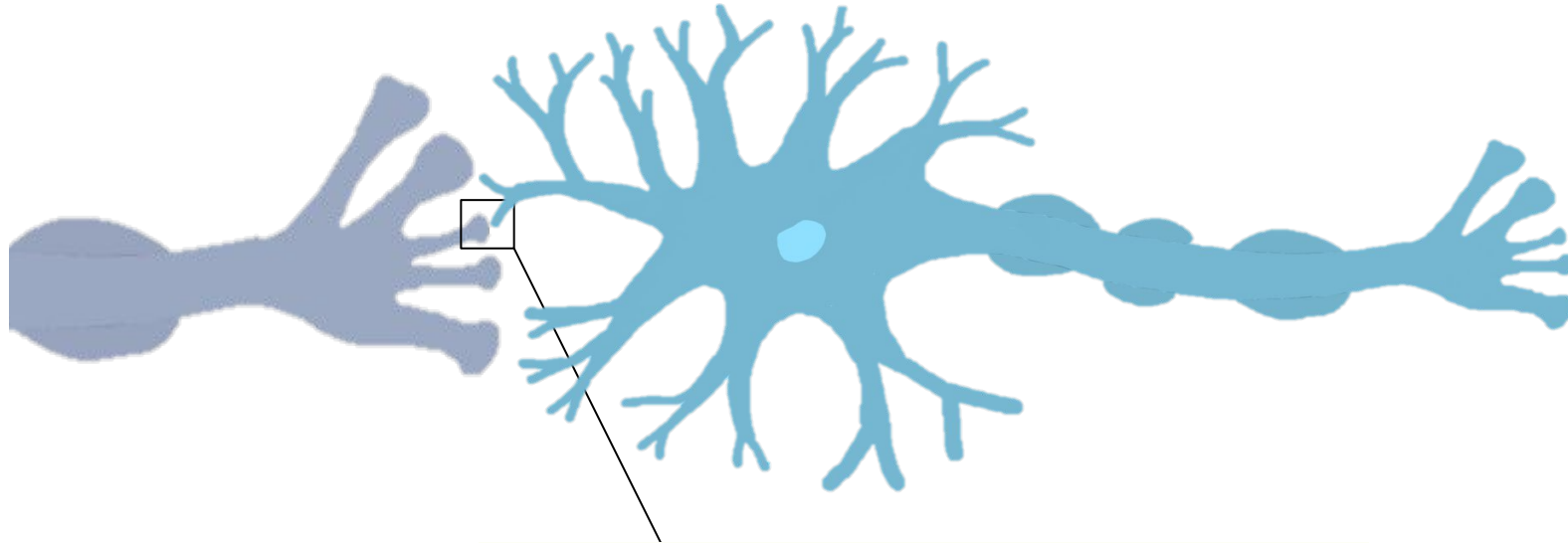
# Neurotransmission

## Sympathetic vs Parasympathetic

	Sympathetic	Parasympathetic
<b>Pupil</b>	<b>Dilates</b> to allow more light to enter the eye	<b>Contracts</b>
<b>Salivary Glands</b>	<b>Decreases</b> salivation	<b>Increases</b> salivation
<b>Lungs</b>	<b>Expand</b> to help increase breathing rate	<b>Contracts</b>
<b>Heart</b>	Heart rate <b>increases</b>	Heart rate <b>decreases</b>
<b>Stomach</b>	<b>Decreases</b> contractions related to digestion	<b>Increases</b> contractions related to digestion
<b>Intestines</b>	<b>Decreases</b> contractions related to digestion	<b>Increases</b> contractions related to digestion
<b>Gall Bladder</b>	<b>Inhibits</b> the release of bile	<b>Stimulates</b> the release of bile
<b>Liver</b>	<b>Increases</b> the release of blood glucose	<b>Decreases</b> the release of blood glucose
<b>Adrenal Glands</b>	<b>Stimulate</b> release of hormones	<b>Inhibits</b> release of hormones
<b>Bladder</b>	<b>Relaxes</b>	<b>Contracts</b>

# Neurotransmission

# Neurotransmission



- **Glutamate:** *Main excitatory neurotransmitter in the CNS*
  - Enhances info transmission by making postsynaptic neurons more likely to fire
  - It therefore **increases LTP**
  - Plays a key role in learning and memory
  
- **Gamma-amino butyric acid (GABA):** *Main inhibitory neurotransmitter in the CNS*
  - Makes postsynaptic neurons less likely to fire
  - It therefore leads to **decreased LTP and could lead to LTD**

**‘Glutamate = Go, GABA = Slow’**



# Neurotransmission

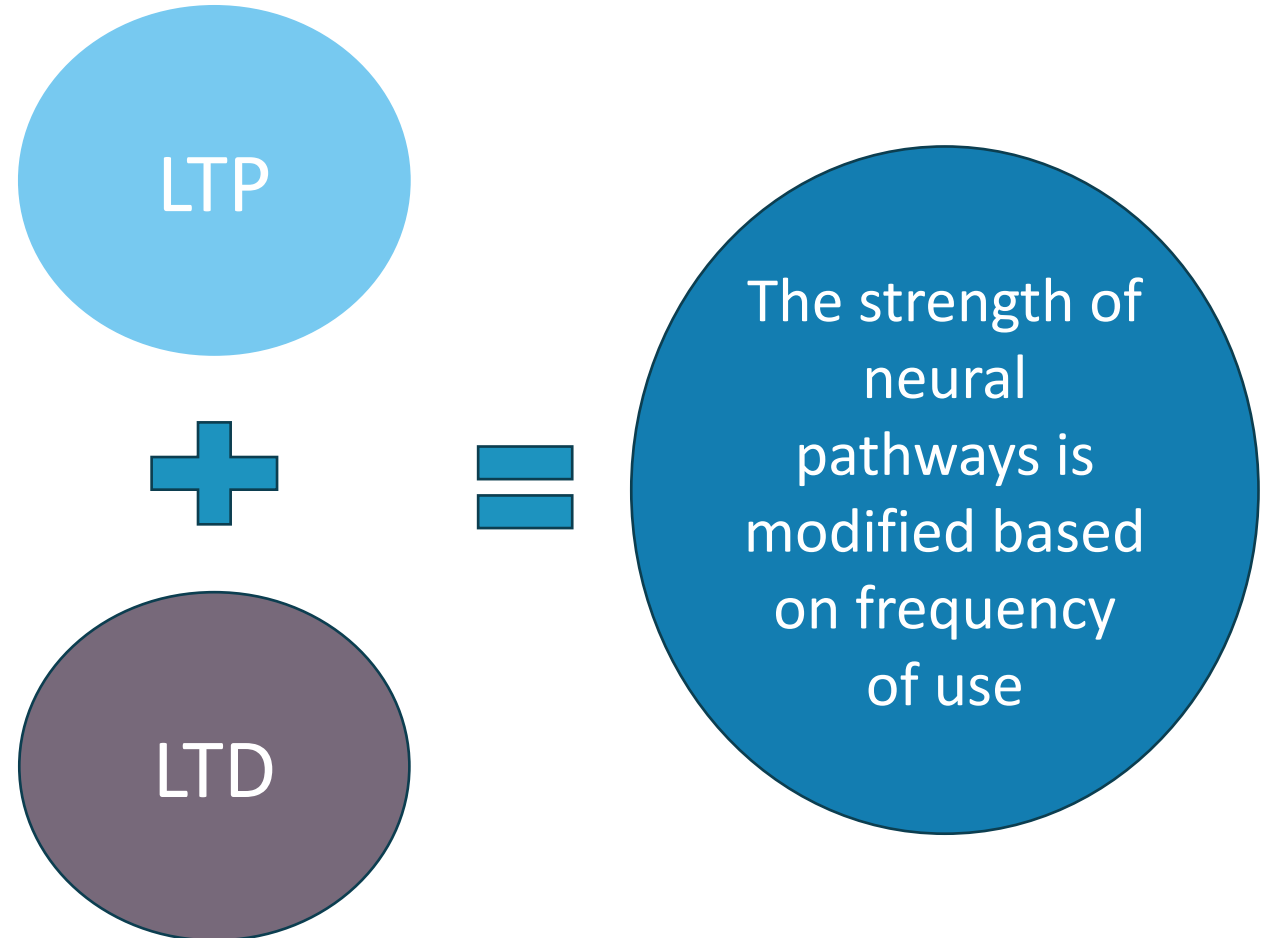
# Neural Basis of Learning

‘Neurons that fire together, wire together’ – Hebb’s rule

- Long term potentiation (LTP) is the increase in the strength of neural pathways due to repeated activation
- i.e. LTP increases the likelihood that if a presynaptic neuron fires, the postsynaptic neuron will fire too

‘Use it or lose it’

- Long term depression (LTD) is the decrease in the strength of neural pathways due to reduced activation
- i.e. LTD decreases the likelihood that if a presynaptic neuron fires, the postsynaptic neuron will fire too



- **Sprouting** is the formation of new neural connections to create new synaptic pathways
- **Rerouting** is the establishment of an alternate synaptic pathway to avoid damaged neurons
- **Pruning** is the removal of unnecessary synapses in order to make useful neural pathways more efficient



# Neurotransmission

## Question 3 (12 marks)

When Raafe learnt to type when he was a child, he used only the index finger on each hand to develop his skills. As an adult, Raafe applied for a job as an administrative assistant and needed to learn a technique called touch-typing, which uses all fingers on both hands. His touch-typing skills would be tested as part of the job selection process.

a. Explain how long-term depression was involved when Raafe learnt the new touch-typing technique. 3 marks

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b. With reference to the lock-and-key process, explain the role of glutamate in learning touch-typing. 4 marks

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# Sample Question + Response

## Question 3a.

Marks	0	1	2	3	Average
%	25	29	32	14	1.4

Marks were awarded for:

- demonstrating knowledge that long-term depression (LTD) is the long-lasting, repeated or prolonged decrease in the strength of neural pathways. LTD could also be described in terms of repeated low-level stimulation or prolonged suboptimal activation of neural pathways
- demonstrating knowledge that the weakening of neural connections will occur for the neural connections involved with two-finger typing
- knowledge that this allows for modification of neural pathways to strengthen/learn the new touch-typing technique.

The following is a sample response.

When Raafe learns to touch-type, long-term depression causes the neural pathways for two-finger typing to become weakened due to repeated low-level stimulation of these pathways. This allows for the new skill of touch-typing to be strengthened.

## Question 3b.

Marks	0	1	2	3	4	Average
%	16	14	19	27	24	2.3

Marks were awarded for demonstrating knowledge that:

- glutamate is the main excitatory neurotransmitter and/or that glutamate increases the chance of the (post-synaptic) neuron firing an action potential
- glutamate acts as a key, and the glutamate receptor sites (on the post-synaptic neuron) act as the lock
- glutamate binds/chemically reacts with its complementary receptor sites (on the post-synaptic neuron)
- glutamate strengthens the synaptic pathways responsible for the touch-typing learning.

The following is a sample response.

Glutamate is the main excitatory neurotransmitter released from the pre-synaptic neuron during learning. Glutamate acts like a key that opens the complementary receptor sites on the post-synaptic neuron, which can be thought of as a lock. The glutamate binds with the receptor site, which strengthens the synaptic pathways responsible for touch-typing.

- **Dopamine** is a neuromodulator that is important for balance, movement, pleasure + rewarding behaviours. It is a neuromodulator, meaning that it can lead to both excitatory + inhibitory effects
  - can be released from a neuron far from its receptor site
  - influence effects of other chemical messengers
- **Serotonin** is a neuromodulator (that also acts as a hormone) and is important for mood and sleep
  - the 'feel-good' hormone

Neurotransmitters	Neuromodulators
Impact singular synapses	Impact multiple synapses/ smaller brain areas
Released in under a fraction of a second	Take a few seconds/ a minute to be released
Can be removed from synapses very fast	Remain in the synapses for longer
Impact flow of ions into the postsynaptic membrane	Impact pre/ postsynaptic cell activity

Use the following information to answer Questions 17–20.

Lilli was sitting with her school friends in a grassy area during lunchtime when a bug started crawling up her leg. Before she realised what it was, she swiped it away with her hand.

### Question 17

Lilli's response is an example of

- A. a fight-flight-freeze response.
- B. a conscious response to sensory stimuli.
- C. a spinal reflex.
- D. countershock.

### Question 18

Which division of Lilli's nervous system is responsible for integrating and coordinating her response to the bug?

- A. somatic
- B. parasympathetic
- C. sympathetic
- D. central

### Question 19

Which division of the nervous system is responsible for conveying the afferent information to the spinal cord?

- A. somatic
- B. parasympathetic
- C. the brain
- D. central

- The fight–flight–freeze response is an involuntary, physical response to a sudden and immediate threat in readiness to either fight, flight (run away) or freeze
- Sympathetic dominance
  - note: codominance of parasympathetic for freeze
  - Heart rate and breathing rate increases, the pupils dilate and more blood is directed to the muscles, to prepare the body for either fight or flight
- Scenario based questions are common
  - When writing your answer think **specific, scenario, statement**

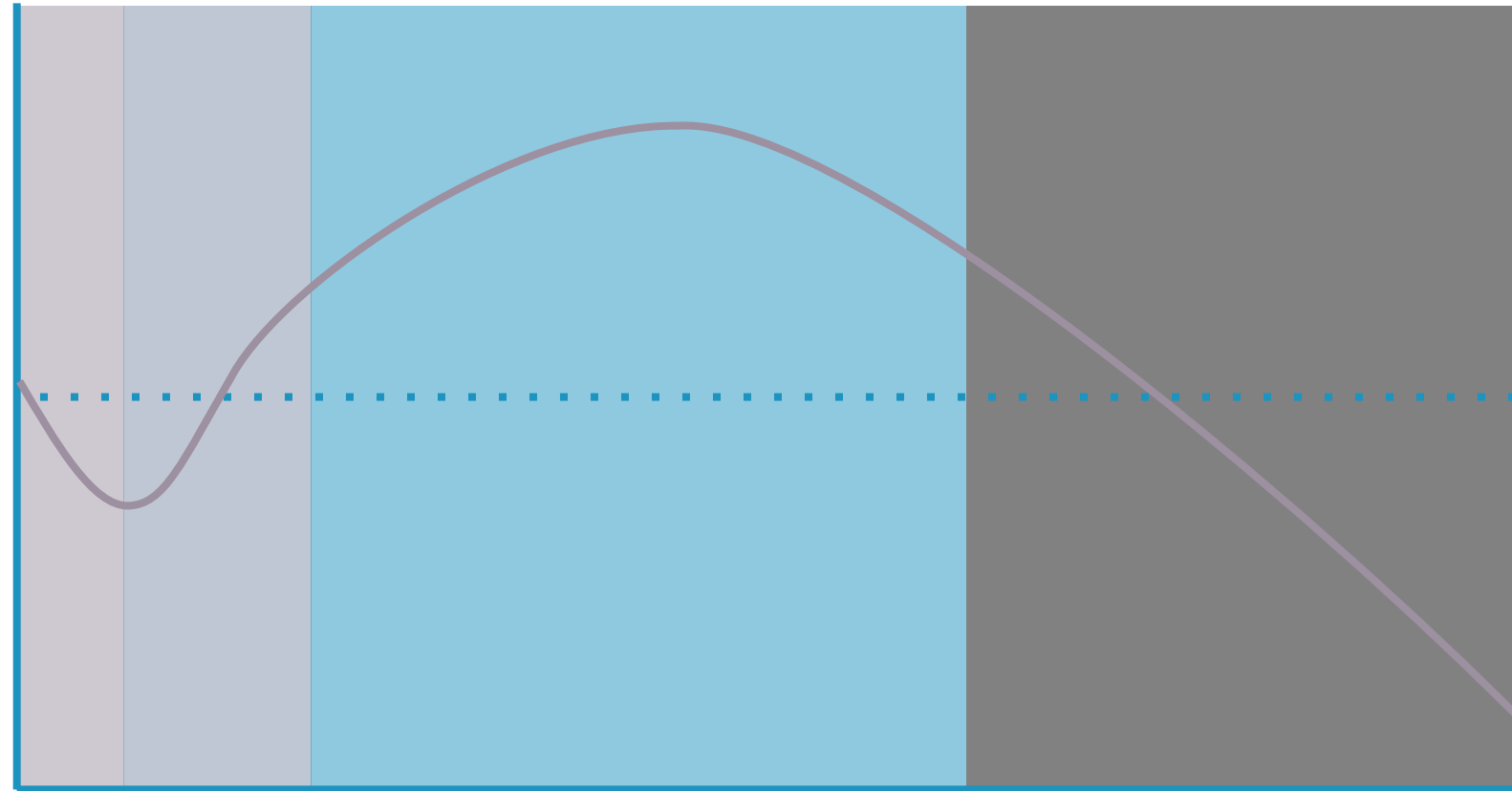
- Includes the brain, spinal cord, autonomic nervous system (sympathetic, parasympathetic and **enteric**) and the hypothalamic-pituitary-adrenal (HPA) axis
- Vagus nerve
- The human gut microbiota refers to a large population of bacteria that live in the gastrointestinal tract
- *A healthy microbiota produces important hormones + neurotransmitters*
  - e.g. GABA, dopamine, serotonin
- Unhealthy microbiota can lead to negative effects including inflammation + the release of anxiety-producing hormones



Thomas has worked for many years as a police officer, which requires him to work night shifts. Thomas regularly finds it difficult to adjust following a period of night shift, often not sleeping for over 24 hours. Recently he has been struggling to find balance in his life, has been feeling isolated from his friends and his doctor diagnosed him with a digestive illness.

**Suggest how stress resulting from Thomas' high-pressure job as a police officer may have contributed to his digestive disorder. In your response outline the interaction of gut microbiota with stress and the nervous system (3 marks)**

- **Definition**
- **Impact on diversity/ numbers**
- **Impact on overall stress levels**
- **The Gut-Brain Axis is a bi-directional communication link between the enteric nervous system (gut) and the central nervous system (brain)**
- **High stress levels may lead to an overall reduction in the diversity and number of gut microbiota.**
- **This may have contributed to the development of Thomas' digestive disorder as the functioning of the brain can impact functioning of the gut and vice versa.**



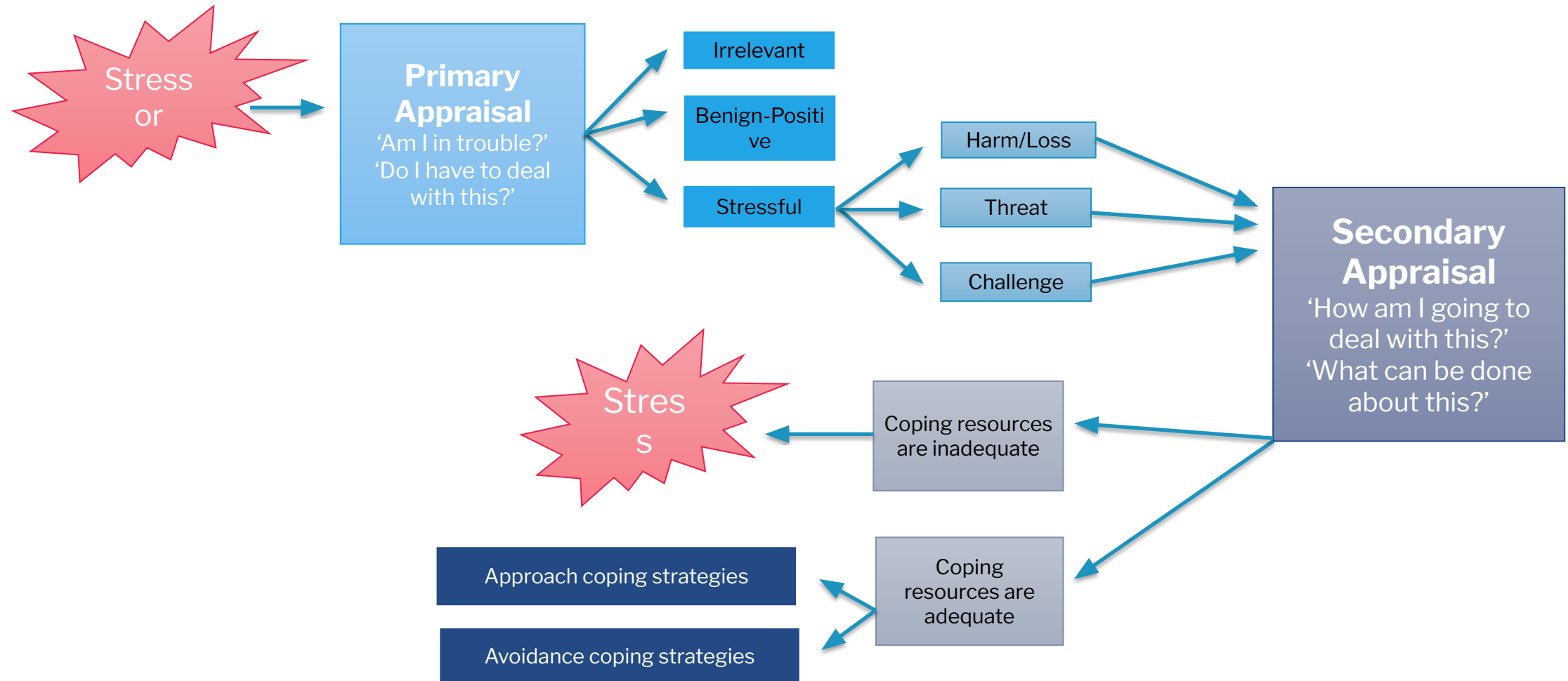
Shock  
Counter Shock  
Alarm

Resistance

Exhaustion

# Stress

# Lazarus + Folkman



## Context-Specific Effectiveness

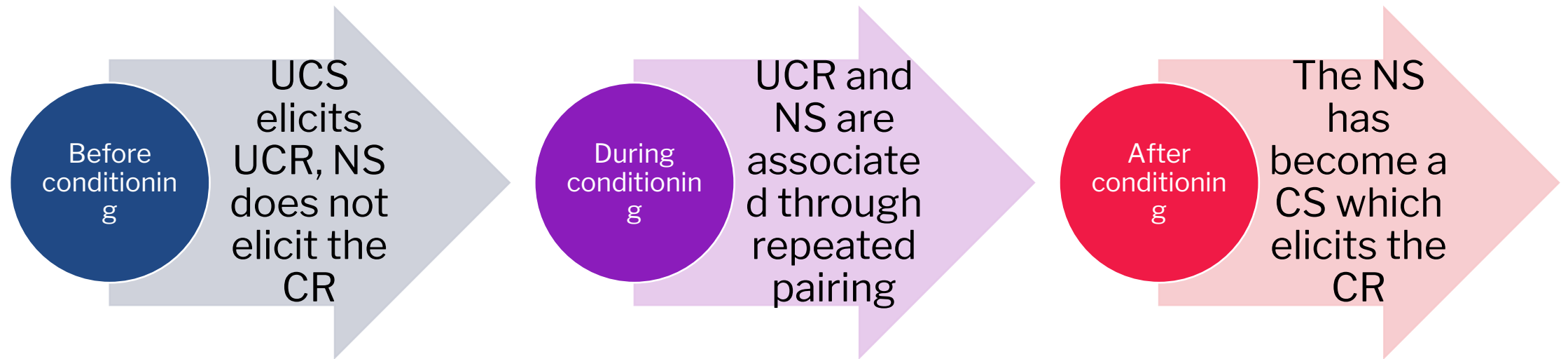
The coping strategy 'matching' the stressor

- E.g. If a student has a big test coming up, a coping strategy that incorporates positive action, such as study, would be effective

## Coping Flexibility

An individual's ability to effectively change or modify their coping technique when necessary

- People with a high coping flexibility are able to change their coping strategies if their current strategy isn't working
- People with a high coping flexibility tend to handle stress more effectively



# Learning + Memory

### Question 3 (8 marks)

#### Snake avoidance training saves dogs' lives

by Kwan Pelucci

Veterinary surgeon Margie Grey is a strong advocate of training dogs to avoid snakes. 'Snake avoidance training saves dogs' lives', said Dr Grey. To prevent dogs from being bitten, she regularly engages an animal trainer specialising in reptiles to work with her clients and their dogs. The methods the trainer uses are described below.

During the training sessions, the dogs wear a collar that delivers a low-level electric shock sent by a remote transmitter held by the animal trainer.

Over two or more sessions, each dog is exposed to a range of non-venomous snakes and trained to avoid these snakes. The animal trainer uses two different training methods in each session.

The first method involves conditioning the dogs to associate snakes with the electric shock delivered through their collar.

The second method involves giving the dogs a treat each time the dogs choose not to approach a snake.

Dr Grey said that even though the first part of the training uses an electric shock, she trained her own dogs using this method because she knows the treatment saves dogs' lives.

- a. In terms of classical conditioning, describe how the animal trainer creates an association between the neutral stimulus and the unconditioned stimulus to develop a conditioned response.

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#### Question 3a.

Marks	0	1	2	3	Average
%	33	29	27	10	1.2

One mark was awarded for each of the following:

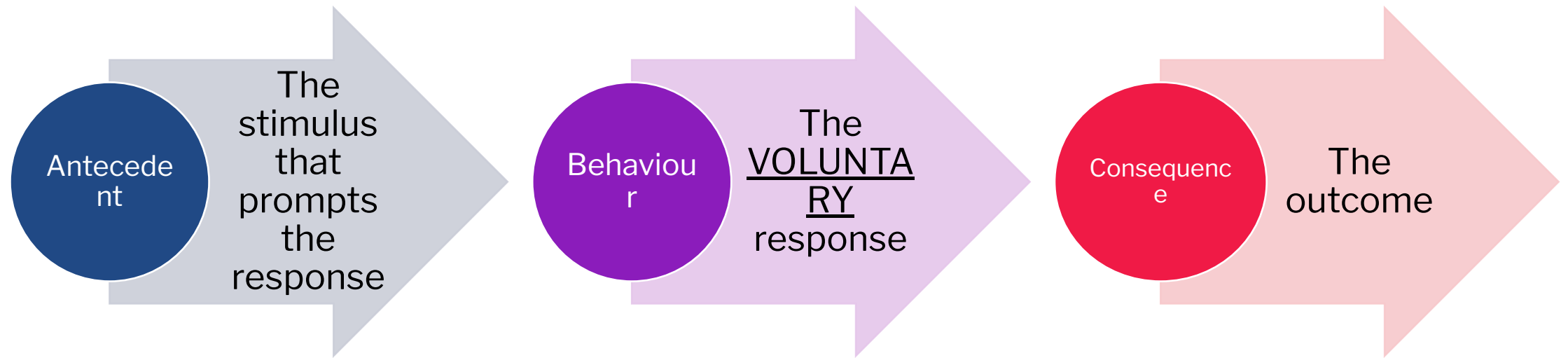
- correct identification of the neutral stimulus (NS) as the snake and the unconditioned stimulus (UCS) as the electric shock (from the collar)
- trainer presents the snake (NS) immediately followed by, or simultaneous with, the shock (UCS)
- demonstrating understanding that the repeated association formed between the snake and the shock causes the snake to become a conditioned stimulus that comes to produce a conditioned fear response when it is presented on its own (resulting in avoidance of the snake).

Commonly used acronyms relating to classical conditioning were allowed. The collar or shock collar could **not** be named as the UCS; the UCS is the electric shock. The UCR is the fear response.

If a flow chart was used, it needed to state explicitly that the NS comes before (or simultaneously with) the UCS. Writing 'NS + UCS' was not sufficient for the assessor to infer that the student understood the importance of the order of stimulus presentation.

The following is a sample response.

The animal trainer creates a conditioned fear response to snakes by presenting the dog with a snake, the NS, followed by the electric shock, the UCS [2 marks]. Over repeated trials, the dog learns the association between the snake and the shock, producing a conditioned fear response to the snake when it is presented on its own [1 mark].



	<u>Positive (+)</u>	<u>Negative (-)</u>
<b>Reinforcement</b> (do it again!)	Positive reinforcement	Negative reinforcement
<b>Punishment</b> (don't do it again!)	Positive punishment	Negative punishment



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Dr Grey said that even though the first part of the training uses an electric shock, she trained her own dogs using this method because she knows the treatment saves dogs' lives.

b. Operant conditioning was also used in this training.

Name the antecedent, the subsequent behaviour and the type of consequence in the training sessions. 3 marks

Antecedent \_\_\_\_\_

Marks	0	1	2	3	Average
%	13	22	24	42	2

Behaviour \_\_\_\_\_

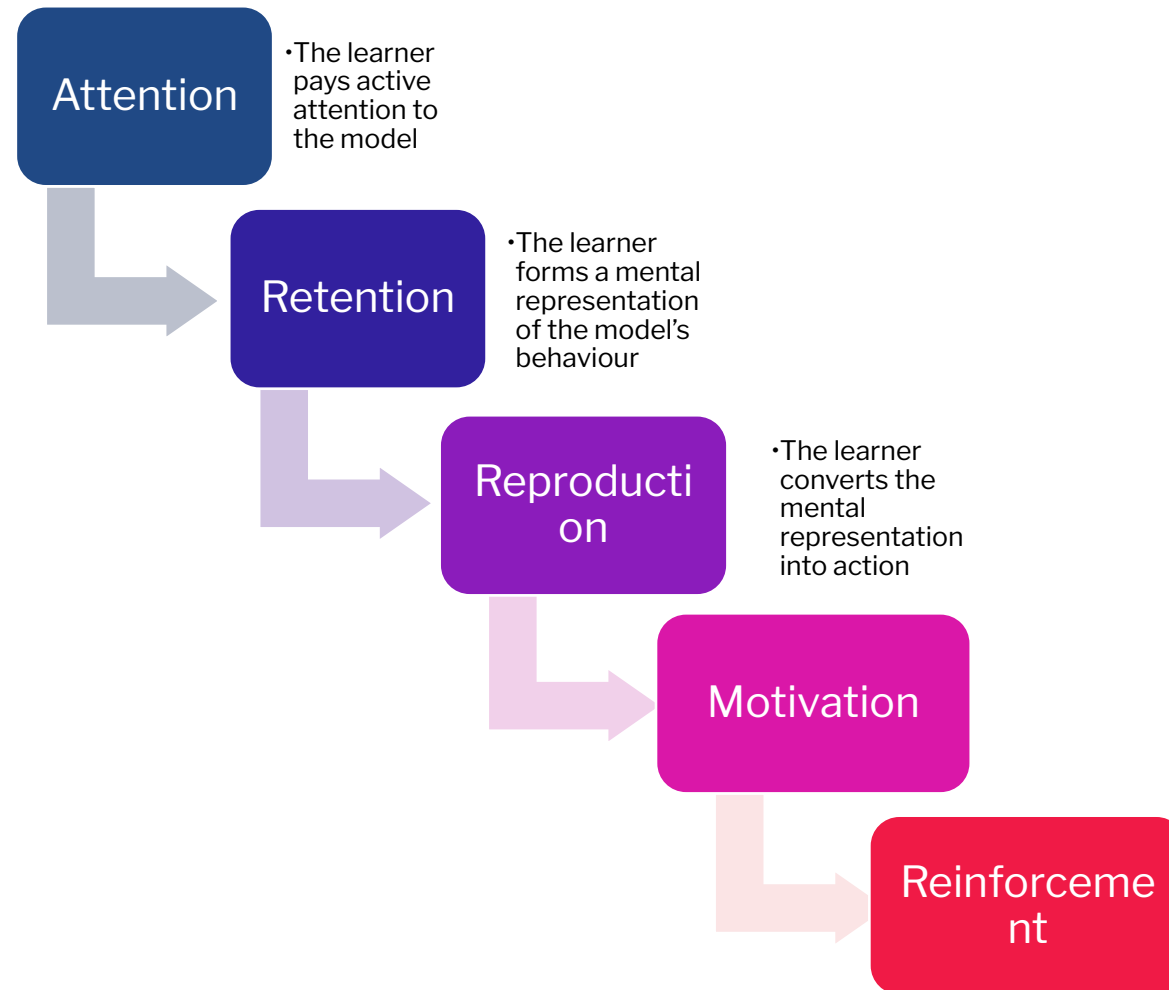
One mark was awarded for each of the following:

- identifying the snake as the Antecedent
- identifying avoidance of the snake (not approaching the snake) as the Behaviour
- identifying positive reinforcement as the Consequence (with treat given for avoiding/not approaching the snake in the second method used in each training session).

Type of consequence \_\_\_\_\_

\_\_\_\_\_

Stating 'treat' alone was not sufficient for the Consequence.



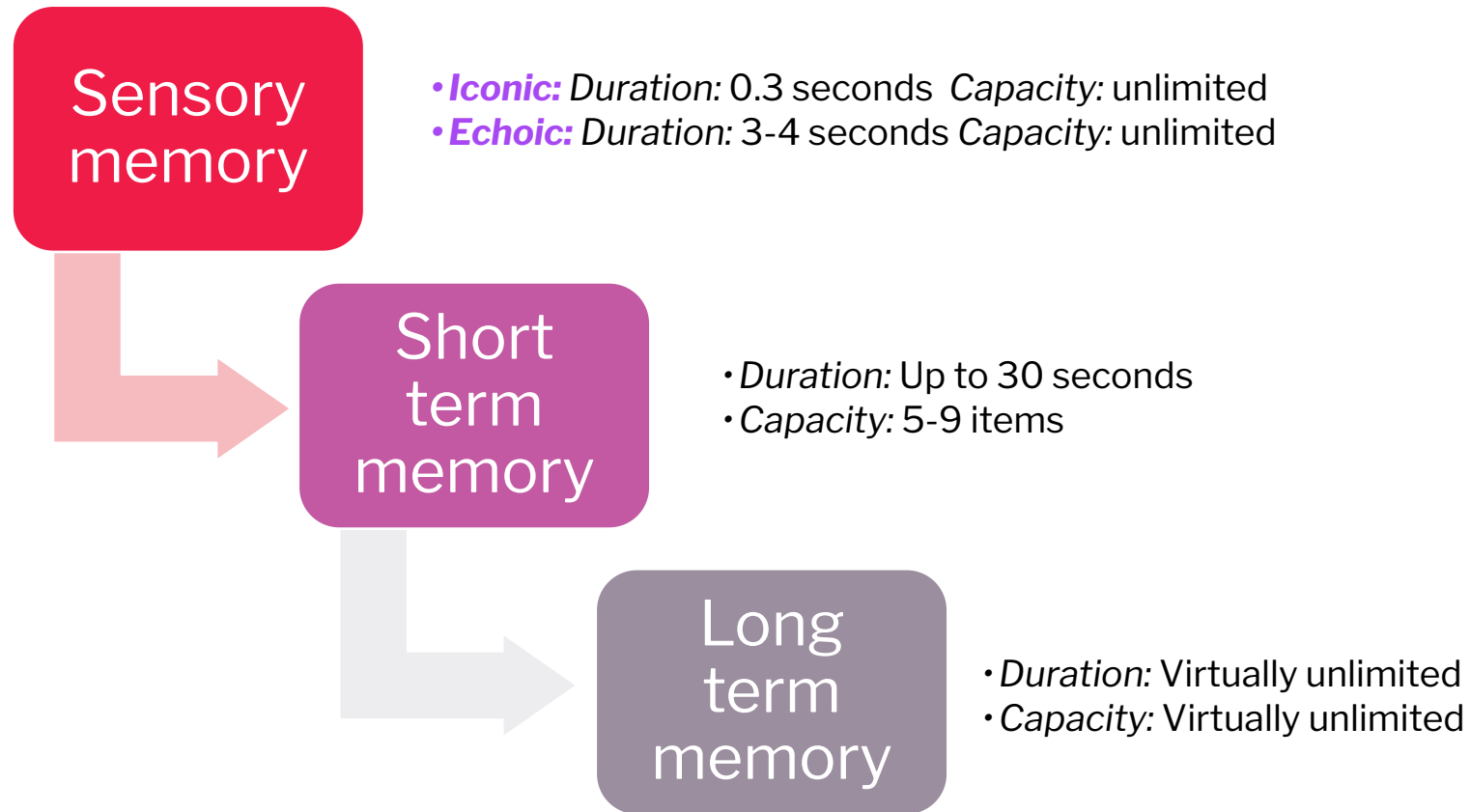
- Aboriginal and Torres Strait Islander knowledge systems represent the oldest and longest continuing forms of learning in Australia
- **Situated learning theory** emphasises that learning should take place in the same context where it would be applied, enabling individuals to practise what has been learnt
- Situated cognition provides a model of learning that is more communal + collaborative – the learner is in a system with particular knowledge
  - Learning occurs via observation + imitation of actions of other members of the system
  - Learning is more unstructured + less rigid
  - Emphasis is on mastering context-specific skills rather than rote learning information

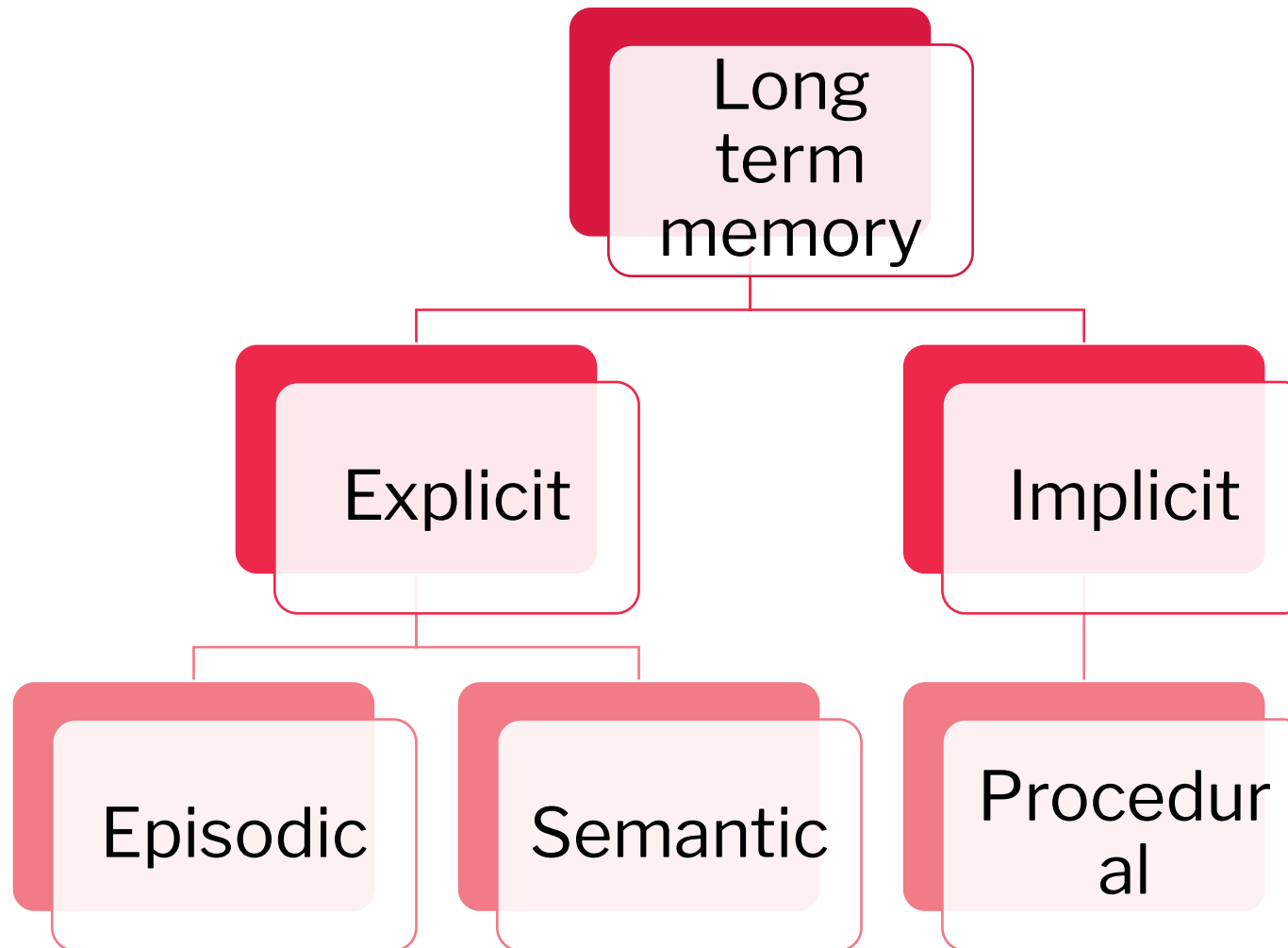
### Question 44

Sarah's Physical Education teacher was demonstrating to the class how to perform a forward somersault during a diving lesson. Sarah was motivated to learn how to somersault but, due to her fear of heights, she doubts that she will have the necessary courage to attempt the dive.

Sarah's potential inability to attempt the dive is due to which one of the following stages of observational learning?

- A. attention
- B. retention
- C. motivation
- D. reproduction







## Amygdala

- Role in the formation of emotional memories
- Particularly implicit memories- classically conditioned fear responses
- More likely to remember events that produce strong emotional reactions due to the presence of adrenaline when they are emotionally aroused
- *Doesn't store any memories*

## Hippocampus

- Essential role in the consolidation of explicit – semantic + episodic memories (turning STM into LTM)
- Also important for spatial memory
- *NOT involved in implicit memories*
- *Doesn't store any LTM*

**NEOCORTEX:** Storage of explicit memories

**HIPPOCAMPUS:** Encoding explicit memories

**AMYGDALA:** Encoding emotional memories

**CEREBELLUM + BASAL GANGLIA:** Encoding and storage of implicit memories



# Learning + Memory

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- **Episodic future thinking** involves mentally experiencing an event that might occur in your personal future by projecting yourself forward in time and involves semantic autobiographical knowledge and episodic autobiographical knowledge to create the 'world' in which the future thinking occurs
- **Alzheimer's** is a type of dementia characterised by widespread deterioration of brain neurons, which causes memory decline, gradual loss of cognitive and social skills and changes in personality
  - **Neurofibrillary tangles** within neurons
  - **Amyloid plaques** between neurons
  - Reduced ability to retrieve long-term memories of autobiographical events
  - Reduced ability to undergo episodic future thinking
- **Aphantasia** is a disorder involving the inability to voluntarily visualise imagery

## Written cultures

- **Acronyms** → first letters from multiple words to form a new word that's easier to remember
  - pronounceable words
  - e.g. SAME = sensory - afferent, motor - efferent
- **Acrostics** → phrases made up of words beginning with the first letters of the words you want to remember
  - e.g. Never Eat Soggy Weet-Bix = North, East, South, West
- **Method of loci** → memorising information through placing each item along an imaginary journey
  - combines visualisation with spatial memory of environments that are familiar to the individual

Kyan and his friend Alex plan to have a competition to see who can remember the most amount of playing cards in a deck of cards. Kyan has researched a technique called the Method of Loci which can be used as a mnemonic device.

**Explain how Kyan can use the Method of Loci to remember the playing cards (4 marks)**

- Choose a familiar location
- Create a memory path through the familiar location
- Visualise each location and associate it with a piece of information
- Mentally revisit the location palace, where each location serves as a memory cue
- Kyan should choose a location that he knows well like his house
- Kyan should create a mental path throughout the memory palace. For e.g. in his house, Kyan could mentally walk from the front door to each room
- While mentally walking through his house, Kyan would need to visualise each playing card in a different location. For e.g. the Queen of Hearts at the front door, the Ace of Spades in the hallway etc.
- Kyan would then mentally revisit his house, where each location (like the front door) would serve as a memory cue to remembering the playing card that he mentally attached to this location (like the Queen of Hearts)

## Oral cultures

### • *Sung narratives*

- Singing allows us to create bigger chunks of information that can be stored in STM
- Auditory aspects of songs aid in encoding as the individual associates words with a certain beat, tempo or melody

- **Songlines** are memory codes used by Aboriginal people that trace journeys + describe how a traveller should respectfully make a journey across country
  - Describe landmarks
  - By giving landmarks characteristics within the song, encoding is enhanced further

### Question 19

Which of the following memory stores has the lowest capacity?

- A. long-term
- B. short-term
- C. iconic
- D. echoic

# PART TWO

## UNIT 4

## Normal Waking Consciousness

S

- Standard pattern and quality of mental activity

## Altered State of Consciousness

S

- Anything that isn't NWC
- Can be natural or induced

- Know the definitions of an EEG, EOG and EMG word-for-word. 'Detect, amplify and record electrical activity of the...' (**DARE**)
- **EEG** → brainwaves
- **EOG** → muscles that control eye movements
- **EMG** → muscle tension
- **Sleep diary**
  - Participants keep track of details surrounding their sleep.
- **Video monitoring**
  - Often used during sleep studies. It can then record things such as movement, tossing and turning, night terrors or sleep



### REM Sleep

- Brain waves: increased frequency, decreased amplitude
- Sleeper appears relaxed despite fast heart + breathing rate
- Mental Recovery

### NREM Sleep

1. Increased frequency, decreased amplitude
  2. Slower frequency, increasing amplitude
  3. Deep sleep – Decreased frequency, increased amplitude
- Physical recovery

- **Ultradian rhythm:** less than a day
  - Sleep cycles
  - Length increases as night goes on
  - Deep sleep decreases throughout night
  - REM sleep increases
  
- **Circadian rhythm:** a day / 24 hours
  - Sleep-wake cycle
  - This naturally extends longer than 24 hours in the absence of environmental cues

- An area of the brain that controls our sleep-wake cycle
  - Influenced by zeitgebers – environmental cues
- **SCN** sends neuronal messages to the **pineal gland** to secrete more/less of the hormone **melatonin**
  - Negative feedback loop
  - Melatonin levels are usually higher at night
- High melatonin levels = greater drowsiness
- Lower melatonin levels = greater alertness
- **Light** is the key factor that influences the sleep-wake cycle

- **Total amount of sleep**

- As people grow older, their total time spent in sleep tends to **decrease**. Infants may sleep for up to 16 hours a day, while older adults may only sleep for 6-7 hours per day

- **Changes in sleep pattern**

- The amount of time spent in **REM sleep decreases** during the first two years of life, and then **remains fairly stable** through to an old age.
- When first born, infants have approximately 50% REM sleep, this decrease to 20-25% by age 5 and remains fairly stable throughout the rest of life.
- As people age, their amount of **deep sleep (NREM stages 3 and 4) decreases**. Often, elderly people may have very little or no deep sleep, and spend a lot more time in NREM stage 2 sleep.

- Sleep deprivation occurs when there is inadequate quality and/or quantity of sleep

<u>Affective</u>	<u>Behavioural</u>	<u>Cognitive</u>
Easily irritated /short tempered Amplified emotional responses Low impulse control	Sleep inertia Excessive sleepiness Fatigue	Lapses in selective attention Lower ability to maintain focus Irrational thinking
Difficulty judging others emotions Reduced empathy More likely to over react	Micro sleeps Impaired behaviour control inattentiveness Reduced motor coordination	Impaired learning & memory Reduced ability to think clearly -Especially on simple tasks -Especially for boring tasks

- The performance on tasks of a person that was fully sleep deprived for 17hr was equal to people with a BAC of 0.05 (legal BAC limit for driving in AUS)

17hr = BAC 0.05

- People that were fully sleep deprived (also known as 'sustained wakefulness') for 24 hours performed equivalent to people with a BAC of 0.10%

24hr = BAC 0.10

- **Circadian rhythm sleep disorder:** Non-ideal timing of sleep-wake cycle
- **Delayed sleep phase syndrome** → sleep cycle is pushed back, resulting in the body falling asleep later than usual, and waking up later
  - Melatonin secreted later than usual
- **Advanced sleep phase disorder** → sleep cycle is brought forward, resulting in the body falling asleep earlier than usual, and waking up earlier
  - Melatonin secreted earlier than usual
- **Shift work** → mismatch in waking time and body's natural sleep time; tired when working, awake when wanting to sleep
- **Bright light therapy** → timed exposure to safe levels of bright light

- A mentally healthy person is NOT just someone who isn't experiencing mental health disorder
- Mental wellbeing constantly fluctuates and is influenced by both internal and external factors





- **Functioning** → how well an individual is able to individually operate in their environment.
  - meeting the demands of everyday life
- **Resilience to life stressors** → able to cope with and ‘bounce back’ from stressors; deal with change + uncertainty.

- A multidimensional + holistic framework for wellbeing used by Aboriginal and Torres Strait Islander people
- Considers connections across various domains
  - Body → physical health
  - Mind → mental health
  - Family → interpersonal interaction
  - Community → belonging, relationships
  - Culture → heritage
  - Land → connection to Country
  - Spirituality → connections to the Dreaming; views, rituals, ceremonies
- Connections to these domains varies throughout one's lifetime

<u>Stress</u>	<u>Anxiety</u>	<u>Phobia</u>
<ul style="list-style-type: none"><li>• Can contribute to mental disorders</li></ul>	<ul style="list-style-type: none"><li>• Can contribute to mental disorders</li></ul>	<ul style="list-style-type: none"><li>• Is a diagnosable mental disorder</li></ul>
<ul style="list-style-type: none"><li>• Considered normal in certain situations</li></ul>	<ul style="list-style-type: none"><li>• Considered normal in certain situations</li></ul>	<ul style="list-style-type: none"><li>• Not considered normal</li></ul>
<ul style="list-style-type: none"><li>• Mild amounts can be helpful</li></ul>	<ul style="list-style-type: none"><li>• Mild amounts can be helpful</li></ul>	<ul style="list-style-type: none"><li>• Not helpful</li></ul>
<ul style="list-style-type: none"><li>• Source of stress is generally known</li></ul>	<ul style="list-style-type: none"><li>• Source of anxiety is not always known</li></ul>	<ul style="list-style-type: none"><li>• Source always known</li></ul>

# Mental Wellbeing

# Specific Phobia Contributing Factors

<u>Biological</u>	<u>Psychological</u>	<u>Social</u>
<ul style="list-style-type: none"> <li>• GABA Dysfunction</li> </ul>	<ul style="list-style-type: none"> <li>• Precipitation by Classical Conditioning</li> <li>• Perpetuation by Operant Conditioning</li> </ul>	<ul style="list-style-type: none"> <li>• Specific Environmental Triggers</li> </ul>
<ul style="list-style-type: none"> <li>• Long-Term Potentiation</li> </ul>	<ul style="list-style-type: none"> <li>• Cognitive Biases</li> </ul>	<ul style="list-style-type: none"> <li>• Stigma</li> </ul>

<u>Biological</u>	<u>Psychological</u>	<u>Social</u>
<ul style="list-style-type: none"> <li>• Benzodiazepines (GABA agonists)</li> </ul>	<ul style="list-style-type: none"> <li>• Cognitive behavioural therapy</li> </ul>	<ul style="list-style-type: none"> <li>• Psychoeducation for families and supporters</li> </ul>
<ul style="list-style-type: none"> <li>• Breathing retraining</li> </ul>	<ul style="list-style-type: none"> <li>• Systematic desensitisation</li> </ul>	

## Benzodiazepine Agents 3 marks

- Role of GABA as a primary inhibitor neurotransmitter in the CNS
- Symptoms of GABA dysfunction
- Definition of benzodiazepines as GABA agonists that mimic the function of GABA
- Promoting feelings of calm, reducing anticipatory anxiety
  - Helps manage a phobia but NEVER cures it!

## Breathing Retraining questions: 3-4 marks

- Problem with anxiety/ phobic response (including low CO<sub>2</sub> levels)
- Definition of breathing retraining
- Restoration of CO<sub>2</sub> and O<sub>2</sub> levels via breathing retraining
- Restoration of parasympathetic NS dominance over sympathetic NS dominance to reduce anxiety

## Psychoeducation for friends and families: 3 marks

- Identify the intervention
- Identify an aspect (e.g. not encouraging avoidance behaviours/ challenging unrealistic thoughts)
- Specific impacts on how it can limit catastrophic thinking/ perpetuation of a specific phobia through operant conditioning

## Cognitive Behavioural Therapy (3 marks)

- Identify cognitive behavioural therapy as the intervention
- Mention cognitive restructuring with specific examples
- Mention behavioural strategies with specific examples
- Show the positive impact of these two being used in conjunction

## Systematic Desensitisation (3 marks)

- Psychologist teaches the patient a relaxation technique
- A fear hierarchy is created ranging from least to most anxiety inducing phobic prompts (give examples)
- Gradual exposure to each level + relaxation technique
- Breaks the association between the phobic stimulus and fear response

## Cultural Continuity

- The ability to preserve the historical traditions of a culture and carry them forward
  - Strong cultural identity enhances SEWB

## Self-determination

- Refers to ensuring Indigenous communities have the power + resources to support their own mental wellbeing
  - Traditional forms of healing

<u>Biological</u>	<u>Psychological</u>	<u>Social</u>
<ul style="list-style-type: none"> <li>• Adequate nutritional intake, hydration + sleep</li> </ul>	<ul style="list-style-type: none"> <li>• Cognitive behavioural strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Support from family, friends + community</li> </ul>
	<ul style="list-style-type: none"> <li>• Mindfulness meditation</li> </ul>	



- Independent Variable (variable being manipulated)
- Dependent Variable (variable on which the IV will be measured)

An **extraneous variable** is a variable other than the IV that *can cause* a change in the DV, therefore affecting the experiment in an unwanted way

A **confounding variable** is a variable other than the IV which *has had* an unwanted effect on the DV

**Between Subjects** – Participants are allocated to either the control or experimental group.

**Within Subjects** – One participant is exposed to both the control and experimental conditions

**Mixed Design** – Participants are involved in tasks that may require aspects of a between subjects design and within subjects design.

# Scientific Skills + Exam

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## Experimenter Effect

This can occur if the experimenter is biased because they know which group is receiving the treatment and which isn't – this can be controlled for using a double-blind procedure.

## Standardised Instructions + Procedure

All participants in a study should be given the same instructions and follow the same procedure (apart from when necessary for the IV) to avoid possible extraneous variables.

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**Single-Blind Procedure** – This is when the participants are unaware of whether they are in the experimental or control group, and therefore unaware whether they have been exposed to the IV. This avoids issues with participant expectations, as all participants equally feel like they are receiving a treatment.

**Double-Blind Procedure** – Both the participants and the experimenter are unaware of which is the experimental and which is the control group. This avoids issues with participant expectations and the experimenter effect.

**Random Sampling** – Every member of the population has an equal chance of being selected to be part of the sample. (Names out of a hat, lottery)

**Stratified Sampling** – Involves dividing the population to be sampled into distinct subgroups, then selecting a separate sample from each subgroup in the same proportions as they occur in the population

E.g. There are 1000 students in a school, 200 in each year from 7-10, and 100 in years 11 and 12. A researcher wants a stratified sample of 20 students, so he would select four from each year from 7-10, two from year 11 and two from year 12. (Same proportion as population)

**Allocation** refers to how participants are assigned to either the experimental or control group

- in an independent groups design

**Random allocation** is when participants are randomly allocated to either the experimental or control group

- essential to reduce individual participant variables between the two groups
- as long as the two groups are big enough and random allocation is used, the groups should be reasonably equivalent

**Qualitative data** is information about qualities, or characteristics (words).

**Quantitative data** is numerical data about what is being studied (numbers).

Primary data is gathered by the researcher themselves during the study.

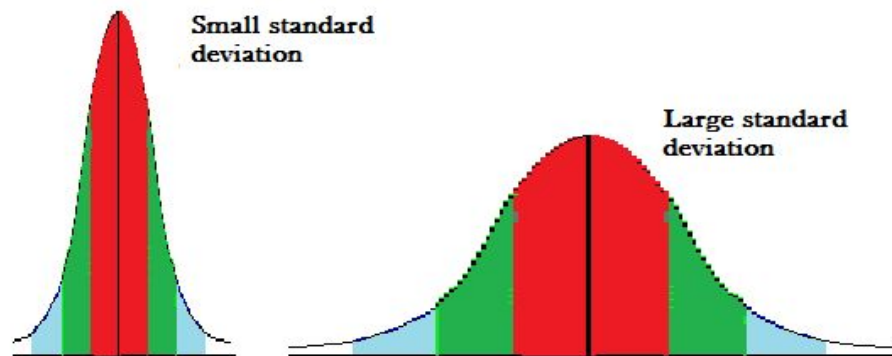
Secondary data comes from another source (e.g. ABS).

There are a couple of stats you need to know:

**Mean** – The average of all scores. Is best used when scores are clumped together.

The **standard deviation** shows how far scores within a set of scores spread out from the mean

A high standard deviation means that there is a greater spread, or variance, in the scores. A low standard deviation means that there is a small spread, or variance, in the scores





**Repeatability** refers to how consistent a measurement is under the same conditions

**Reproducibility** refers to how consistent a test is when performed under different conditions

**Validity** refers to how accurately the test or method actually measures what it is supposed to

- e.g. If I stood on a scale, would it give me my true weight?

A **generalisation** is a decision about how widely the results of a study can be applied to other members of the population

To make a generalisation:

- No ethical guidelines must have been breached
- There should be no major extraneous variables in the experiment
- Convenience sampling mustn't have been used (must be random or stratified)
- A very small sample size shouldn't have been used

If the experiment is well-designed, has no major extraneous variables and uses random or stratified sampling, then usually a generalisation can be made to the wider population

***Protection and Security of Participants' Information*** – The researcher must make sure that personal information about participants is not misused, disclosed or lost

***Confidentiality*** – The researcher must ensure that participants, and their individual results, can't be identified in any way. Very important when publishing results

***Voluntary Participation*** – Participants must voluntarily consent to be part of the study. They also can't be punished or disadvantaged for not being part of the study

***Withdrawal Rights*** – Participants, and their data, must be free to withdraw from the study at any time

**Informed Consent** – Participants must be informed about the research study before it begins. This includes the nature and purpose of the study, and potential risks, general information about tasks and their withdrawal rights. Having been informed, they must then consent to participate in the study (signing a consent form).

**Deception** – Deception is acceptable (with ethical permission), however, the researcher must make sure that the participants are informed of the deception after the study has been completed, and that the deception doesn't cause significant harm or trauma.

**Debriefing** – Debriefing happens after the study. Participants are informed of the results and conclusion of the research. Any deception must be revealed.

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## Question 3

**Beware**

**VCAA 2013 SA Q3 © VCAA**

In an experiment, it is essential to control for extraneous variables so that

1 mark

- A. there is a probability that the results will be obtained by chance.
- B. a valid conclusion can be made about the effect of the independent variable on the dependent variable.
- C. a valid conclusion can be made about the effect of the dependent variable on the independent variable.
- D. the hypothesis is supported and the results of the experiment can be generalised to the broader population.

# Scientific Skills + Exam

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## Question 2 **Beware**

Professor Hoffman has developed a theory that students who have 9 or more hours of sleep each night will perform better at complex mathematical tasks than students who have less than 8 hours of sleep each night. He conducts an experiment and records the results himself. He finds a statistically significant difference between the two groups, with the students who sleep longer demonstrating superior performance.

- a. With reference to experimenter effects, why should this finding be viewed with caution? 1 mark

### Question 2 a.

*Professor Hoffman recorded the results himself, and so the results may be biased by his expectations. For example, he could treat the experimental group differently, which could affect the outcome of the dependent variable.*

# Scientific Skills + Exam

## Question 2 **Beware**

Professor Hoffman has developed a theory that students who have 9 or more hours of sleep each night will perform better at complex mathematical tasks than students who have less than 8 hours of sleep each night. He conducts an experiment and records the results himself. He finds a statistically significant difference between the two groups, with the students who sleep longer demonstrating superior performance.

- b. Name and describe a procedure Professor Hoffman could use to deal with the problems associated with experimenter effects.

2 marks

### Question 2 b.

Professor Hoffman could utilise a single blind experimental procedure, which is where the experimenter is unaware of which participants have been allocated to the experimental and control groups.

# Scientific Skills + Exam

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## Question 4

**Beware**

**VCAA 2020 SA Q14 © VCAA**

Hannah is a university student who has recently signed a lease to move into a rental property in an apartment block. Hannah enjoys the freedom of having her own apartment. Since moving into her new apartment, Hannah has hosted loud parties most weekends. This has resulted in her neighbours making a formal complaint to her landlord. Hannah's landlord has sent her an official letter stating that her lease will be terminated if she continues to have loud parties.

If Hannah reduces the number of loud parties in response to the contents of the letter, which principle of operant conditioning is being demonstrated?

- A.** Response cost, because Hannah's neighbours are upset by her loud parties
- B.** Negative reinforcement, because the contents of the letter achieved the desired response
- C.** Response cost, because having her lease terminated would result in Hannah losing her apartment
- D.** Negative reinforcement, because the formal complaint by the neighbours is an unpleasant consequence



# Scientific Skills + Exam

## Question 7 **Beware**

Mac's dog, Raffi, barks excessively every time someone comes into the house. Mac finds this very annoying and yells at Raffi, but Raffi keeps barking. Give **three** reasons why this scenario is an example of operant conditioning rather than classical conditioning.

3 marks

Question 7:

*By yelling at Raffi, Mac is providing a consequence for Raffi's behaviour. Raffi is barking voluntarily, and Raffi and Mac are both active participants in this situation.*

This question is asking you to list the features of operant conditioning that differ from classical and then apply this to the situation given. It's helpful for questions like this to have a table in your notes similar to the one below that compares and contrasts classical and operant conditioning.

	Classical	Operant
Role of the learner	Passive	Active
Nature of the response	Reflexive	Voluntary (not automatic)
Acquisition	Repetitive pairing of a neutral and unconditioned stimulus	Providing a consequence following a particular behaviour

# Scientific Skills + Exam

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## Question 8

**Beware**

Bethany's success as a social media influencer being what influences Morgan to become one themselves is an example of, according to observational learning,

1 mark

- A. motivation, as Morgan has the desire to reproduce the same behaviour.
- B. motivation, as Bethany's success is a positive consequence.
- C. reinforcement, as Morgan sees this as an incentive of the career.
- D. reinforcement, as Bethany has continued to post the same content.

# Scientific Skills + Exam

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**Question 4** **Beware** **VCAA 2008 Exam 2 SB Q9 © VCAA**

James used to enjoy his job working in an office. However, for some time, James has been constantly criticised by his supervisor. James now feels anxious whenever he arrives at work.

- a. Name the type of conditioning that has caused James to be anxious whenever he arrives at work. 1 mark

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- b. James has started to take sick days to avoid the anxiety. The number of sick days he has taken in the last couple of months has increased. Eventually, James telephones his workplace to say he is sick and will not be at work for a week. What type of reinforcement has occurred to encourage James to take the week's sick leave? Explain your answer.

2 marks

## Question 4 b.

Negative reinforcement: by not going to work, James' feeling of anxiety is removed, thereby strengthening this avoidant behaviour and making it more likely that he will not attend work in the future.

# Scientific Skills + Exam

## Question 7 **Beware**

Jackie is walking home from school when it starts pouring rain, so she puts an umbrella up to keep herself dry, which is successful. Meanwhile, her brother Max is five minutes late to football training because of the rain, so his coach makes him run five laps. Using Jackie and Max as examples, explain the difference between positive punishment and negative reinforcement.

2 marks

### Question 7:

Jackie is experiencing negative reinforcement, which involves removing a negative stimulus to strengthen a behaviour. Putting up her umbrella removes the negative stimulus of the rain getting her wet, so she is more likely to use an umbrella in future. Max is experiencing positive punishment, which involves adding a stimulus to weaken behaviour. His coach is adding the stimulus of running laps to try and weaken his behaviour of being late.

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**Question 2** **Beware** **VCAA 2017 Sample Exam SA Q28 © VCAA**

Which one of the following statements about short-term memory is most accurate?

1 mark

- A. Short-term memory holds only information transferred from sensory memory.
- B. All incoming information is held in short-term memory for approximately 30 minutes.
- C. Short-term memory holds all sensory information until it is encoded into long-term memory.
- D. Short-term memory holds a limited amount of encoded information while it is being processed.

# Scientific Skills + Exam

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## Question 7 **Beware**

Tuyen was in a car accident and damaged both her amygdala and cerebellum.

- a. Explain the effect of damage to Tuyen's amygdala.

2 marks

### Question 7 a.

*Due to Tuyen's damaged amygdala, she will likely struggle to recall the emotional component of memories as the amygdala is crucial in their formation.*

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# Scientific Skills + Exam

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b. Explain the effect of damage to Tuyen's cerebellum.

2 marks

**Question 7 b.**

*Due to damage to Tuyen's cerebellum, she may be unable to remember or acquire new, classically conditioned reflex responses.*

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# Scientific Skills + Exam

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## Question 7

**Beware**

**VCAA 2014 SA Q27 © VCAA**

Fraser hit his head playing hockey and found he was unable to remember the events leading up to the hockey game. The type of memory affected by Fraser's amnesia was his

1 mark

- A. sensory memory.
- B. working memory.
- C. short-term memory.
- D. long-term memory.

# Scientific Skills + Exam

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## Question 8

**Beware**

What is the purpose of mnemonic devices?

1 mark

- A. To decrease the time taken to retrieve the information
- B. To increase the reliability of the stored information
- C. To lengthen the amount of time information stays in short-term memory
- D. To strengthen the consolidation of memories

- Psych is a subject with stacks of content, so you need to work out a way to trim it down
- A lot of the info in textbooks and other resources isn't actually examinable. Use the study design (and your teachers) to focus your energy on the important stuff
- Practice doing questions as much as possible
- Put effort into it. It's a subject that people can do really well at – results usually match effort levels

- I did the exam in order – practice a few different methods to see what works best for you
- Make sure you're healthy
- Get used to being awake and alert at that time
- Don't rely on being able to study well after other exams

- Generally I suggest setting 30 mins aside for the 10 marker
- Make a plan of what you'll write
- Consider how other topics connect
- Make sure you link to the scenario
- I encourage subheadings + paragraphs
- I liked to do this last so I wasn't thinking about how much time I had to leave for other questions
- Do reread your response and the stimulus
- **Know your study design well!**

- Relax!
- You'll likely have other exams on future days – try to take this time to yourself
- Try to avoid being drawn into extended convos on how a question should've been answered

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**Thank You!**

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**Thanks so much!**