

# ATARNotes

## PSYCHOLOGY 3&4

ATARNotes September Lecture Series

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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

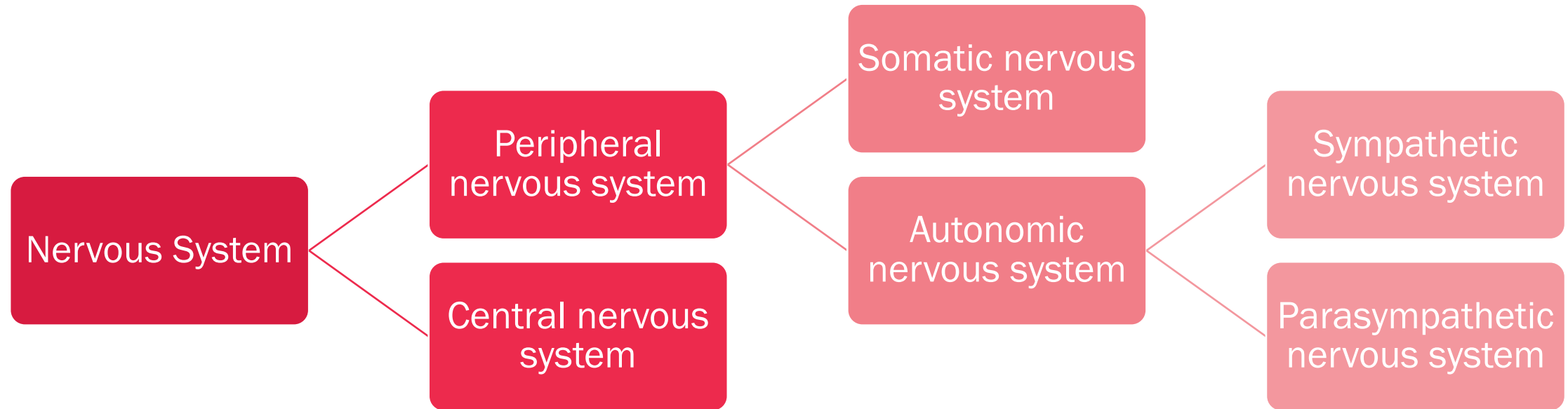


# PART ONE

## UNIT 3

# Neurotransmission

# Divisions of the Nervous System



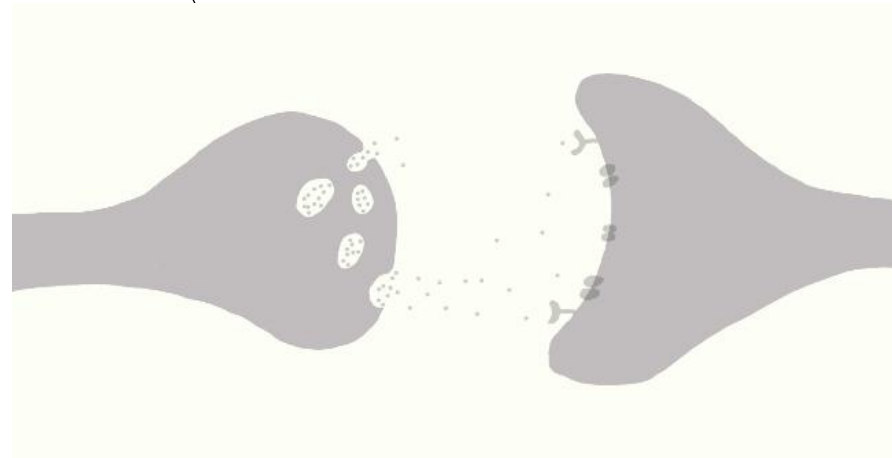
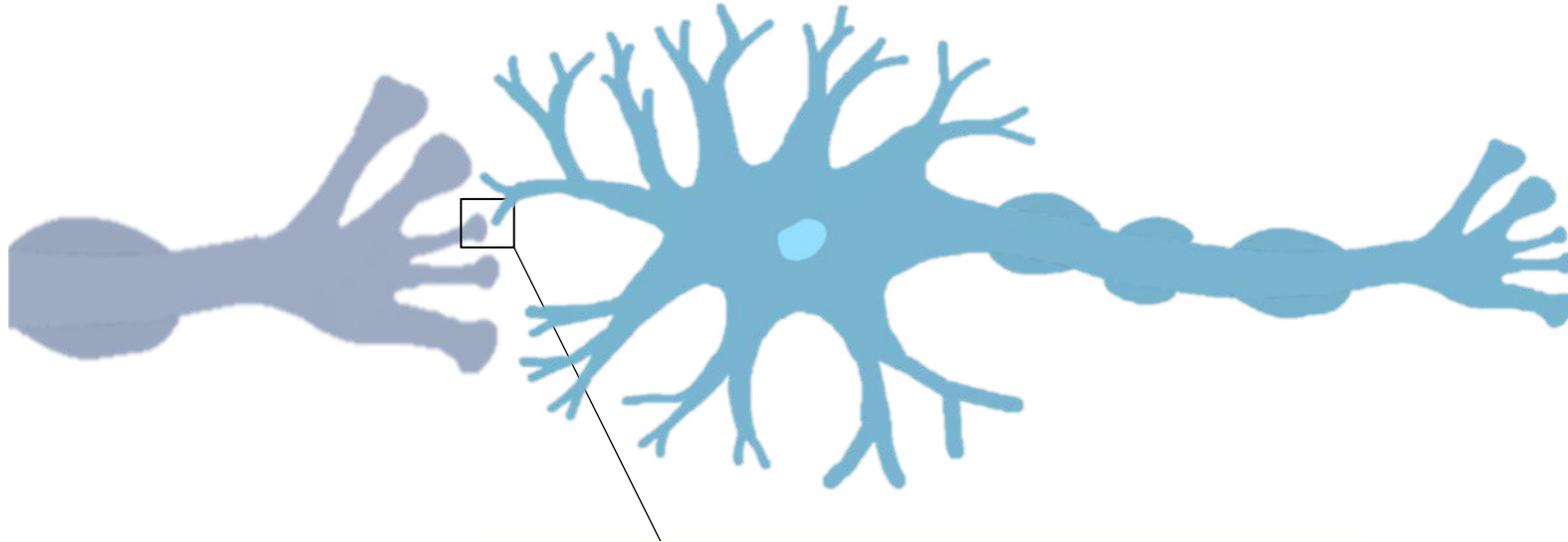
# Neurotransmission

# Sympathetic vs Parasympathetic

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

# Neurotransmission

# Neurotransmission



- **Glutamate:** *Main excitatory neurotransmitter in the CNS*
  - Enhances info transmission by making postsynaptic neurons more likely to fire
  - It therefore *increases LTP*
- **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’**



- *Dopamine* is a neurotransmitter 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 neurotransmitter (that also acts as a hormone) and is important for mood and sleep
  - the 'feel-good' hormone

- **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



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?

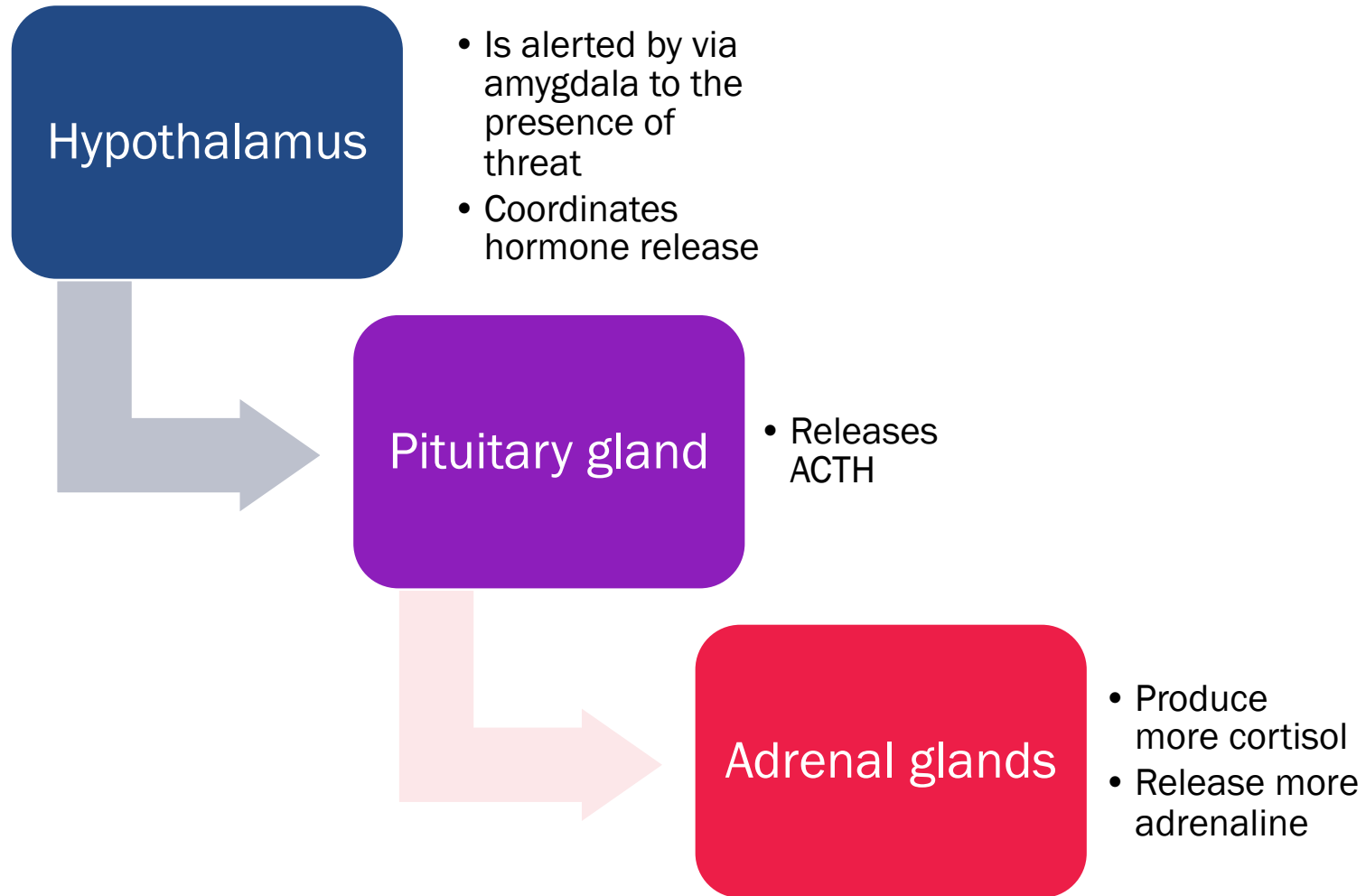
- A. somatic
- B. parasympathetic
- C. sympathetic
- D. central

### Question 19

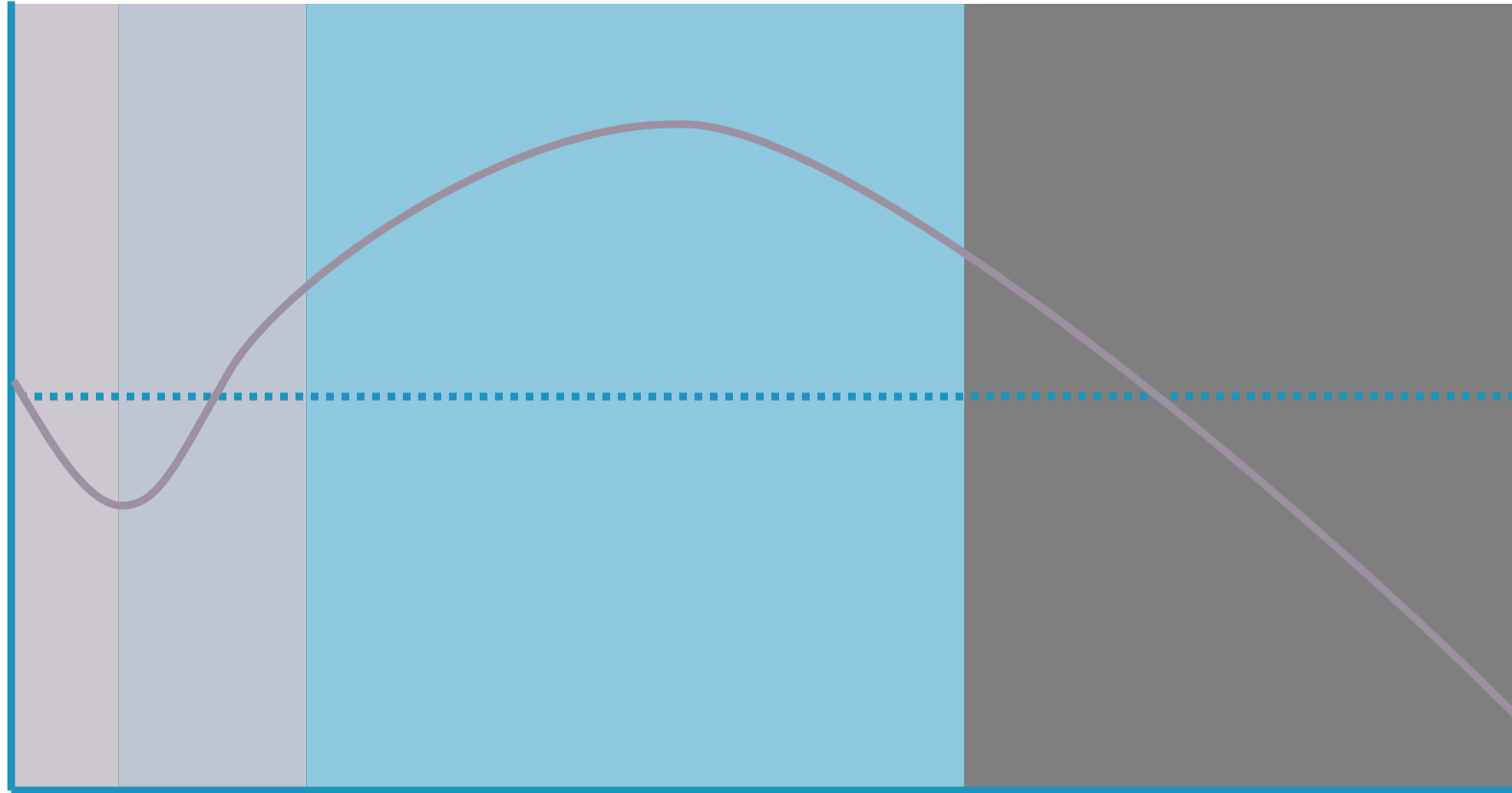
Which division of the nervous system is responsible for conveying the afferent information to the spinal cord?

- 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



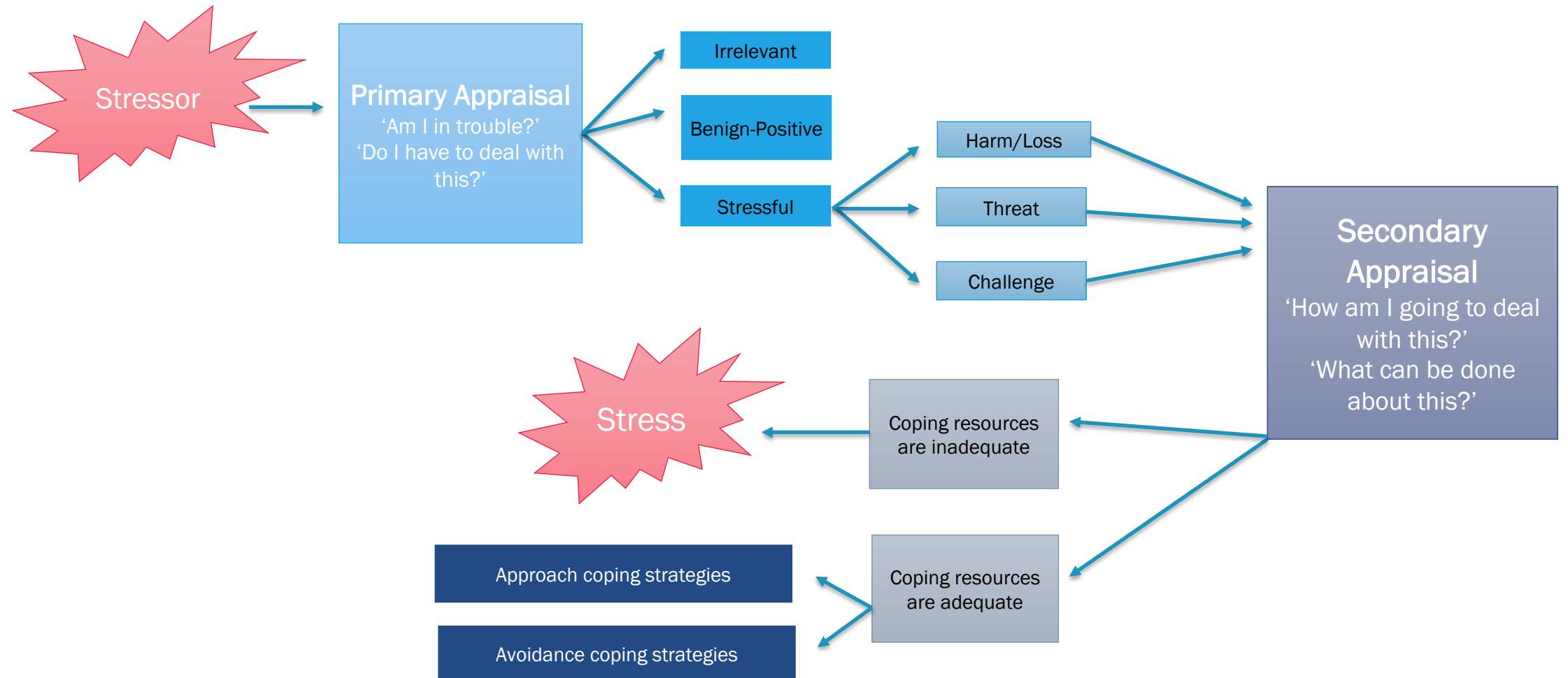
**Shock** **Countershock**  
**Alarm**

**Resistance**

**Exhaustion**

# Stress

# Lazarus + Folkman





## Context-Specific Effectiveness

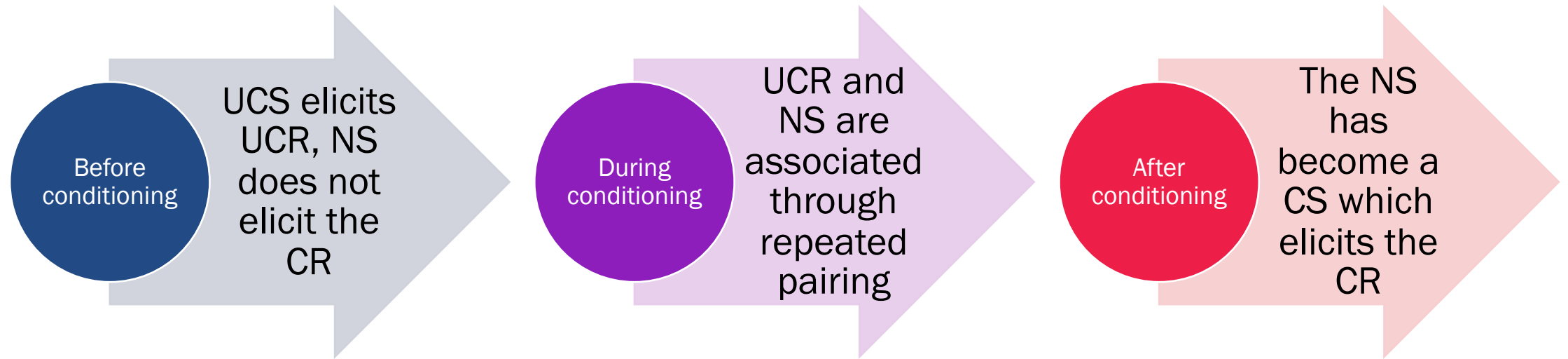
The coping strategy 'matching' the stressor

- *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

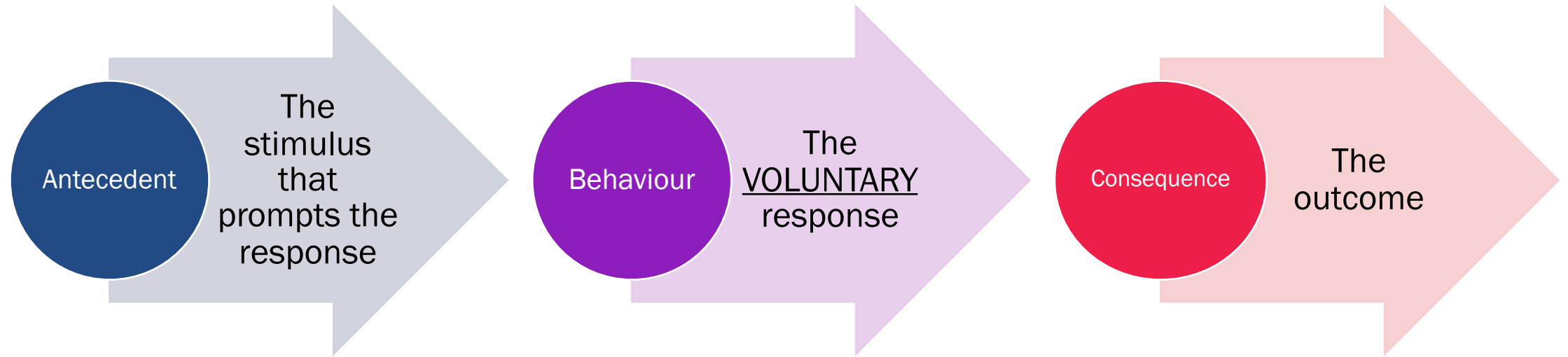
An individual's ability to effectively change or modify their coping technique when necessary

- 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

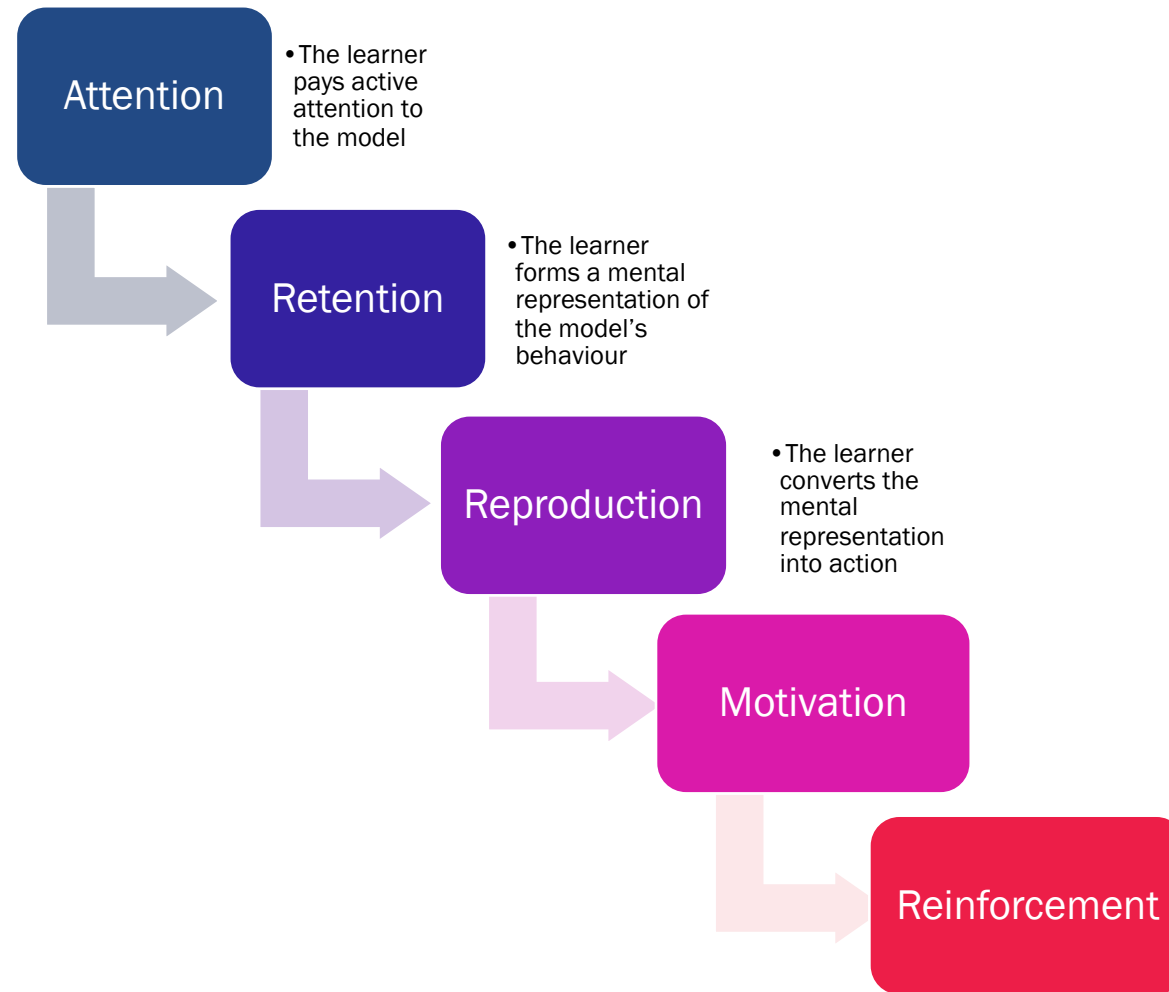


# Learning + Memory

# Operant Conditioning



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



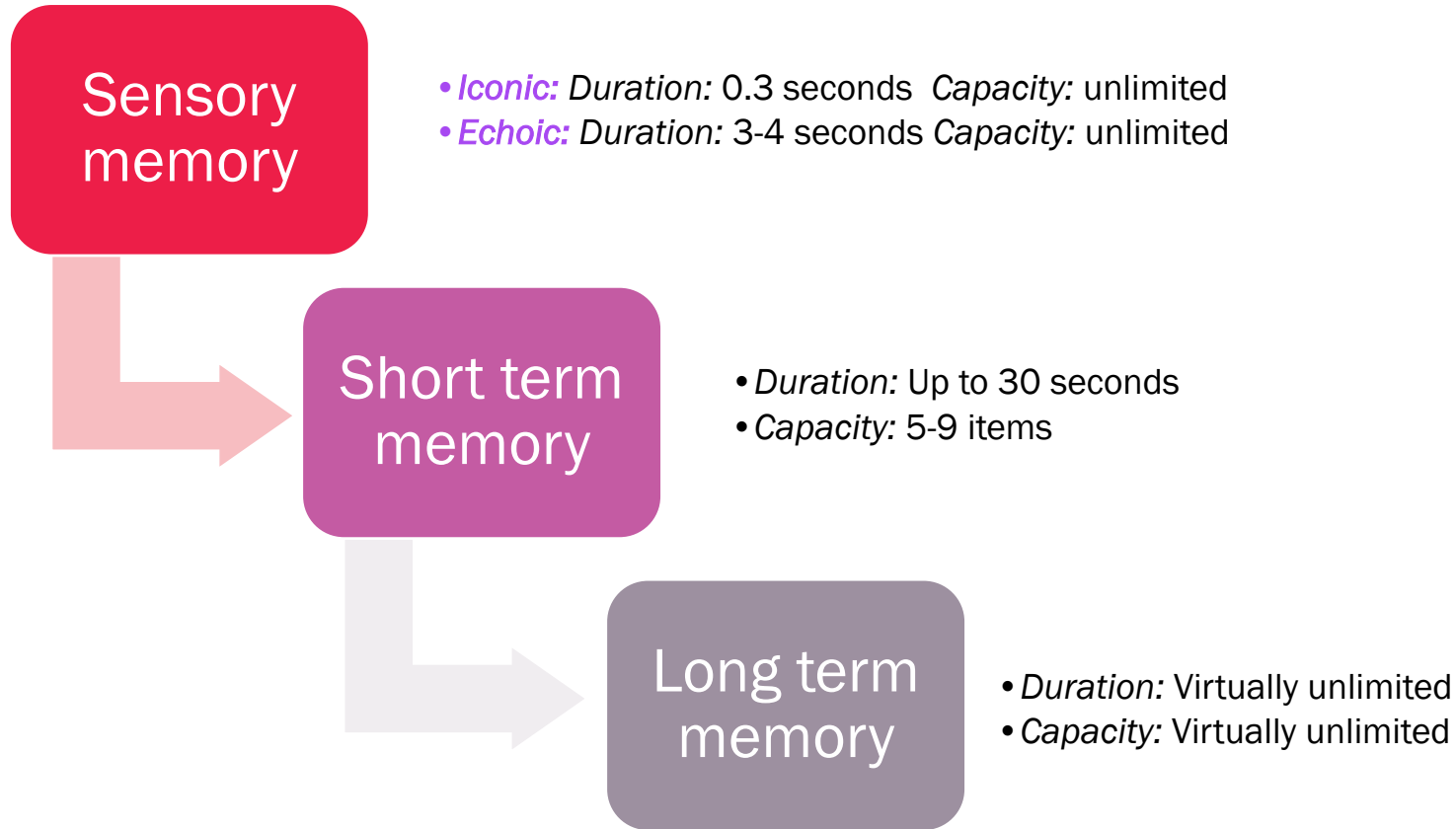
- Aboriginal and Torres Strait Islander knowledge systems represent the oldest and longest continuing forms of learning in Australia
- *Situated learning theory* emphasises that learning should take place in the same context where it would be applied, enabling individuals to practise what has been learnt
- 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

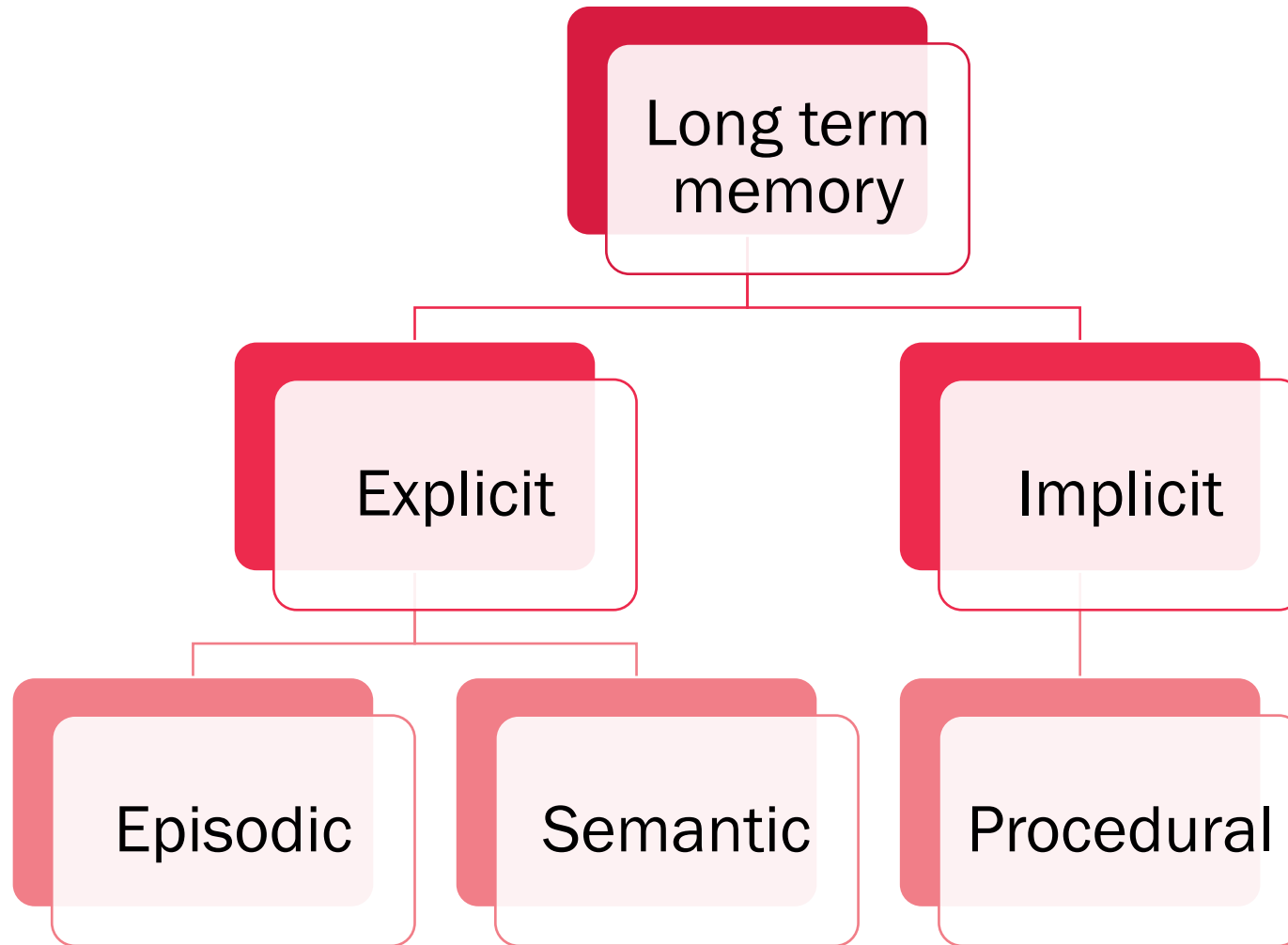
Sarah's Physical Education teacher was demonstrating to the class how to perform a forward somersault during a diving lesson. Sarah was motivated to learn how to somersault but, due to her fear of heights, she doubts that she will have the necessary courage to attempt the dive.

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 that involves being unable 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

## 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

- Standard pattern and quality of mental activity

### Altered State of Consciousness

- 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* → brain
- *EOG* → muscles that control eye movements
- *EMG* → muscles
- *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 walking

### 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	Sleep inertia	Lapses in selective attention
Amplified emotional responses	Excessive sleepiness	Lower ability to maintain focus
Low impulse control	Fatigue	Irrational thinking
Difficulty judging others emotions	Micro sleeps	Impaired learning & memory
Reduced empathy	Impaired behaviour control	Reduced ability to think clearly
More likely to over react	inattentiveness	-Especially on simple tasks
	Reduced motor coordination	-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*: Unideal 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>

<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>	

## *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.

## Scientific Skills + Exam

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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.

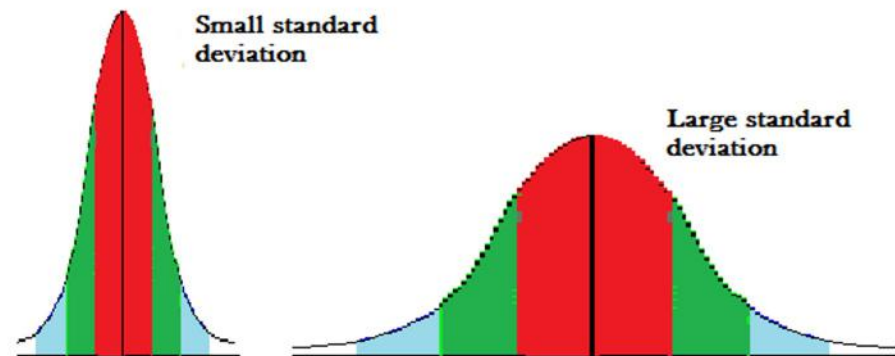
Secondary data comes from another source (e.g. ABS).

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.

- 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

- 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

# ATARNotes

**Thank You!**