YEAR 12 ATAR COURSE BOOK

ACADEMIC TASK FORCE

REVISION SERIES

PSYCHOLOGY

UNIT 3 & 4

FIRST EDITION

SONYA CERNY

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REVISION SERIES

PSYCHOLOGY

YEAR 12 ATAR COURSE

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ACADEMIC TASK FORCE ACADEMIC ASSOCIATES EXAM EXPERTS CREELMAN
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After finishing her Bachelor of Secondary Education, Sonya Cerny taught Science, Human Biology, HASS and Art until pursuing her interests in visual arts through a Masters of Applied Design and Art at Curtin University. Sonya was fortunate enough to establish ATAR Psychology at Aranmore Catholic College, and a few years later completed a Graduate Diploma in Psychology. Her passion for Psychology and desire to produce a resource to help students understand and navigate the new syllabus led her to write this book – the second of her published texts.

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INTRODUCTION

The Academic Task Force Revision Series is a comprehensive revision resource for students to use alongside class textbooks and lesson notes. This Revision Series book, enables students to review and improve their understanding of concepts for Psychology Year 12, Units 3 & 4 in preparation for ATAR examinations. Each chapter includes a checklist, comprehensive revision notes and key teaching concepts, examination level review questions and teaching points beyond the syllabus to help explain concepts. Model answers and a reference guide are provided at the back of the book.

Key Teaching Points and Beyond the Syllabus

The Year 12 ATAR Psychology course, Units 3 & 4 key concepts and course objectives are detailed at the start of each chapter in a checklist format so you can track your progress. You can measure and monitor the concepts you have learnt in class and reviewed in this book. You can then track your revision progress against each of the key teaching points. Finally, you can measure your progress and ability to demonstrate your learning with successful completion of review questions assessed against model answers. The key teaching points checklist enables you to identify gaps in your study plan and to set your revision pace throughout the year.

Each chapter provides comprehensive revision notes that correspond with the current syllabus. Additional information not explicitly contained in the syllabus is provided within **beyond the syllabus** text boxes, as well as displayed in purple font in the glossary of key terms. While this material is not assessable, it may be of interest to students to support and develop their understanding of syllabus content.

Theories and Studies

Each named theory includes their specified features, strengths, limitations, and their application to a real-world context. Identified studies have been described in terms of their aim, method utilised, key findings, contribution to psychology, and criticisms or limitations.

Chapter Review Questions

Each chapter includes review questions to reinforce topic learning and exposes you to questions and answers at test/examination level. End of chapter review questions have been written using terminology from the SCSA glossary of questioning terminology where applicable. The questions have been allocated marks, and answers are provided in table format, similar to Psychology WACE exam marking keys. Model answers and marking key are provided at the end of the book and should be used to help you assess your understanding of examinable concepts.

7th Edition APA Referencing Guide

Students are required to acknowledge sources of information using appropriate referencing. A guide for using the 7th edition APA referencing style is outlined at the back of the book.

Guide to Writing an Extended Response

Pointers to help you formulate the extended response section of WACE exams are listed. An example of an extended response question, sample answer and marking key are provided.

This Revision Series book will help you achieve success at school and will be a valuable resource in your revision for Psychology Year 12, Units 3 & 4 throughout the year. All the best for your exams!

Sonya Cerny

1 SENSATION, PERCEPTION, THE ROLE OF ATTENTION IN MEMORY AND MODELS FOR EXPLAINING MEMORY

Key teaching points	Learn	Revise	Demonstrate
Memory			
• Sensation and perception			
○ Processes of sensation – reception, transduction, transmission			
○ Processes of perception – selection, organisation, interpretation			
• The role of attention in memory			
○ Selective and divided attention as seen in the cocktail party effect (Cherry, 1953)			
• Models for explaining memory			
○ Processes of memory – encoding, storage, retrieval			
○ Features of the multi-store model of memory (Atkinson and Shiffrin, 1968)			
• Sensory register: duration, capacity, encoding			
• Short-term memory: duration, capacity, encoding			
• Long-term memory: duration, capacity, encoding			
– Procedural, declarative – semantic and episodic memory			
• Features of the working memory model (Baddeley and Hitch, 1974; Baddeley, 2000)			
– Central executive, phonological loop, visuospatial sketchpad, episodic buffer			

SENSATION AND PERCEPTION

- Humans have several senses that detect information from the environment, known as stimulus energy, and convert this energy into electrochemical energy within specialised cells within the sense organs called sensory receptors. Electrochemical energy is transferred to parts of the brain where mental representations of the world are generated.

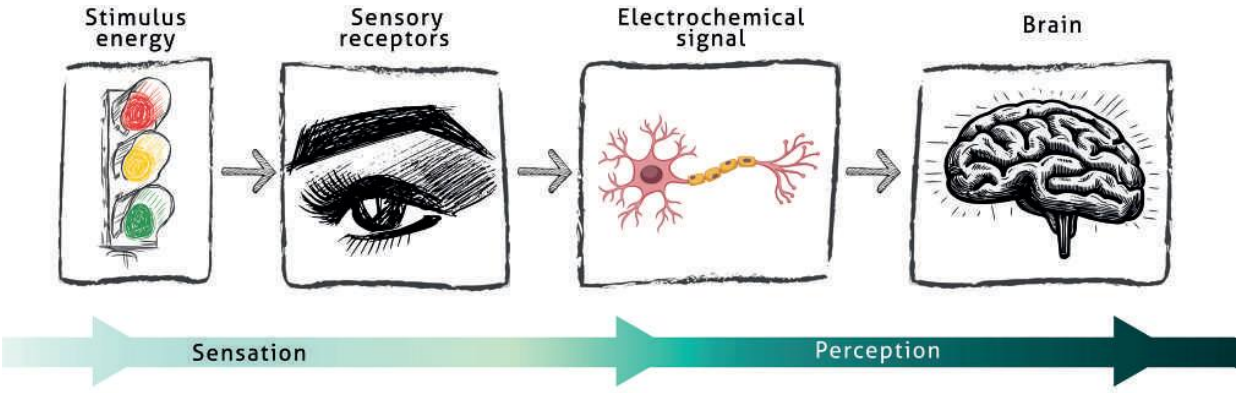


Figure 1.1 Sensation involves the detection of stimulus energy and its conversion into electrochemical energy by sensory receptors in sense organs, then its transmission to specialised parts of the brain. Perception proceeds once electrochemical energy reaches regions of the brain where information is subsequently selected, organised, and lastly, interpreted.

PROCESSES OF SENSATION

Stimulus: anything that influences an organism.

- Stimuli interact with the body via sensory receptors.

Sensation: the detection of environmental stimuli by the sense organs and the conversion of sensory information to electrochemical energy.

Sensory organs: specialised organs in the body containing sensory neurons functioning as sensory receptors.

Sensory receptors: specialised cells in the body that detect sensory information.

Sense	Stimulus energy	Sensory receptors and organ	Region of brain electrochemical energy is registered
Vision	Light waves	Photoreceptors in the retina of the eyes	Primary visual cortex in the occipital lobes
Touch (pressure, pain, temperature)	Mechanical, thermal and chemical energy	Cutaneous receptors in the skin	Primary sensory cortex in the parietal lobes
Hearing	Sound waves	Hair cells in the cochlea of the ears	Primary auditory cortex in the temporal lobes
Smell	Chemical energy	Olfactory receptors in the nasal cavity of the nose	Frontal and temporal lobes
Taste	Chemical energy	Chemoreceptors in taste buds on the tongue	Taste regions in the medulla; the lower part of the brain stem

Lobes and primary cortices of the brain

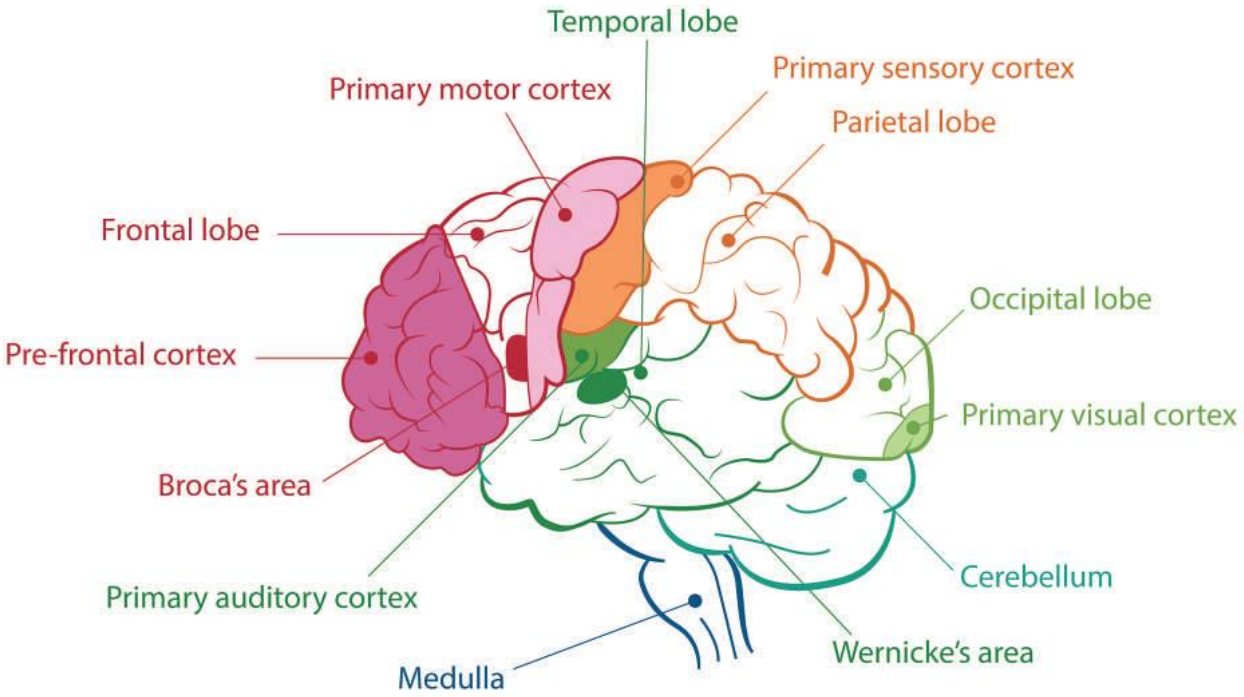


Figure 1.2 Regions of the brain where electrochemical energy is registered.

- The process of sensation is a physiological response as it does not engage the brain. Except in the case of physical defect or damage, in general, humans react to sensory information in a similar way.
- Sensation involves three main steps: reception, transduction and transmission.

Reception: the detection of sensory information in the sense organs of the body by sensory receptors.

- Sensory information, also known as stimulus energy, is detected by specialised neurons within the sense organs of the body.

Transduction: the changing of sensory information into electrochemical energy.

- The brain is unable to process sensory information, thus stimulus energy is transformed into electrochemical energy within sensory receptors of sense organs.

Transmission: the movement of electrochemical energy from sensory receptors to the brain for interpreting.

- Nerves from sense organs carry electrochemical energy to specialised regions of the brain. E.g., optic nerves transmit information to the primary visual cortices in the occipital lobes and auditory nerves send information to the primary auditory cortices in the temporal lobes.

PROCESSES OF PERCEPTION

Perception: the mental representation that the brain creates using information detected by the senses.

- This psychological process elicits varying responses from people to identical stimuli because the selection, organisation and interpretation of information are influenced by differing contexts, cultural factors and unique past experiences.

Selection: crucial features of information are selected for further processing and insignificant content is disregarded.

- This step takes place because the brain is incapable of processing the extensive amount of information it receives.

Organisation: selected information is categorised, allowing for the arrangement of meaningful patterns.

- The categories formed differ greatly between individuals due to past experiences.

Interpretation: meanings assigned to the groups of patterns.

- A mental representation is now available to the individual.

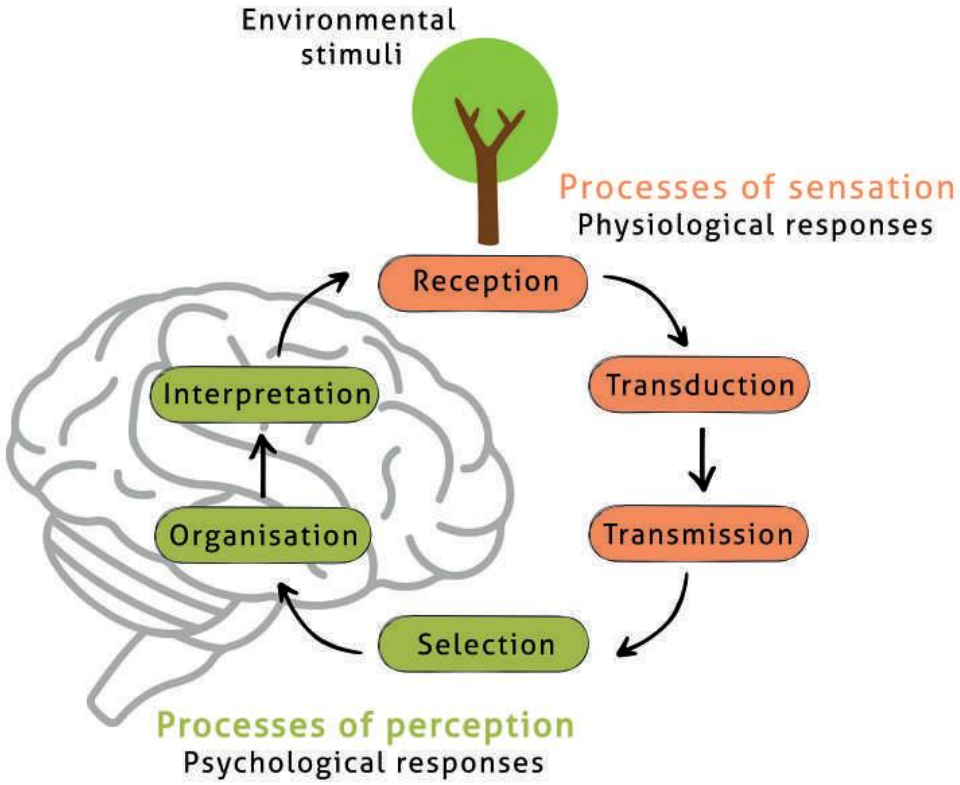


Figure 1.3 While sensation and perception are two separate processes, they occur so quickly that they are experienced as one seamless event.

THE ROLE OF ATTENTION IN MEMORY

Attention: the mental capacity to concentrate on a specific stimulus while ignoring other stimuli.

- Attention can be a voluntary process as well as involuntary.

Memory: the cognitive function through which information and past experiences are actively processed, stored and retrieved.

SELECTIVE AND DIVIDED ATTENTION AS SEEN IN THE COCKTAIL PARTY EFFECT (CHERRY, 1953)

- The cocktail party effect refers to the ability for an individual to be aware of multiple conversations occurring around them at the same time using divided attention, as well as using selective attention, where their focus is on one conversation and the rest are neglected.
- Psychologist Edward Colin Cherry conducted numerous experiments in laboratory settings where recognition of information was tested by participants listening to continuous speech.
- Two of the experiments are described below. For each, speech recordings were of the same speaker reading out two scripts.

Experiment one

Participants used both ears when presented with two different spoken messages simultaneously. No headphones were worn for this experiment and the two speech recordings of entirely different topics were on the same tape.

Participants were tasked with singling out and repeating one of the speeches word-by-word or phrase-by-phrase. While participants could play back the tape as often as they liked, the task was to be completed verbally and they were unable to write anything down. Researchers marked down on the scripts the words and phrases that were correctly recognised by the participants.

While participants described the task as extremely difficult, with some replaying the tape up to twenty times, participants were generally successful in separating the speeches.

Experiment two

As shown in Figure 1.4, two recorded speeches were played concurrently to participants via headphones with one speech presented to the right ear and a different speech presented to the left ear. Participants were asked to verbally repeat back one of the messages while simultaneously listening to it.

Participants were able to complete this task easily, understandably with a slight delay behind the recording. It was trickier to recall what the speech was about, even though they repeated it correctly. Participants were unable to describe what they were played in the other ear.

Cherry's experiments demonstrate how we use divided attention via our awareness of simultaneous conversations in a crowded noisy space, and how we are able to focus our attention toward one conversation and subsequently disregard all other conversations using selective attention.

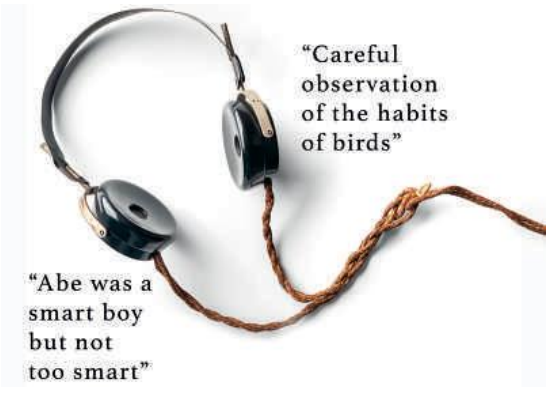


Figure 1.4

Selective attention: the process of concentrating on chosen stimuli while disregarding others.

Divided attention: the ability to concentrate on two or more stimuli simultaneously.

MODELS FOR EXPLAINING MEMORY

PROCESSES OF MEMORY

- There are different ways that information can be encoded such as acoustic encoding where information is encoded based on its sound, visual encoding where information is encoded according to images and semantic encoding which encodes information based on its meaning.

Storage: the retention of information within the stores of memory.

Retrieval: the movement of information from the long-term store of memory to conscious awareness.

Encoding: the form in which information is stored.

FEATURES OF THE MULTI-STORE MODEL OF MEMORY (ATKINSON AND SHIFFRIN, 1968)

- Atkinson and Shiffrin used the analogy of a computer, with its encoding, storage and retrieval processes, to explain their multi-store model of memory. Information flows through three storage systems, similar to the way data moves through a computer processor.
- The memory system is divided into three components: the sensory register, short-term memory and long-term memory.
- These three stores can be understood as being connected to each other through attention, rehearsal and retrieval processes.

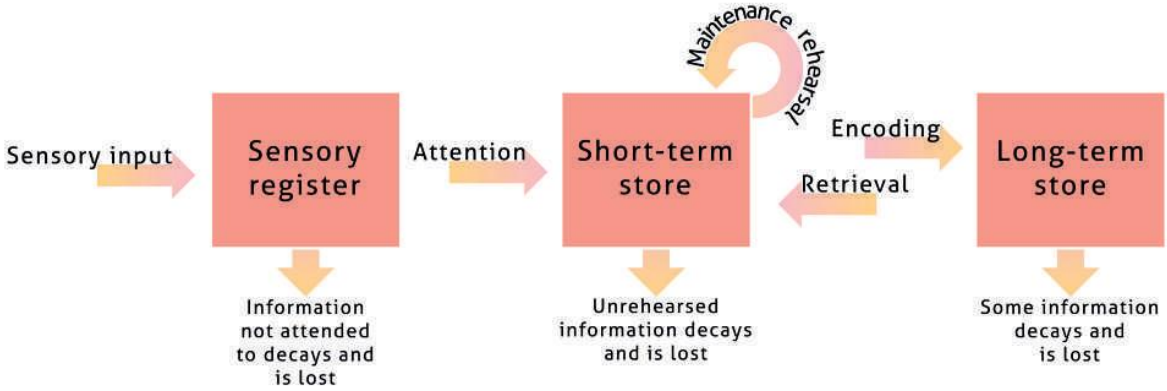


Figure 1.5 The multi-store model of memory as proposed by Atkinson and Shiffrin.

Decay: the fading of memory over time.

Capacity: the maximum amount of information able to be stored at a given time.

Duration: the length of time information can be stored for.

Sensory register

- Sensory information enters this first store of memory and information not attended to rapidly decays and is lost. While the capacity of information held in this store is unlimited, Baddeley and Hitch theorised that it lasts only a few hundred milliseconds. It has since been suggested that sensory information, specifically auditory information, has a duration of three to four seconds.
- The reception of sensory information by sense organs is an unconscious and automatic process.

Sensory register: the memory store where sensory information is briefly held before decaying or transferring to the short-term store.

- Atkinson and Shiffrin's article from 1968 explained that there were likely separate stores for each of our senses, however, they only focused on the stores for auditory information and visual information. It is now widely accepted that there is an echoic store for auditory information, iconic store for visual information, olfactory store for smell, haptic store for tactile information and gustatory store for taste.
- Visual information is held for 0.2 to 0.4 seconds in the iconic store while auditory information remains in the echoic store for 3 to 4 seconds. The variation in duration supports the notion that sensory information is encoded into different stores.

Short-term memory

- Sensory information that is attended to transfers to the short-term store which is described as the working memory. Note that the transfer of information does not infer the content is removed from the sensory register. A trace of the memory remains behind and continues to decay.
- Information is mainly encoded acoustically in the short-term store. Research shows there are other codes involved in the short-term store, including visual and semantic.
- There is a limited capacity of 5–9 pieces of information that can be held at one time. Information decays and is lost after 15 to 30 seconds unless a control process (e.g., rehearsal and coding procedures) is used to hold it for longer or allow for encoding into the long-term store.

Short-term memory: a temporary memory store for limited information received from the sensory register and long-term store.

Long-term memory

- An unlimited amount of information is stored in the long-term store and while there is some decay that occurs over time, the information is relatively permanent. That is, in relation to the duration of information held in the sensory register and short-term store, information in the long-term store is enduring.
- Information in the long-term store is encoded semantically which means that unless the things that people remember are meaningful, they will decay over time. It also suggests that major meaningful concepts will be remembered rather than minute details.

Long-term memory: a relatively permanent memory store for a limitless amount of information that sends and receives information from the short-term store.

Memory store	Encoding	Capacity	Duration
Sensory register	Visual and acoustic	Unlimited	0.2 to 4 seconds
Iconic	Visual	Unlimited	0.2 to 0.4 seconds
Echoic	Acoustic	Unlimited	3 to 4 seconds
Short-term	Mainly acoustic	5–9 items	15–30 seconds
Long-term	Semantic	Unlimited	Relatively permanent

Procedural memory: a type of long-term memory for skills or actions that are usually difficult to explain in words.

- Being able to demonstrate **HOW** to perform an action or skill demonstrates a procedural memory held in the long-term store. E.g., driving a car involves checking the mirrors, steering, indicating and using the pedals. It would be difficult to describe the processes involved in driving, it is much easier to show this skill by physically acting.
- With practice, conscious effort is not required to recall procedural memories. These are described as being 'implicit memories'.

Declarative memory: a type of long-term memory for factual information that can be expressed in words.

- Knowing factual information and being able to verbally declare it. E.g., knowing that the car you drive requires fuel to be added when the fuel gauge indicates a low level.
- It takes a conscious effort to retrieve declarative memories, they are also known as 'explicit memories'.
- Declarative memory can be further subdivided into semantic memory and episodic memory.

  Semantic memory: a type of declarative memory for impersonal factual knowledge.

  - E.g., knowing that car engines may overheat and risk being damaged when driven on an empty oil tank. This is impersonal factual information that can be verbalised.

  Episodic memory: a type of declarative memory for personally significant events.

  - We can remember when these events happened.
  - E.g., remembering the time you ran out of fuel on the freeway and needed to be towed to a petrol station is a personal memory that is factual.

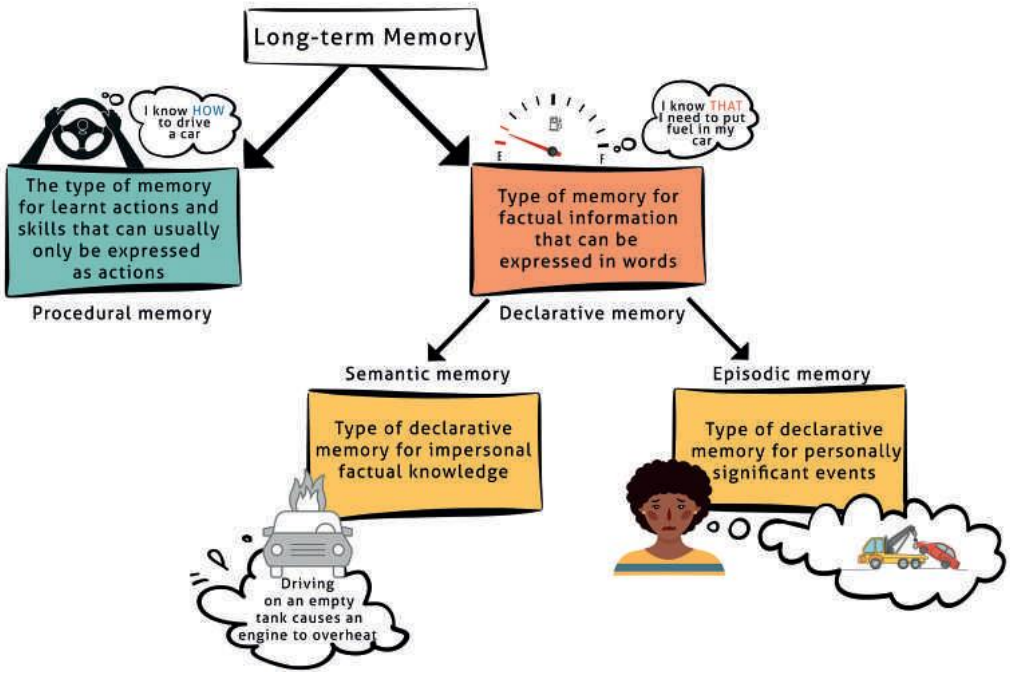


Figure 1.6 The forms of long-term memory.

FEATURES OF THE WORKING MEMORY MODEL (BADDELEY AND HITCH, 1974; BADDELEY, 2000)

- While Atkinson and Shiffrin alluded to the idea of the short-term store primarily acting as a storage component, Baddeley and Hitch believed the multi-store model did not explore important details of the short-term store.
- Baddeley and Hitch described the short-term store as a complex active store that holds pieces of information while they are being manipulated.

Working memory model: a view of short-term memory as a dynamic storage system capable of simultaneously holding multiple pieces of information.

- Baddeley and Hitch suggested in 1974 that working memory consisted of a central executive which integrated information from two slave systems, the phonological loop and visuospatial sketchpad. Baddeley added a third slave system to the model in 2000, the episodic buffer.

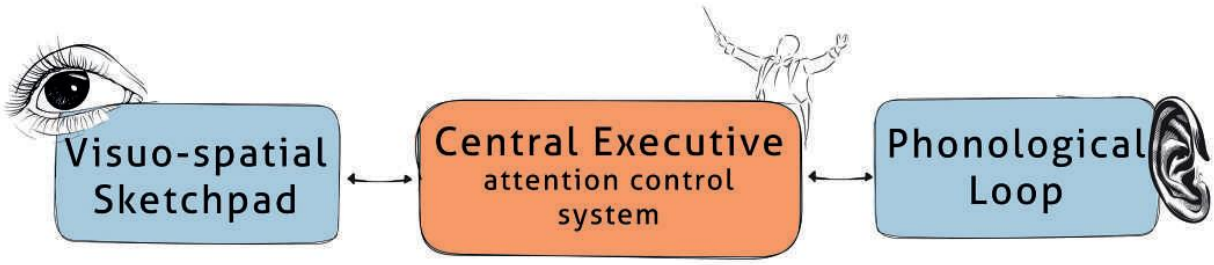


Figure 1.7 The 1974 model of working memory theorised by Baddeley and Hitch.

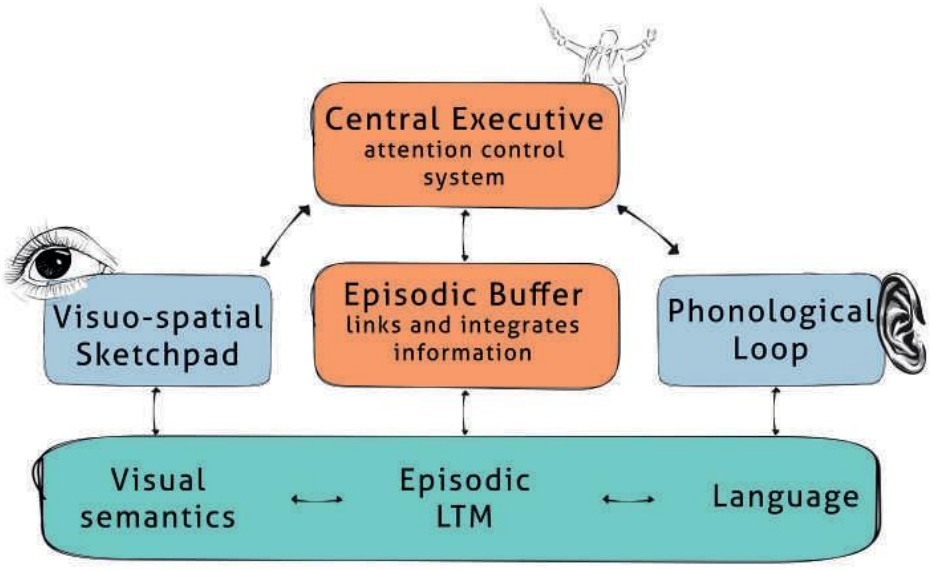


Figure 1.8 Baddeley's 2000 working memory model.

Central executive

- The central executive receives information from the sensory register and decides what information will be attended to. Additionally, information retrieved from the long-term store is controlled by the central executive.
- This component controls attention given to tasks, allowing for selective attention, or switching attention between different tasks, referred to as divided attention. The central executive is only able to process one type of input at a given time, thus explaining the attention switching it performs.
- It integrates information from the phonological loop, visuospatial sketchpad and episodic buffer.

Central executive: a component of the working memory model responsible for coordinating the slave systems as well as controlling attention given to information and decision making.

Phonological loop

Phonological loop: a component of the working memory model that temporarily stores and processes auditory information.

- This slave system works with auditory information that has been encoded acoustically and is further divided into the phonological store and articulatory control process.

  Phonological store: storage for words that are heard (inner ear).

  Articulatory process: repeats heard words in a loop allowing for maintenance rehearsal to occur (inner voice).

Visuospatial sketchpad

Visuospatial sketchpad: a component of the working memory model that stores and manipulates visual and spatial information.

- The visuospatial sketchpad is used when visualising something in the mind, e.g., picture the house you grew up in.
- Spatial information pertaining to the location of items and our bodies in relation to their surroundings is also stored. E.g., reading a map and navigating your way through a crowd of people.

Episodic buffer

Episodic buffer: a component of the working memory model that temporarily stores consolidated information from the central executive, visuospatial sketchpad, phonological loop and long-term memory.

- This more current addition to the multi-store model has a limited capacity and is accessible by the consciousness.
- According to Baddeley, semantic memories held in the long-term store of memory are integrated with information retrieved from the visuospatial sketchpad and phonological loop within the episodic buffer to produce segments he termed 'episodes'.

Question 1

(a) Outline the reason why stimulus energy is converted into electrochemical energy. (2 marks)

(b) Suggest why sensation and perception appear as one unified process. (2 marks)

Question 2

(a) Demonstrate the memory process related to the following examples by ticking (✓) one choice for each example. (4 marks)

	Encoding	Storage	Retrieval
Reading an article in a magazine			
Telling your friend the ending to a movie you watched last month			
Walking past a shop and realising you have been to the shop before			
Keeping in mind the artist of a song the radio host announced			

(b) There are three stores of memory according to the multi-store model of memory. Identify which one of the three stores of memory we have conscious awareness of. (1 mark)

(c) Outline **one** difference between the sensory store and long-term store in Atkinson and Shiffrin's multi-store model of memory. (2 marks)

(d) For each of the following statements, identify whether the memory used is semantic, procedural or episodic.

(i) Van remembering how to set up his laptop to project the screen on the board. (1 mark)

_____

(ii) Van remembering the time he had his first interview for a job after university. (1 mark)

_____

(iii) Van remembering that there are more than 2 million small businesses in Australia. (1 mark)

_____

(e) Complete the table below illustrating differences between two forms of long-term memory: procedural memory and semantic memory. (4 marks)

	Procedural memory	**Declarative memory**
Whether or not conscious thought is required		
Type of information recalled		

(f) Select the type of long-term memory that does not involve conscious thought: semantic, procedural or episodic. (1 mark)

_____

(g) According to Atkinson and Shiffrin's multi-store model of memory, outline what occurs to sensory information that is ignored. (1 mark)

_____

(h) Explain why we are not overwhelmed by the unlimited amount of information held in our sensory memory store. (2 marks)

_____

_____

_____

Question 3

The World Memory Championships is a competition of memory sports. One discipline is memorising a list of random words in 15 minutes. Competitors use the memory palace technique (method of loci) whereby they allocate meaningful associations to the words in order to memorise them.

(a) In 'speed cards' the competitors are quickly shown a shuffled deck of cards, card by card, and are then required to verbally name each card in order as quickly as possible. Which sensory register is used when participants are shown the cards? (1 mark)

_____

(b) In the first trial of 'spoken numbers', competitors listen to 200 numbers (one digit spoken every second) and are then required to write the numbers in order. With reference to Baddeley and Hitch's 1974 working memory model, identify the slave system temporarily storing and manipulating this information. (1 mark)

_____

(c) Name the **two** locations information coming into the slave system named in part (b) can arrive from. (2 marks)

One: _____

Two: _____

(d) Outline **two** functions of the central executive. (2 marks)

One: _____

_____

Two: _____

_____

2 MEMORY FORMATION AND PROCESSES OF FORGETTING AND REMEMBERING

Key teaching points	Learn	Revise	Demonstrate
Memory			
• Memory formation			
○ Structures of the brain			
• The role of the hippocampus in the formation and storage of memory			
• The role of the cerebellum in the formation and storage of implicit memories			
• The role of the amygdala in the formation of memories			
– Henry Molaison – case study			
• Process of forgetting and remembering			
○ Forgetting			
• Types of forgetting			
– Retrieval failure			
– Interference – proactive and retroactive			
– Motivated forgetting			
– Decay theory			
○ Remembering			
• The role of recall (free, serial and cued), recognition and re-learning in memory			
• Levels of processing model of memory (Craik and Lockhart, 1972)			
– Shallow (structural, phonemic) and deep (semantic, elaboration) processing			
– Study: depth of processing and the retention of words in episodic memory (Craik and Tulving, 1975)			

MEMORY FORMATION

STRUCTURES OF THE BRAIN

Hippocampus: the region located deep within each temporal lobe that plays a major role in memory and learning.

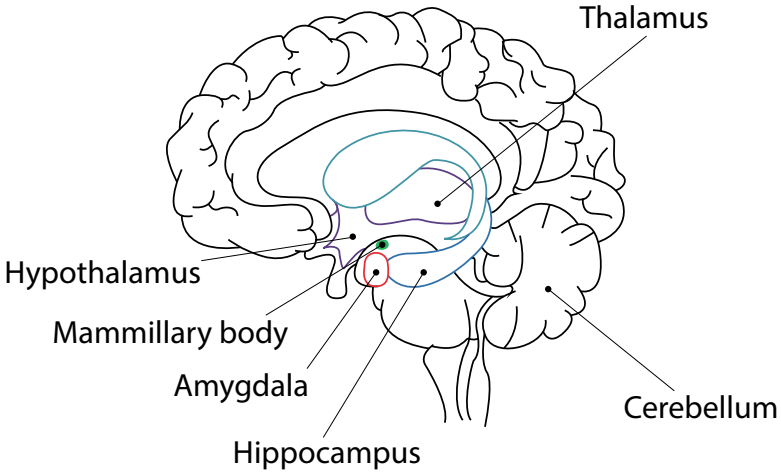
Cerebellum: the structure underneath the cerebrum involved in balance, judging distance and coordination of fine motor movement.

Amygdala: a collection of nuclei deep within each temporal lobe that play a role in emotional responses and modulates the fear response.

Thalamus: the double-lobed structure located just above the brainstem that receives sensory information, except smell, and transmits information to the cerebral cortex. The thalamus also has an influence on sleep.

Hypothalamus: the structure that sits below the thalamus and regulates sleep, eating, body temperature and sex drive. The hypothalamus also regulates the release of hormones from the pituitary gland that sits beneath it.

Pre-frontal cortex: the front layer of the frontal lobes that coordinates executive functions, such as the ability to predict the consequences of behaviours, as well as the ability to recognise and regulate emotions.



The roles of the hippocampus, cerebellum and amygdala in the formation and storage of memory

	Role in the formation of memories	Role in the storage of memories
Hippocampus	Play a major role in the formation of declarative memories. *This is supported by the case study of Henry Molaison.*	Memories are temporarily held in the hippocampus then moved to the pre-frontal cortex.
Cerebellum	One of the brain regions that forms procedural memories.	Is involved in the storage of procedural memories, specifically of learned sensorimotor skills such as cutting paper with a pair of scissors.
Amygdala	Has a significant role in the formation of memories associated with fear. Such fearful memories can be established with just a few repetitions.	It is unlikely that the amygdala stores memories. The amygdala strengthens episodic memories stored in other regions of the brain.

HENRY MOLAISON – CASE STUDY

- Henry Molaison experienced epileptic seizures from when he was 10 years old, and their severity increased from the age of 16. He was knocked off his bicycle at age 9 and this is believed to have possibly contributed to the development of his epilepsy.
- He was unable to work due to his condition and anticonvulsant medication was not successful in controlling his seizures.
- Doctors measured his brain activity using electroencephalography (EEG). They were unable to pinpoint the specific locations in his brain where the seizures originated, but they believed they were arising from the medial regions of both left and right temporal lobes.

Figure 2.1 Henry Molaison

- Surgery was recommended as the best option for Henry and on September 1st 1953, now aged 27, he underwent a bilateral medial temporal lobe resection. Neurosurgeon, Dr Scoville, removed the medial portions (section closest to the middle of the brain) of the temporal lobes, each extending 8cm toward the back of the brain. This resulted in the pair of amygdala and the majority of both hippocampi being removed.
- The procedure did not stop the seizures entirely, but reduced their severity. There was no change to his personality or decrease in general intelligence. He did, however, suffer from partial retrograde amnesia for the eleven years leading up to the surgery. Memories from his childhood were largely unaffected.
- Henry also demonstrated difficulty transferring information from the short-term store of memory to the long-term store. However, he was able to improve on two tests used to assess long-term memory: incomplete-pictures test and mirror-drawing. He had no memory of sitting the tests on a daily basis, yet his performance improved over time. This led to the understanding that long-term memory is made up of procedural memories and declarative memories. Test improvements demonstrated he was creating procedural memories unconsciously.
- His case was the first one that indicated procedural memories are not controlled by the hippocampus or amygdala, but a different region of the brain.
- Henry's inability to form new declarative memories after the removal of his hippocampus led to the understanding that the hippocampus plays a major role in declarative memory production. Information in his short-term memory was unable to be encoded into long-term memory.

- Difficulty creating new long-term memories is a form of amnesia known as anterograde amnesia.
- Neuropsychologist Dr Milner performed cognitive tests on Henry for the next fifty years, using the initials 'H.M' in her publications to protect Henry's identity. Henry Molaison died in 2008 at the age of 82.

Retrograde amnesia: the inability to recall past memories prior to the onset of amnesia.

Anterograde amnesia: the inability to form new memories after developing amnesia.

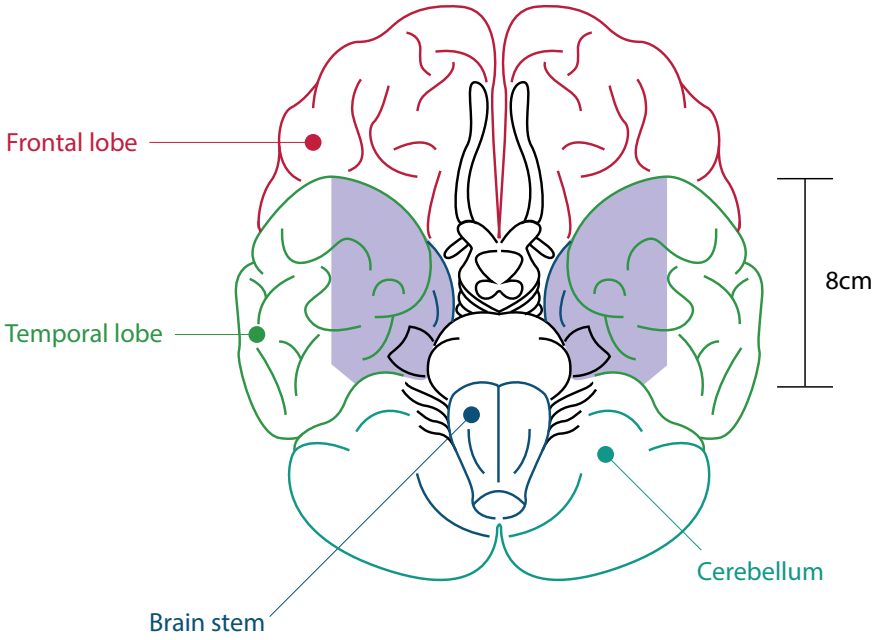


Figure 2.2 The areas coloured purple represent the parts of the medial temporal lobes (section of each temporal lobe closest to the middle of the brain) that were removed in Henry Molaison. The amygdala and hippocampus are both located in this region that is typically excised in medial temporal lobe resection.

Beyond the syllabus

Infantile amnesia is the inability of adults to retrieve accurate episodic memories from before two or three years of age. It is believed that this is because the hippocampus is not fully formed in infants, and they also lack a sense of self.

Additionally, there is evidence suggesting this form of amnesia occurs because at the time of memory formation, language acquisition skills were not yet developed, leading to difficulties with verbal recall. Methods to retrieve memories from this age, such as hypnotic age regression, have so far not been successful.

PROCESS OF FORGETTING

Forgetting: the inability to retrieve memories.

TYPES OF FORGETTING

Retrieval failure

Retrieval failure: the inability to consciously recall information stored in the long-term store due to the absence of retrieval cues that could trigger memory retrieval.

Interference

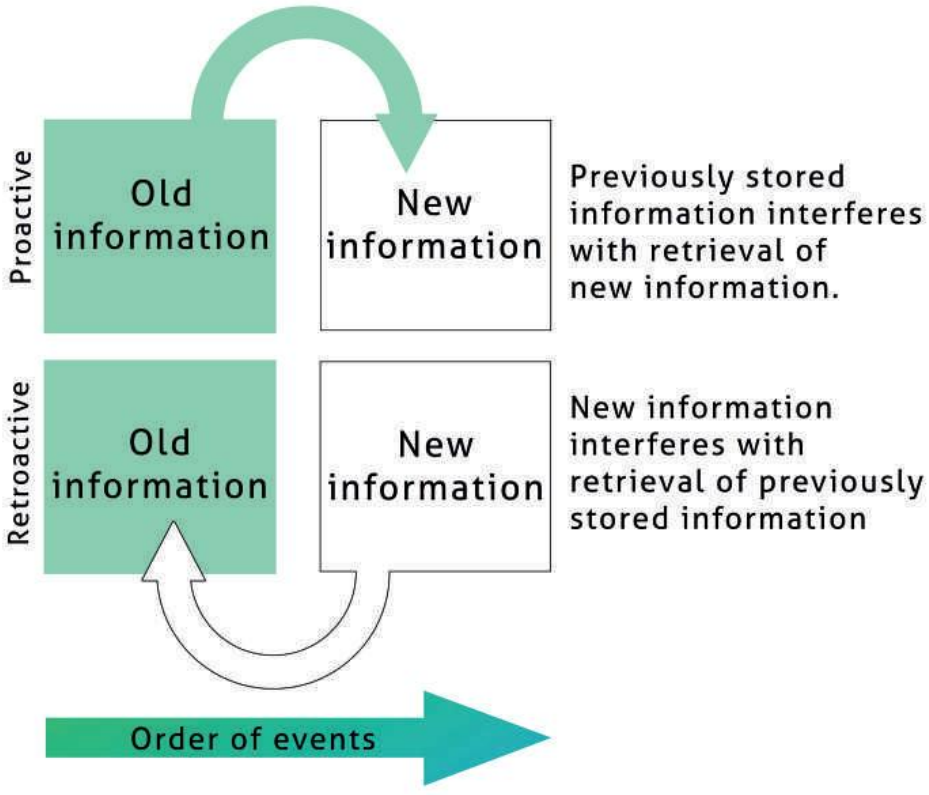
Interference: when information in the long-term store cannot be retrieved due to it being disrupted by similar information.

Proactive interference: where previously stored information interferes with retrieval of new learning.

- E.g., pressing the 'A' button on the controller for the 'jump' action in a new game instead of the 'Y' button, which is what older games you played used. The previously stored information ('A' button for the 'jump' action) is interfering with retrieval of new learning ('Y' button for the 'jump' action).

Retroactive interference: where new learning interferes with retrieval of previously stored information.

- E.g., needing to enter the previously used password in order to change it to a new password that you have selected. Coming up with a new password (new memory) is interfering with recalling the old password (old memory).



Motivated forgetting

Motivated forgetting: the intentional or unintentional suppression of memories or thoughts from conscious awareness to minimise emotional distress.

- Motivated forgetting can be classified into two primary categories: psychological repression, which is an involuntary and subconscious process, and thought suppression, which is a deliberate and conscious effort to push certain thoughts and memories out of one's conscious awareness.
- Both categories of motivated forgetting perform the same goal of forgetting memories in order to reduce anxiety.

Decay theory

Decay theory: theory that suggests memories fade over time.

- When information is transferred from the sensory register to the short-term store of memory, a memory trace is established. This memory trace gradually erodes over time and actively rehearsing information is thought to counteract this process.
- As long-term memories appear to be relatively permanent, decay theory postulates that it is short-term memories that are predominantly affected by decay.
- Decay theory acknowledges decay alone does not cause forgetting and that additional processes play a role.
- According to Atkinson and Shiffrin, information is transferred between memory stores and memory traces are left behind. These traces disappear rapidly unless information is used quickly, leading to retrieval failure.

PROCESS OF REMEMBERING

ROLE OF RECALL IN MEMORY

Recall: the process of retrieving information from long-term memory without the provision of cues to aid in retrieving the information.

Retrieval cue: stimuli aiding in the retrieval of memories.

Type of recall	Description	Example
Free recall	The retrieval of as much information as possible about a specific topic in any order.	Name the teachers that you remember from primary school.
Serial recall	The retrieval of information in a set order.	List the order of planets in the solar system starting nearest the Sun.
Cued recall	Provided retrieval cues help with the retrieval of memory.	Fill in the missing words within a sentence.

ROLE OF RECOGNITION IN MEMORY

Recognition: the ability to identify previously stored information by matching stimuli to stored memories.

- In a recognition task, individuals select the correct answer from a set of alternative options.
- E.g., multiple-choice questions that provide options from which the correct answer is found.
- Recognition tasks typically result in more successful retrieval of information compared to recall tasks because recognition tasks provide retrieval cues.

ROLE OF RELEARNING IN MEMORY

Relearning: reacquiring knowledge or skills that were previously learned but may have begun to decay over time.

- Relearning identifies information that was not remembered and can now be successfully encoded into long-term memory via elaborative rehearsal.
- E.g., writing down everything you have learned about a topic in class, identifying the key points you have missed, and then having a classmate re-teach them to you.

LEVELS OF PROCESSING MODEL OF MEMORY (CRAIK AND LOCKHART, 1972)

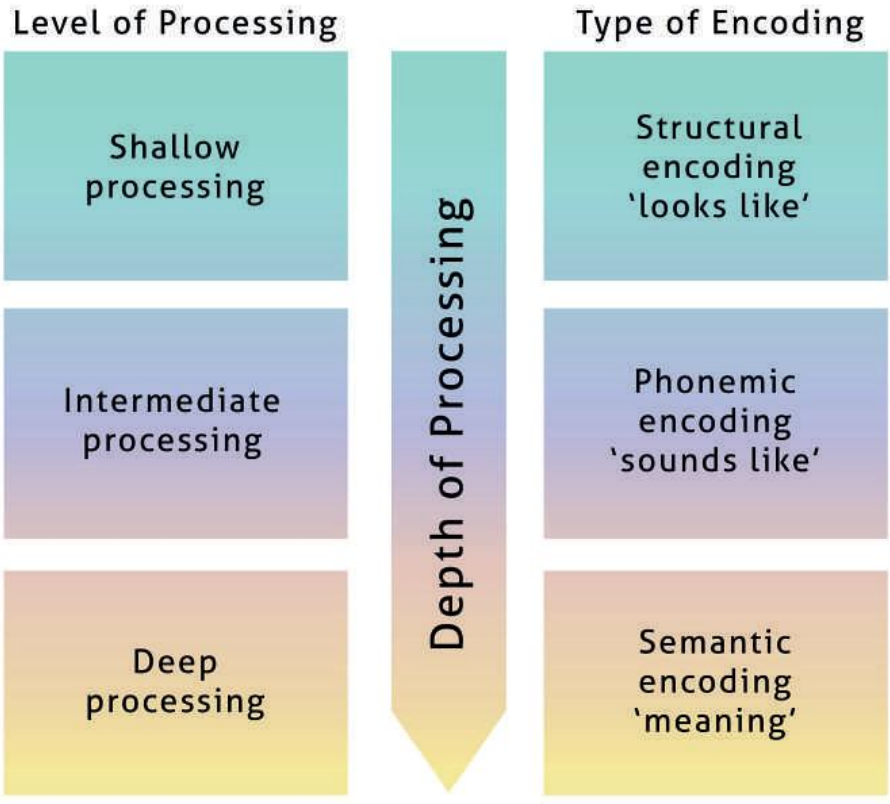
- According to Craik and Lockhart, the endurance and strength of long-term memories depend on the depth of cognitive processing.
- By depth, Craik and Lockhart were referring to the meaning derived from stimuli.
- Levels-of-processing theory is one explanation for why elaborative rehearsal more successfully transfers information from the short-term store to the long-term store of memory than maintenance rehearsal.

Shallow processing

- This form of processing encodes physical information based on appearance, known as **structural encoding**, and via **phonemic encoding**, which is the encoding of auditory information.
- E.g., physical or auditory qualities including brightness and loudness.
- Maintenance rehearsal is used in shallow processing to hold information in short-term memory for longer than the usual 15–30 seconds. Information processed in this way results in memories that are short term and difficult to recall.

Deep processing

- Elaborative rehearsal of information allows for deep processing because the information is encoded semantically. **Semantic encoding** works by attaching meaning to the information and/or linking the information to knowledge currently in the long-term store.
- It is easier to recall information encoded via deep processing than shallow processing.



STUDY: DEPTH OF PROCESSING AND THE RETENTION OF WORDS IN EPISODIC MEMORY (CRAIK AND TULVING, 1975)

Aim

To determine the impact that levels of processing have on the recall of memory.

Method

Participants

Twenty-four male and female students from the University of Toronto were selected to be part of the sample. Convenience sampling was utilised as both Craik and Tulving were based at the university from which the participants studied.

Materials

A list of 60 words, a set of three questions and a list of 180 words that incorporated the original 60 words.

Design

The independent variable was the type of encoding used to memorise a list of words: structural encoding, phonemic encoding, and semantic encoding. The dependent variable was the number of words recalled.

Procedure

Participants chose to be part of the study that they were told was testing perception. They were randomly allocated into one of three conditions: structural encoding, phonemic encoding and semantic encoding. All participants were provided with a list of 60 words and were required to answer one question for each word.

Participants in the structural encoding condition were asked, 'Is the word in capital letters or lower case?' Those in the phonemic encoding condition were asked, 'Does the word rhyme with …?' Participants tasked with using semantic encoding were asked, 'Does the word go in this sentence …?'

A list of 180 words, including the 60 words originally provided to participants, was given to each participant. They were required to indicate which words were part of the original list of 60.

Key findings

Participants in the semantic encoding condition recalled more words than participants in the phonemic or structural encoding conditions, as displayed in the graph in Figure 2.3.

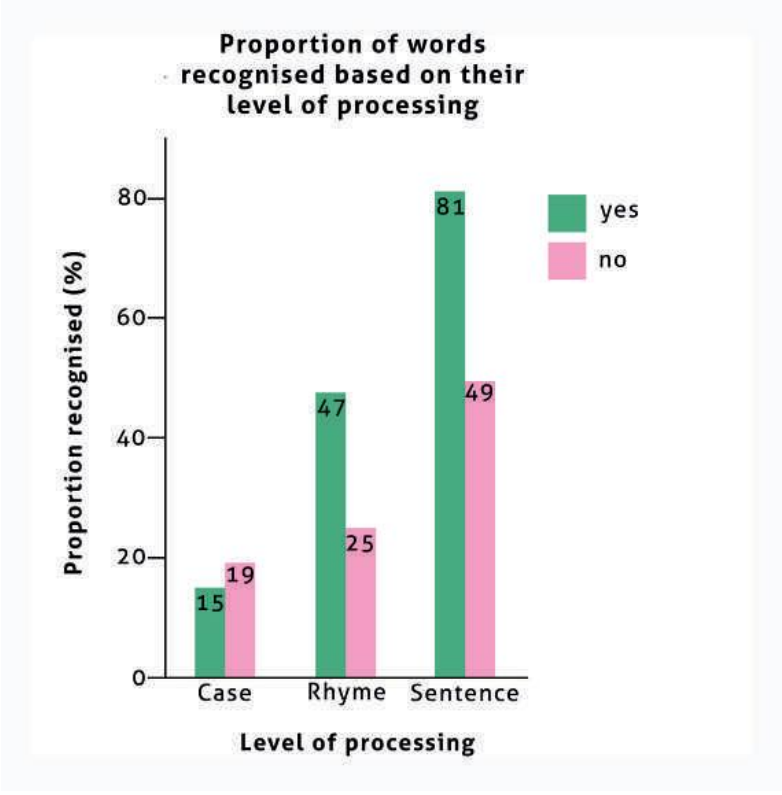


Figure 2.3 Results from Craik and Tulving's experiment on depth of processing and the retention of words in episodic memory.

- Words that were semantically encoded via elaborative rehearsal and deep processing led to higher recall accuracy. In contrast, words that were structurally and phonemically encoded underwent shallow processing, resulting in less accurate recall.

Contribution of the study to psychology

- The empirical evidence provided as a result of the study enabled other researchers to run similar experiments and not only allow for reliability to be assessed, but to additionally demonstrate high reliability.

Criticisms and limitations of the study

- As participants were told that the study was assessing perception, which was not the case, participants were not explained the true purpose of the study and were deceived. Specific details of the debriefing process for the study are not available, hence it is not known whether or not the participants were told of the deception and explained the reason for its use.
- It is unclear whether it is the depth of processing that improves retrieval of information from long term memory or if it is the fact that greater effort is used during encoding.

Question 1

(a) (i) Name the structure of the brain that is understood to significantly contribute to the creation of episodic memories, as supported by the case study of Henry Molaison (1 mark)

(ii) Describe the role the structure named in question (i) has in the storage of episodic memories. (2 marks)

(iii) The amygdala does not store memories, however, it does affect memories stored in other regions of the brain. Describe the way in which this occurs. (2 marks)

(iv) While Henry Molaison gave consent to undergo a bilateral medial temporal lobe resection, many assert that he was unable to provide consent for the years of cognitive tests he sat following the surgery. Referring to the multi-store model of memory, explain this assertion. (3 marks)

Question 2

(a) Michelle completed an online purchase but accidentally typed in the postcode from her old house rather than from the house she is living at now. Identify the type of interference that occurred. Explain your response. (3 marks)

(b) (i) Name the **two** categories of motivated forgetting. (2 marks)

One: _____

Two: _____

(ii) Outline the purpose of motivated forgetting. (1 mark)

Question 3

(a) The company Van has started working for ran a quiz night at the end of the month. With reference to memory, explain why Van is more likely to score better on multiple-choice questions than on short-answer questions. (3 marks)

(b) Van and 13 of his colleagues gathered in a meeting room to listen to a guest speaker talk about marketing techniques. All the colleagues were then asked to complete questions based on the talk. Half of the colleagues stayed in the meeting room to complete it while the other half moved into the staff room. Those who stayed in the meeting room, on average, answered more questions correctly than those who moved to the staff room. Explain how these results support retrieval failure theory.
(3 marks)

Question 4

Giovanni is a driving instructor who uses different measures of retention to help him to assess the driving knowledge and skills of his students. For each of the following measures of retention, describe how Giovanni could assess his students.

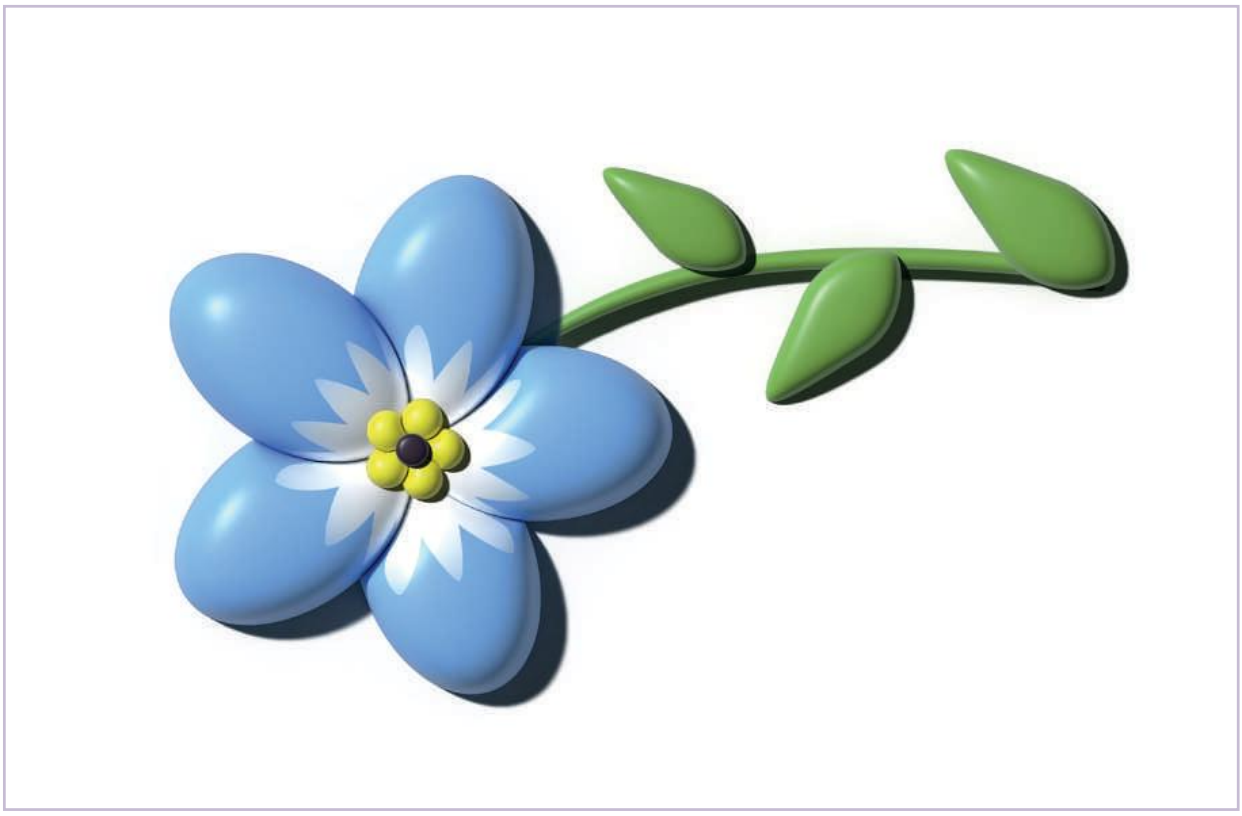
(a) Recognition (1 mark)

(b) Relearning (1 mark)

(c) Recall (1 mark)

REHEARSAL AS A STRATEGY TO IMPROVE MEMORY AND CAUSES OF MEMORY LOSS AND IMPACTS ON BEHAVIOUR AND EMOTION

3



Key teaching points	Learn	Revise	Demonstrate
Memory			
• Rehearsal as a strategy to improve memory			
○ Maintenance rehearsal			
○ Elaborative rehearsal			
○ Role of repetition as seen in Ebbinghaus and the forgetting curve (1885)			
• Causes of memory loss and impacts on behaviour and emotion			
○ Trauma – Chronic Traumatic Encephalopathy (CTE)			
○ Degeneration – Alzheimer's disease			
○ Drug induced – Wernicke-Korsakoff Syndrome (WKS)			

REHEARSAL AS A STRATEGY TO IMPROVE MEMORY

- Rehearsal increases the time information is held within the short-term store of memory, providing the time needed for encoding to operate.

Maintenance rehearsal: a rehearsal technique where the repetition of information allows it to be held in the short-term store of memory for a longer period of time.

- People may think of the information or say it over and over.
- It is unlikely that information rehearsed using maintenance rehearsal will become encoded into the long-term store.

E.g., repeating a phone number in your head to try to remember it when you are unable to write it down or save it on your phone is an example of maintenance rehearsal.

Elaborative rehearsal: rehearsal technique allowing information to be encoded into long term memory by attaching meaning to it.

- Information can be made meaningful by relating it to prior knowledge or forming personal connections with the information.
- Elaborative rehearsal is likely to encode information into the long-term store.

Figure 3.1 Remembering the directions of a compass by using the mnemonic 'never eat soggy Weet-Bix'. This is a type of mnemonic known as an acronym.

ROLE OF REPETITION AS SEEN IN EBBINGHAUS AND THE FORGETTING CURVE (1885)

- Herman Ebbinghaus was the sole participant in his early studies on forgetting where he used nonsense syllables combined from letters producing non-existent words, such as 'lef'.

Figure 3.2 Herman Ebbinghaus

- After recording the number of trials it took before he could memorise a list of nonsense syllables, he attempted to recall the list at varying intervals to determine what would be forgotten over time.
- Graphing the memory retention over time, Ebbinghaus noted rapid forgetting over the first day leading to more gradual loss in the days following.
- This finding became known as the forgetting curve and is used to support decay theory.

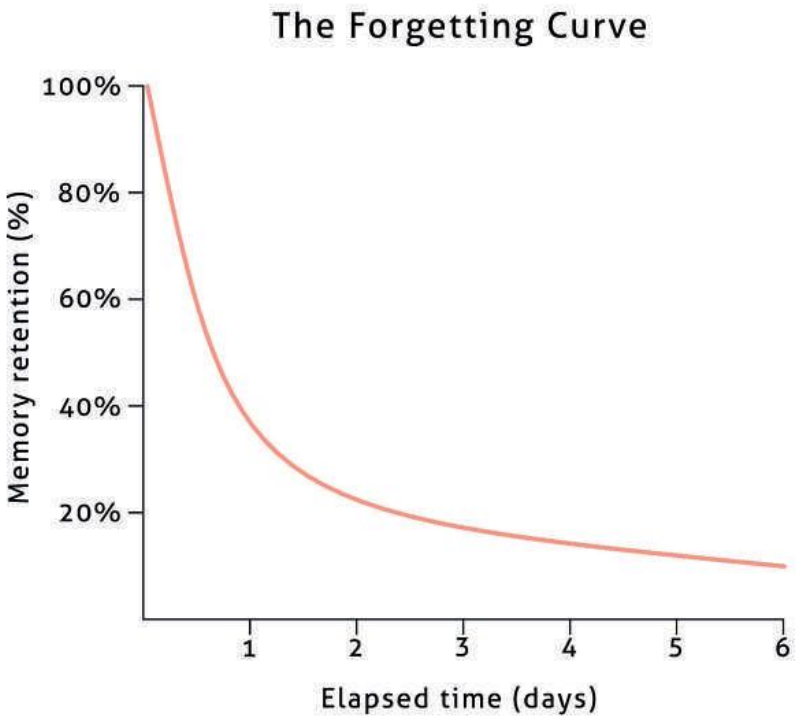


Figure 3.3 The steep drop in memory retention shows a loss of approximately 66% of the nonsense syllables in day one.

CAUSES OF MEMORY LOSS AND IMPACTS ON BEHAVIOUR AND EMOTION

TRAUMA – CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

Chronic traumatic encephalopathy (CTE): a progressive brain disease associated with repeated traumatic brain injuries that causes problems with cognition and memory.

- While this disease is not yet well understood, it is somewhat agreed that it is caused by multiple traumatic brain injuries commonly associated with military combat due to exposure to explosive blasts, and sports such as boxing, ice hockey, soccer, rugby and football.
- The degeneration of brain cells caused by CTE is thought to be related to the development of memory problems.
- While CTE involves tau, a protein in nerve cells also associated with Alzheimer's, the way in which tau abnormally builds up in the brain differs.

How CTE impacts behaviour	How CTE impacts emotion
• May cause impulsive behaviour • Confusion due to memory loss • Slurred speech • May experience erratic or aggressive behaviour • May become agitated • Experiencing apathy – a lack of interest and motivation to do things*	• Emotional instability in the form of intense mood swings • Outbursts of anger • Symptoms of depression • Experiencing apathy – a lack of interest and motivation to do things*

Note: due to ongoing research on CTE, symptoms are not agreed upon by all scientists.
**Apathy may be considered both a behavioural and an emotional characteristic.*

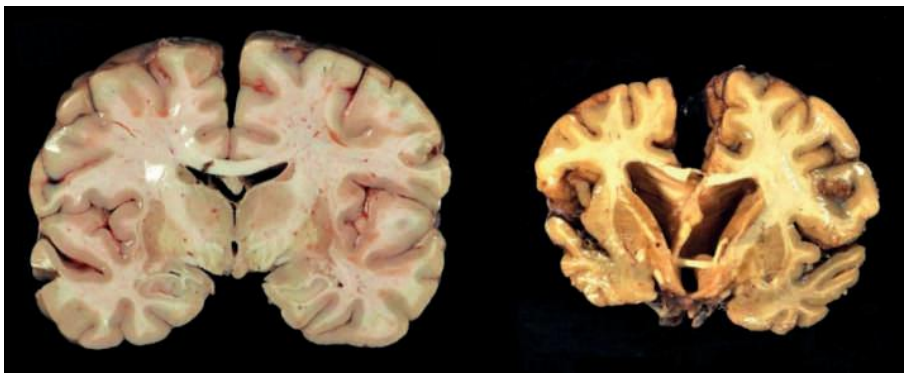


Figure 3.4 Clear structural differences between a normal brain (left) and a brain with advanced CTE (right). Image source: Boston University Center for the Study of Traumatic Encephalopathy.

DEGENERATION – ALZHEIMER'S DISEASE

Alzheimer's disease: a brain disease that involves the degeneration of neurons in regions of the brain that are involved in cognitive skills and memory formation and retrieval.

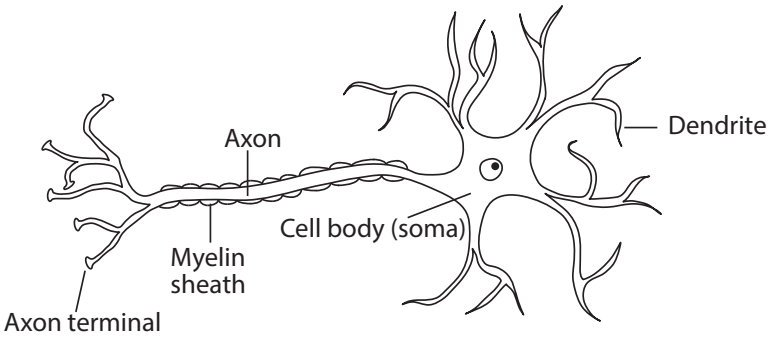


Figure 3.5 **Neurons** are cells of the nervous system that communicate with each other, as well as muscle and gland cells. **Dendrites** are the extensions of the cell body that receive **neurotransmitters** (molecules that act as chemical messengers) and convert them into electrical nerve impulses conducted toward the cell body. The **cell body** contains a nucleus that controls the activities of the neuron. The long projection of the neuron that conducts electrical nerve impulses and carries them away from the cell body is known as the **axon**.

- Alzheimer's is the most common cause of **dementia**, the general term for a group of symptoms including a decline in memory, cognitive skills and reasoning.
- Neurofibrillary tangles, amyloid plaques and neuron loss are the key features of this disease.
- Supporting the internal structure of the axon are microtubules that allow nutrients to move from the cell body, down the axon and to the axon terminals.
- Tau is a type of protein mainly found in the axon and dendrites of neurons. It clumps together, resulting in the breakdown of the microtubule structures supporting the axon.
- Damage to the internal structure of the axon impacts the electrical nerve impulses that travel through the axon.

Neurofibrillary tangles: abnormal accumulations of tau protein within neurons of the brain.

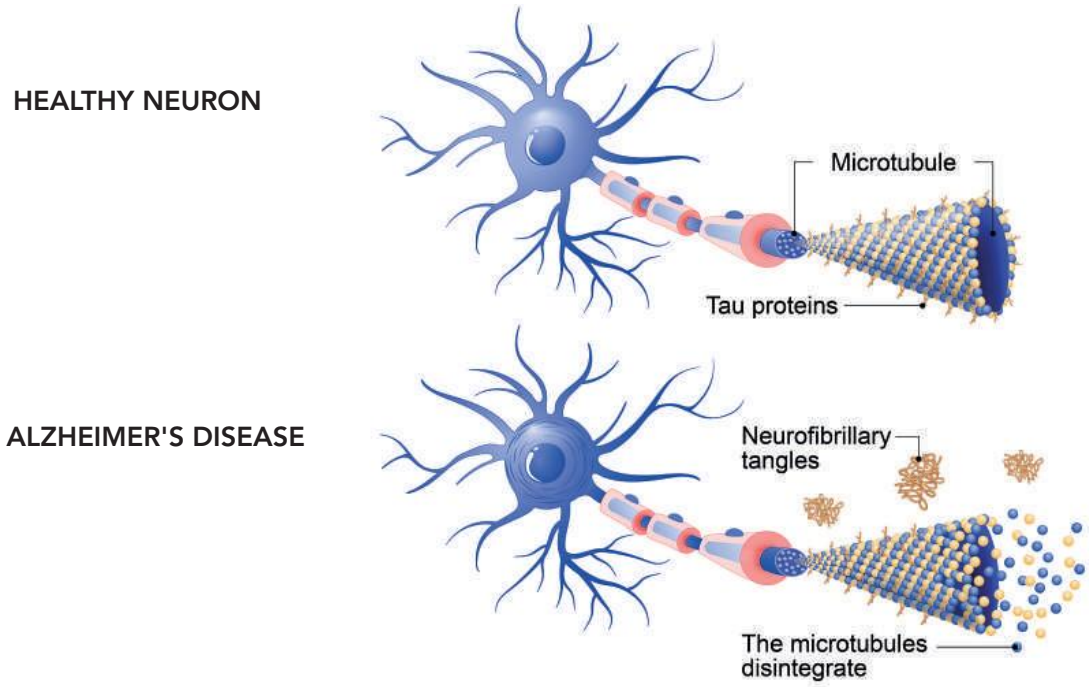


Figure 3.6 A comparison between a healthy neuron and one with neurofibrillary tangles resulting in the breakdown of microtubules in the axon.

- Another protein, a form of beta-amyloid, is found in abnormally high levels in the brains of individuals with Alzheimer's. They clump together alongside scar tissue from deteriorated neurons to form amyloid plaques.
- First developing in regions of the brain responsible for cognition and memory, these amyloid plaques gather between neurons and interrupt their ability to function.

Amyloid plaques: accumulations of scar tissue formed by deteriorating neurons and clusters of beta-amyloid protein.

- In those with Alzheimer's disease, neurofibrillary tangles, amyloid plaques and neuron loss are more prevalent in the hippocampus and amygdala – regions associated with the formation of new memories, and in the cerebral cortex – the area that supports remembering, reasoning and language processing.
- Brain atrophy, predominantly of the hippocampus and cerebral cortex, becomes widespread by the final stages of the disease, leading to a significant reduction in brain volume.

Atrophy: a decrease in size of a tissue or organ.

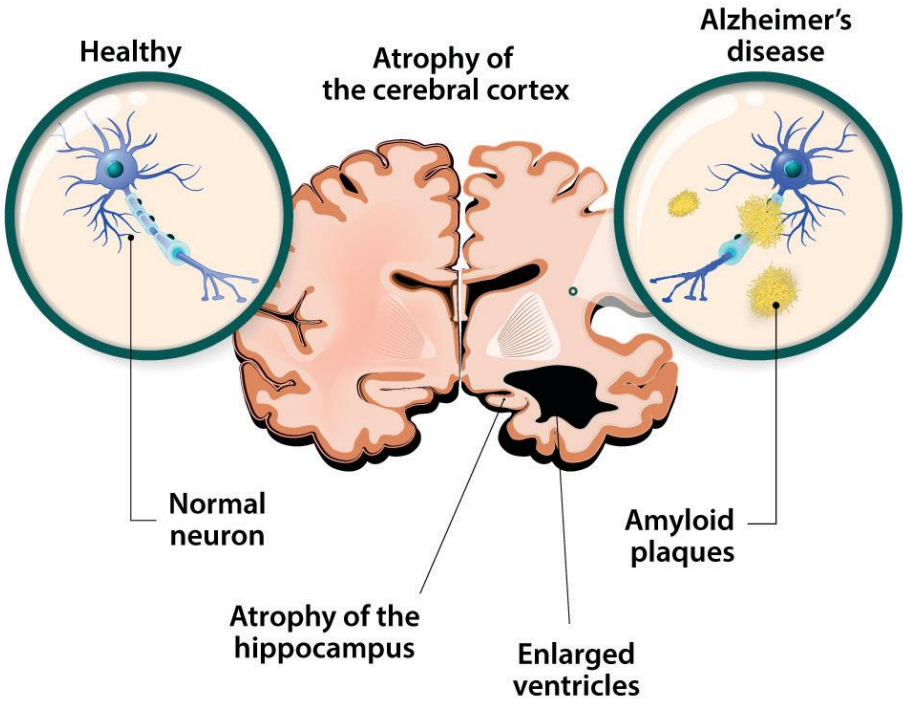


Figure 3.7 The left of the diagram shows a healthy brain and neurons with the right side displaying atrophy of the cerebral cortex and hippocampus in addition to neurons with amyloid plaques in a brain with Alzheimer's disease.

How Alzheimer's disease impacts behaviour	How Alzheimer's disease impacts emotion
• May become lost or disoriented and not know where they are or how to get home • Particular habits may change • Experiencing apathy – a lack of interest and motivation to do things* • May become more outgoing than they were in the past • Is easily agitated • May behave in an aggressive manner	• Abrupt changes in mood for no obvious reason • Feeling fearful or suspicious • Experiencing apathy – a lack of interest and motivation to do things* • Feeling anxious • Feeling angry and frustrated (a state of irritability) is common in the middle stage of the disease

Note: the above symptoms are not displayed in every person with Alzheimer's disease, the disease affects individuals in very different ways.

**Apathy may be considered both a behavioural and an emotional characteristic.*

Beyond the syllabus

While researching Alzheimer's disease online, I came across Wendy Mitchell's blog. Wendy was diagnosed with younger onset dementia in 2014, when she was 58 years of age. She uses her blog to keep track of her thoughts before they fade – acting as a memory store, full of daily stories, reflections and photos. I got in contact and she generously gave her time to answer some questions. The following are her responses in her own words.

What indicators led to your diagnosis. Did you notice changes in your cognitive abilities and share concerns with your GP?

I was a runner and the first thing I noticed was my legs and brain stopped working at the same speed. If I had to turn a corner my legs would get it in a tangle and I'd end up on the floor. Also my concentration levels were poor which had never happened. My GP suggested these things were due to the menopause or stress. I'd already gone through an early menopause and I wasn't a stressed person. At work I'd be in meetings and not know the names of people I'd worked with for years. The worst episode was coming out of my office one day and didn't know where I was or who all the people around me were. It was probably then that I went back to the doctor.

Your blog includes a lot of photos that you take throughout your daily adventures. They focus greatly on the beauty you notice around you, especially in nature. What is the importance of you taking photos with your camera in your day-to-day life?

Part of my morning routine is to be outside with nature. When I'm in the house alone the only company I have is dementia, whereas when I'm outside it's as though dementia is diluted and nature is my companion. To click those magic moments on my camera shows others what they're missing as they rush around in their busy lives.

Do you find there is an interrelationship between your memory, sleep, and stress?

Some people says there's a correlation with stress but I've never been one who stresses, so no. Memory and sleep … not really, but memory and dementia, yes. Some people like me, find the biggest side effect of the drug Aricept is that it affects your sleep. I used to wake sleep wake all night long. I seemed to be able to survive with little more than a couple of hours sleep a night. However, I've found that if I walk lots, so tire my body, and work my brain hard during the day, then sleep comes easier. After all we all like a good nights sleep.

What do you find helps you when you experience tip-of-the-tongue phenomenon and cannot retrieve a word or name of someone you know from your long-term memory?

I never stress about it. After all, what does it matter in the grand scheme of things? It can be frustrating sometimes though.

Can brain plasticity be used to strengthen new neural pathways, enabling your brain to best cope with future cognitive decline? You are a highly intelligent woman with a great deal of insight into your own cognitive functioning. If anyone could train their brain to fight against this disease, I'm certain it would be you.

Ha! Well I think it's called resilience. Throughout my life I've had to face many traumas. Dementia was simply another. It comes back to the old adage of 'use it or lose it'. I often think of it along the line of a road network – if there are roadworks or closures, you find another way, just as you can help compensate for the bits of your brain that find it hard to function. There's always a way.

Lastly, do you have any advice you would you like to share with students reading this book who have a family member with dementia?

Think of it as a start of a different life, not one any of us would choose but not the end of life. See the person before you with the talents they have not the dementia. Don't be tempted to wrap us in cotton wool. For the kindest of reason people take over doing and 'doing' is the most important thing for us. My daughters used to help me on with my coat, for the kindest of reasons, but when I was alone I realised I was getting in a pickle putting on my own coat. I said to them 'if you keep putting on my own coat, I'm going to forget how, then you'll have to come to my house every time I want to go out. They stopped immediately. Finally look after yourself, this is a team event …

Wendy is the author of best sellers *What I Wish People Knew about Dementia*, *Somebody I Used to Know* and *One Last Thing: How to Live with the End in Mind*. Her blog on living with dementia can be read at www.whichmeamitoday.wordpress.com and she can be followed on X (Twitter) @WendyPMitchell

Figure 3.8 Wendy Mitchell.

Figure 3.9 A photo Wendy took on one of her daily walks.

DRUG INDUCED – WERNICKE-KORSAKOFF SYNDROME (WKS)

Wernicke-Korsakoff Syndrome (WKS): a rare neurological disorder caused by thiamine (vitamin B1) deficiency leading to the degeneration of brain cells and characterised by difficulties forming new memories and retrieving stored memories.

Neurological disorder: a disorder of the nervous system affecting the brain, spinal cord and neurons of the body.

Nervous system: the system that produces and relays messages between the brain, spinal cord and the network of neurons.

- This disorder causes the degeneration of brain cells (neuronal atrophy) – specifically within the thalamus, hypothalamus and the mammillary bodies.
- The **mammillary bodies**, a pair of structures located on the side of the hypothalamus closest to the brainstem connected directly to the hippocampus and thalamus. They play a role in memory and start to waste away (become atrophied) in individuals with WKS.

Refer to chapter 2 for diagram of the brain showing the location of the thalamus, hypothalamus and mammillary bodies.

- The intestines absorb thiamine, a vitamin used for metabolism to support cellular growth and functioning, largely within the nervous system.
- Chronic alcohol abuse often leads to a thiamine deficiency, further developing into WKS.
- WKS comprises of two stages: Wernicke encephalopathy and Korsakoff amnesic syndrome.
    - Wernicke encephalopathy is a severe yet reversible stage that progresses into Korsakoff amnesic syndrome, the stage that is chronic and irreversible.

Encephalopathy: a general term describing brain diseases that modify the function or physical structure of the brain.

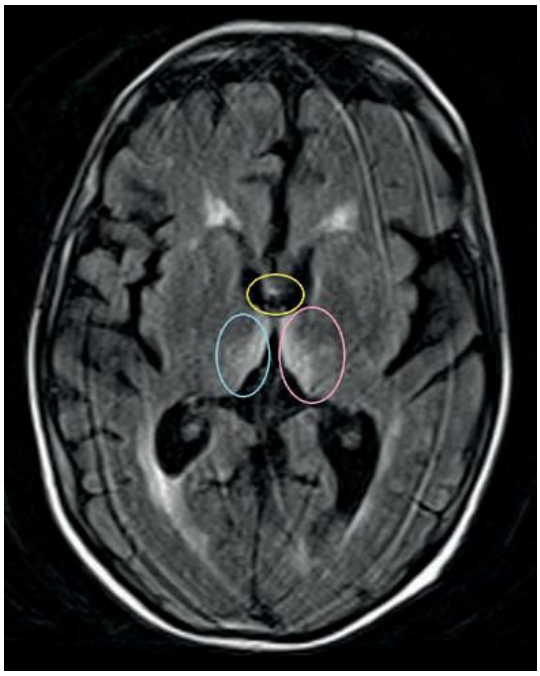


Figure 3.11 This is an MRI scan of an individual with WKS. It shows a 'slice' on the axial plane – moving from the top of the head, down to the brainstem. Brain scans are viewed as if you are looking in the mirror – the right side of the brain is on the left side of the scan. Atrophied mammillary bodies are circled in yellow, the thalamus of the left hemisphere circled in pink and of the right hemisphere circled in blue. The hypothalamus is not visible in this particular scan as they sit below the thalamus. Notice the right thalamus has degenerated more than the left.

How WKS impacts behaviour	How WKS impacts emotion
• Confabulation where individuals make up stories to fill in the gaps in their memory • Experiencing apathy – a lack of interest and motivation to do things* • May become agitated • Repeating the same questions or stories • Involuntary rapid and repetitive eye movements • Slurred speech, poor coordination of muscle movement, and reduced balance (ataxia)	• Memory deficits can lead to feelings of frustration • Experiencing apathy – a lack of interest and motivation to do things* • Feeling anxious

Note: hallucinations are a symptom of WKS that may explain a number of the behavioural and emotional impacts (i.e., agitation and feelings of anxiety).

**Apathy may be considered both a behavioural and an emotional characteristic.*

Question 1

(a) Lola is introduced to her new workmates on the first day of her job. She wants to make a good impression so she tries to memorise their names by repeating them in her head over and over again. Identify the remembering technique she has used and describe how it works. (3 marks)

(b) (i) State the type of rehearsal used by participants in Craik and Tulving's 1975 depth of processing study who were tasked with remembering whether words were in capital or lower case. (1 mark)

(ii) State the type of rehearsal participants utilised when remembering which words fit into a provided sentence. (1 mark)

Question 2

(a) Describe how the shape of the forgetting curve translates to the percentage of memory retention over time (days). (2 marks)

(b) Outline the spacing effect as described by Ebbinghaus. (2 marks)

(c) Directly referring to Craik and Lockhart's levels of processing and types of encoding, explain why Ebbinghaus developed a set of non-existent words to recall rather than using words already in existence. (4 marks)

(d) By using a set of non-existent words, the chance of extraneous variables affecting results is reduced. Name the type of extraneous variable that will be minimised and justify your response. (2 marks)

Question 3

(a) Amyloid plaques are comprised of deteriorating neurons and clusters of beta-amyloid protein. Outline what causes the neurons to deteriorate. (2 marks)

(b) Describe what happens to the mammillary bodies of the brain in individuals with Wernicke-Korsakoff syndrome (WKS). (1 mark)

4

CLASSICAL CONDITIONING

Key teaching points	Learn	Revise	Demonstrate
Theories of learning			
• Classical conditioning			
○ Neutral stimulus, unconditioned stimulus, unconditioned response, conditioned stimulus, conditioned response			
○ Stimulus generalisation, discrimination, extinction and spontaneous recovery			
○ Study: Pavlov's dog (Pavlov, 1902)			
○ Study: 'Little Albert' experiment (Watson and Rayner, 1920)			

CLASSICAL CONDITIONING

- Classical conditioning is a behaviorist principle focused on learning through association. Both humans and animals use classical conditioning to acquire new behaviours from their environment.
- This form of learning is based on the association made between a previously neutral stimulus and a reflex response.

Classical conditioning: a form of learning where an existing reflex response is elicited by the repeated pairing of two unrelated stimuli.

Response: behaviour that emerges as a result of a stimulus.

Reflex response: an automatic, involuntary and almost instantaneous response to a stimulus.

- These responses do not require conscious thought. E.g., blinking when air is directed at the eyes, contraction of the pupil of the eye when exposed to bright light, pulling your hand back from touching a hot substance, or salivating when eating food.

Neutral stimulus: a stimulus that on its own does not elicit a particular response.

Unconditioned stimulus: a stimulus with the inherent ability to elicit a reflex response.

Unconditioned response: the reflexive reaction to a specific unconditioned stimulus.

Conditioned stimulus: a stimulus that elicits a particular response due to learning.

Conditioned response: a reflex response elicited by a previously neutral stimulus as a consequence of learning.

- Prior to conditioning, the neutral stimulus does not produce any sort of response. It is attested that the unconditioned stimulus automatically produces an unconditioned response and continues to do so when paired with the neutral stimulus. After multiple pairings, the neutral stimulus, now termed the conditioned stimulus, elicits the now conditioned response.

Stimulus generalisation: when a stimulus similar to a conditioned stimulus elicits the same response as the conditioned stimulus.

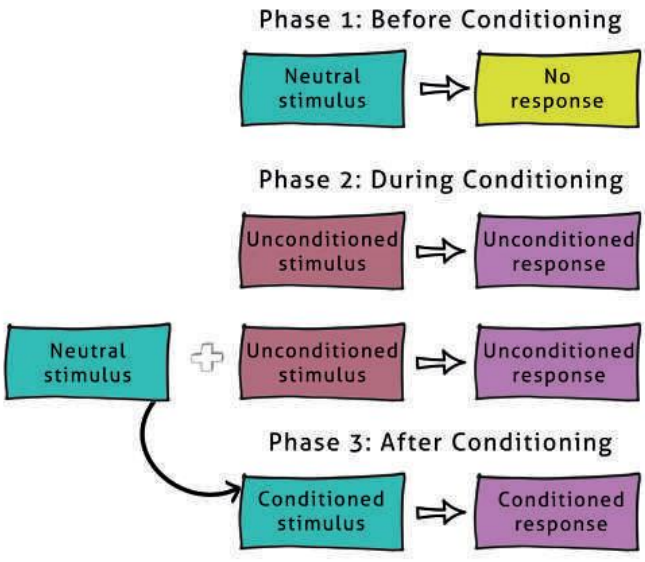


Figure 4.1 Classical conditioning

Stimulus discrimination: when a stimulus does not elicit the conditioned response because it differs significantly from the original stimulus.

Extinction: when repeated presentation of the conditioned stimulus on its own ceases to elicit a response, as there is no longer an association between the conditioned stimulus (previously neutral) and the unconditioned stimulus.

Spontaneous recovery: the sudden reappearance of a previously extinct conditioned response after the unconditioned stimulus has been absent for some time.

STUDY: PAVLOV'S DOG (PAVLOV, 1902)

- Ivan Pavlov is believed to have been the first person to document observations of classical conditioning through his experiments on the salivatory response in dogs.

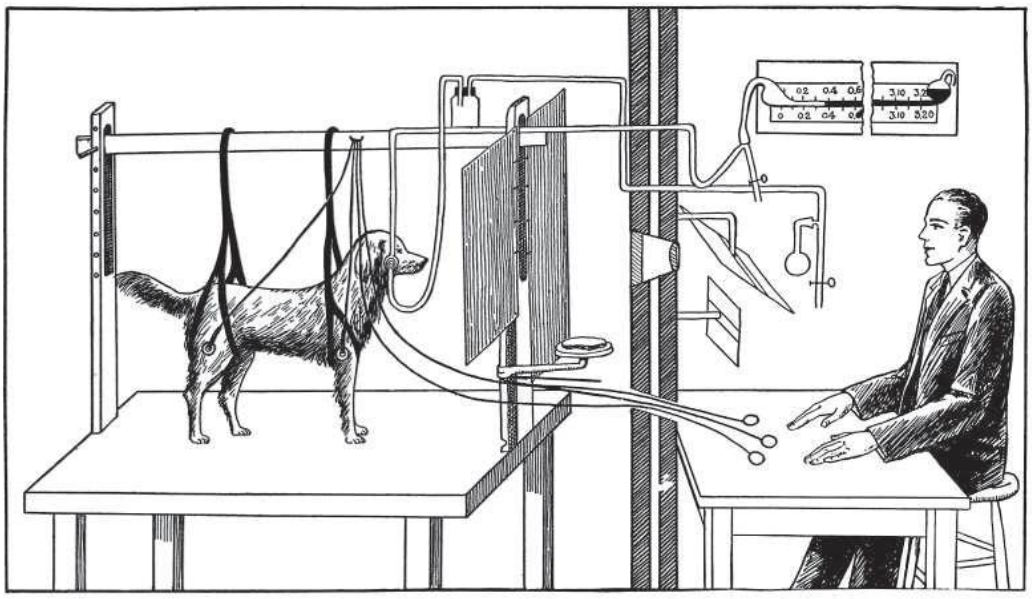


Figure 4.2 The Pavlovian apparatus.

Aim

To investigate classical conditioning in dogs.

Method

Subjects

Dogs (the exact number of dogs used over the experiments is unspecified).

Materials

Meat powder, a bell, and a Pavlovian apparatus.

Design

The independent variable was the presentation of stimuli, whether it be the bell, food or both simultaneously. The dependent variables were the times at which the dogs salivated and the amount of saliva secreted.

Procedure

Dogs were placed within a harness and had a tube inserted into a cheek of the mouth whereby any saliva produced was collected and measured – this set-up was termed the 'Pavlovian apparatus'. As shown in Figure 4.3, a bell was rung close to the dog, salivation did not occur and the sound of the bell was deemed a neutral stimulus (NS).

The dog was given some meat powder in a bowl leading to the production of saliva, the meat powder was the unconditioned stimulus (UCS) that caused the unconditioned response (UCR) of salivation. Next, the bell (NS) was rung just before providing the dog with meat powder (UCS). This was repeated multiple times with saliva produced each time (UCR).

Now, when the bell was sounded, salivation occurred. The sound of the bell that was initially a neutral stimulus had become a conditioned stimulus (CS) that elicited the now conditioned response (CR) of salivation.

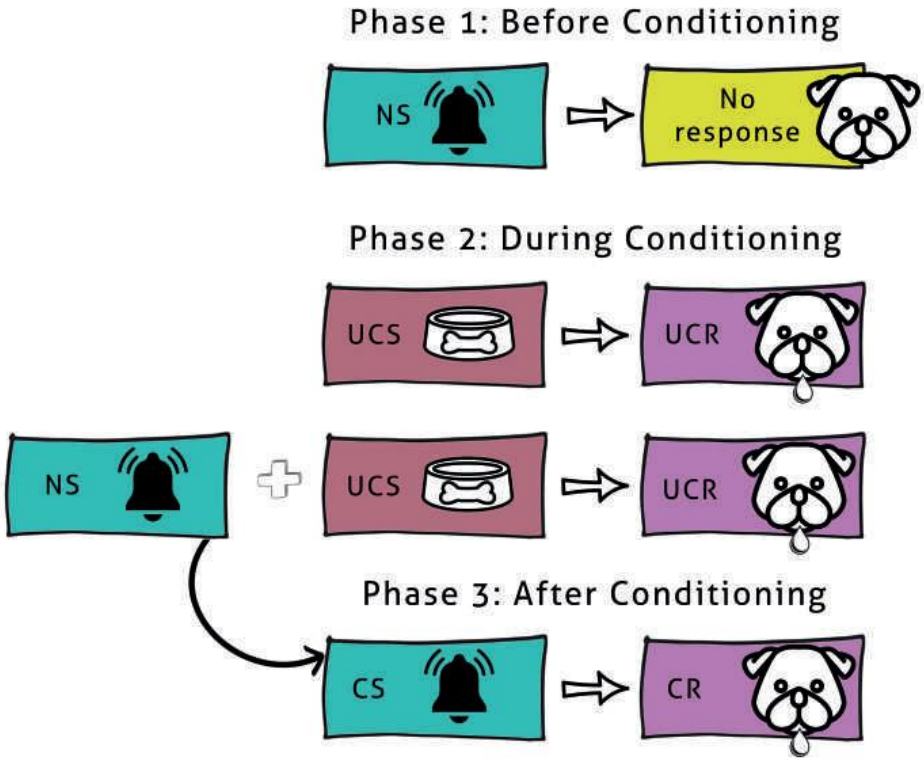


Figure 4.3 Developing a conditioned response

Key findings

- The dogs were able to learn to associate a neutral stimulus with a reflex response, leading to the neutral response developing into a conditioned response.

Contribution of the study to psychology

- Through his initial experiments on dogs, Pavlov profoundly impacted the understanding of learning processes by presenting classical conditioning as an undiscovered form of learning in the field of psychology. His empirical study presented quantitative data allowing other researchers to replicate the study and further develop the theory of classical conditioning.
- The study provided a link between physiological and psychological processes and provided insights as to their interaction in the production of learning behaviours.

Criticisms and limitations of the study

- There is an inability to generalise the results from the dogs in Pavlov's study to humans.
- The dogs were exposed to unpleasant stimuli during the experiments, causing physical and psychological harm. One example was the placing of undesired substances into the mouths of the dogs, such as acid and ammonia.

STUDY: 'LITTLE ALBERT' EXPERIMENT (WATSON AND RAYNER, 1920)

John B. Watson and his graduate student Rosalie Rayner conducted experiments on an almost one-year-old boy at Johns Hopkins University.

In preparation for the experiment, Albert was abruptly exposed to stimuli including a white rat, a Santa Claus mask, a rabbit and burning newspaper – none elicited any emotional response. He was also tested to see whether a fear response could be elicited through loud sounds – specifically made by a hammer hitting a suspended metal bar. The loud noise caused Albert to cry in fear.

Figure 4.4 Albert being introduced to the white rat before conditioning began.

Aims

To assess whether a child can be conditioned to feel fear through the simultaneous visual presentation of a white rat and the loud noise of a hammer hitting a metal bar. If a fear response is successfully elicited, to determine whether this emotional response can be extended to similar stimuli.

Method

Participants

Eleven-month-old boy named Albert (not his real name).

Materials

A white rat, a rabbit, a seal-skin coat, a Santa Claus mask, a metal pole and a hammer.

Design

The independent variable was the exposure to various stimuli and the pairing of stimuli, and the dependent variable was the observed emotional and behavioural responses displayed by the child

Procedure

Albert was seated on a mattress on the floor and a white rat was placed down in front of him. As illustrated in Figure 4.5, the rat did not elicit a response in Albert, hence was a neutral stimulus (NS). Now, each time he touched the rat, a metal bar was struck with a hammer. The loud noise was enough to cause Albert to become fearful and cry, the loud noise being an unconditioned stimulus (UCS) and the fear and crying being the unconditioned response (UCR). The rat, originally the neutral stimulus, became the conditioned stimulus (CS) and upon presentation to Albert would cause him to produce the conditioned response (CR) of crying and being fearful.

Albert was then exposed to stimuli that shared the characteristic of having fur/hair - similar to that of the rat. A seal skin coat was placed in front of him, as was a rabbit. Watson wore a Santa Claus mask with white beard and brought his face close to Albert's.

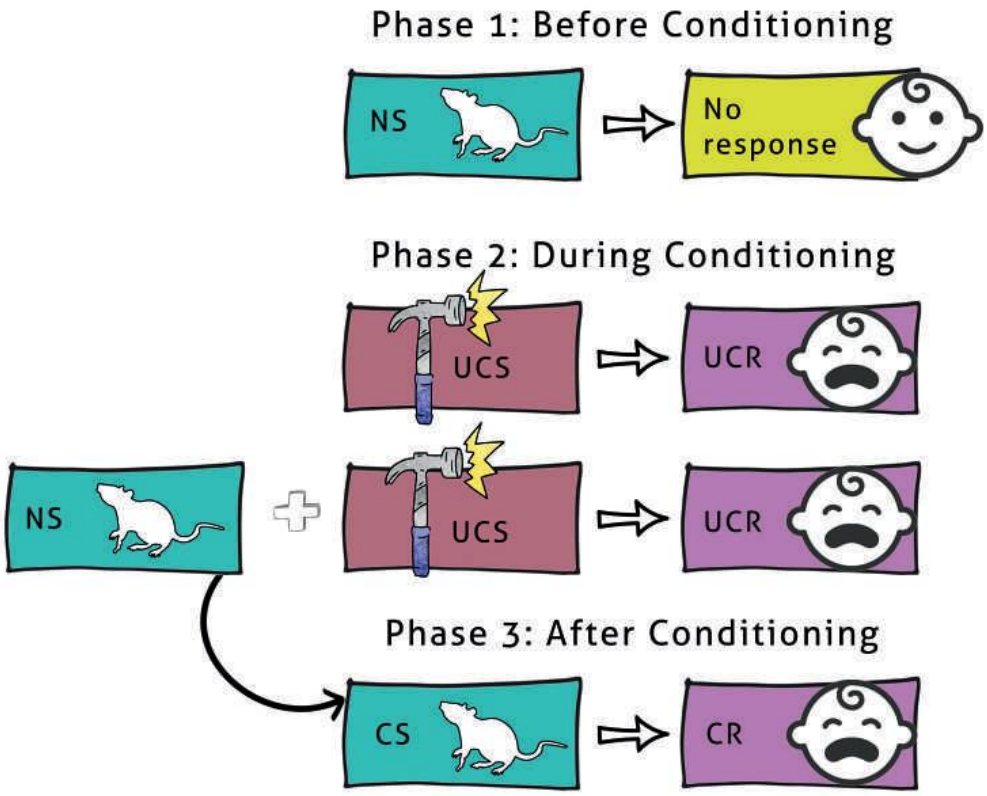


Figure 4.5 Developing a conditioned response

Key findings

- Albert was conditioned to feel fear from the sight of the rat after multiple pairings of the loud noise and him reaching out to touch the rat.
- Emotional transfers from the white rat to the seal-skin coat, rabbit and Santa Claus mask occurred. Stimulus generalisation occurred because the seal-skin coat, rabbit and white mask were similar to the white rat in that they were also soft and had hair.

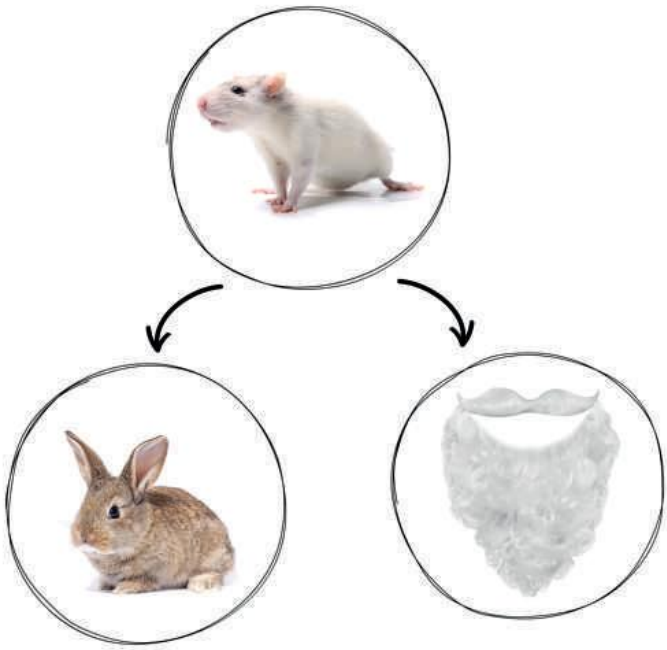


Figure 4.6 Stimuli similar to the CS elicits the same learnt response

Contribution of the study to psychology

- The experiment provided a clear demonstration of how classical conditioning can be used to elicit a fear response. Subsequent research of the formation of phobias and the development of treatment for them utilising learning theories was thus made possible.
- The ethical concerns raised by the experiment led to widespread debate and discussion on ways in which psychological research should be carried out. In particular, obtaining informed consent for participants, especially those who are vulnerable, such as children.

Criticisms and limitations of the study

- While Waston claimed he genuinely did not feel Albert would be harmed in the experiment, it is evident that Albert was psychologically harmed, if not severely traumatised, as a result and likely went on to develop lasting fear toward particular stimuli.
- Albert's mother gave permission for Watson and Rayner to use Albert as their participant, however it is understood that she was not aware of the full extent of the procedure to be carried out and the psychological risks involved thus true informed consent was not obtained.

Question 1

As a child, Bianca was playing in the backyard when a magpie flew down and landed near her. It did not bother her, but her mother (who is terrified of birds), screamed, snatched Bianca up into her arms and ran inside the house with her. Her behaviour caused Bianca to cry. Every time a magpie flew into the backyard, Bianca's mother would react in the same way. Bianca now has a fear of magpies, and when she sees one, she feels scared. Using the scenario, identify the:

(a) (i) Neutral stimulus (1 mark)

(ii) Unconditioned response (1 mark)

(iii) Unconditioned stimulus (1 mark)

(iv) Conditioned stimulus (1 mark)

(v) Conditioned response (1 mark)

(b) Outline how a therapist could cause the extinction of Bianca's conditioned response. Use psychological terminology in your response. (3 marks)

(c) In reference to classical conditioning, define the term 'stimulus generalisation' and describe how this could occur in Bianca's case. (2 marks)

Question 2

(a) Pavlov observed that the dogs stopped salivating after a length of time during which they no longer received food powder in addition to hearing the bell. Identify the principle that has occurred. (1 mark)

(b) Food powder was presented to the dogs without the ringing of a bell for a few hours. Upon hearing the bell, the dogs immediately began salivating again. Identify the principle that has occurred. (1 mark)

Question 3

(a) Suggest why very few pairings of the neutral stimulus and unconditioned stimulus were required by Albert before the neutral stimulus became the conditioned stimulus. (1 mark)

(b) Explain how the ethical guideline 'protection from harm' was breached by Watson and Rayner in their experiments on Albert. (2 marks)

OPERANT CONDITIONING

Key teaching points	Learn	Revise	Demonstrate
Theories of learning			
• Operant conditioning			
○ Three phase model – antecedent, behaviour, consequence			
○ Reinforcement			
• Role of reinforcers – positive and negative			
○ Punishment			
• Role of punishers – positive and negative			
○ Schedules of reinforcement – fixed, variable, interval and ratio			
○ Study: Law of effect (Thorndike, 1898)			
○ Study: Skinner box (Skinner, 1948)			

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OPERANT CONDITIONING

Operant conditioning: a type of learning whereby the consequence of behaviour determines whether they will be repeated or not.

THREE PHASE MODEL

- Operant conditioning comprises three key phases: the antecedent, the behaviour and the consequence(s), often referred to as the ABC sequence of operant conditioning.

Antecedent

- Internal and external conditions are present immediately prior to a particular response.
- An awareness of this phase provides insights into the pre-emptive circumstances surrounding the behaviour.

Behaviour

- The observed behaviour resulting from the antecedent.

Consequence

- The consequence is the outcomes of the behaviour.

Figure 5.1 The ABC sequence of operant conditioning

- The Department of Transport offers drivers who have not committed a traffic offence while on P plates free licence renewal for a year. Peta is aware of this, so she drives safely and follows the road rules for the entirety of her provisional period. She is thrilled when her licence renewal notice arrives in the mail stating the fee for the following year has been waived as a reward for her safe driving.
- Referring to the three phase model illustrated in Figure 5.1, the safe driver reward incentive by the Department of Transport is the antecedent that directs Peta's behaviour of driving safely for the duration of her provisional period. The consequence of her behaviour is the free licence renewal thus motivating her future behaviour - continued safe driving.

REINFORCEMENT AND PUNISHMENT OF BEHAVIOURS

- 'Positive' refers to the addition of a stimulus while 'negative' indicates the removal of a stimulus.

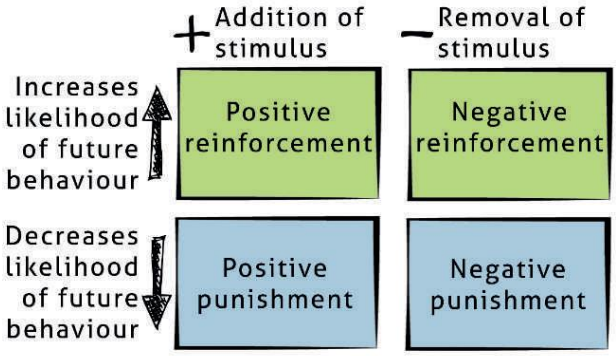

Figure 5.2 Kathy uses operant conditioning to train her dog Pepper to sit on command, not pull on the leash (loose-leash walking) and refrain from barking at passing cars.

Reinforcement: a consequence that increases the likelihood of a behaviour repeating.

Punishment: a consequence that decreases the likelihood of a behaviour repeating.

Positive reinforcement: the addition of stimuli that increase the likelihood of the behaviour being repeated.

e.g. Pepper is given (+) a treat when she sits on command. (Behaviour is reinforced)

Negative reinforcement: the removal of stimuli that increase the likelihood of the behaviour being repeated.

e.g. Kathy reduces (−) the tightness of Pepper's leash when Pepper does not pull on it. (Behaviour is reinforced)

Positive punishment: the addition of stimuli that decrease the likelihood of the behaviour being repeated.

e.g. Kathy blows (+) a whistle when Pepper turns away to bark at a passing car. (Behaviour is punished)

Negative punishment: the removal of stimuli that decrease the likelihood of the behaviour being repeated.

e.g. Kathy ignores (−) Pepper when she jumps up at her. (Behaviour is punished)

SCHEDULES OF REINFORCEMENT

- Schedules of reinforcement can be assessed in terms of the rate at which the behaviour is performed, the response rate, and how long it takes before the behaviour becomes extinct, known as the extinction rate.
- There are two main types of reinforcement: continuous reinforcement and partial reinforcement. **Continuous reinforcement** proves highly effective when instructing a new behaviour because it reinforces the desired behaviour each time it happens, establishing a strong connection between the behaviour and response. Once a behaviour is established, various schedules of **partial reinforcement** can be used to strengthen the behaviour.
- Partial reinforcement can be fixed or variable, and either interval or ratio.

Fixed schedule: a predictable schedule where the length of time or number of responses between reinforcements is set.

Variable schedule: an unpredictable schedule where the length of time or number or responses between reinforcements changes.

Ratio schedule: a schedule dependent on the quantity of responses needed before reinforcement is provided.

Interval schedule: a schedule reliant on the length of time between reinforcements.

- Combinations of the schedules are displayed in the table below.

	Fixed	Variable
Ratio	Reinforcement takes place following a set number of responses	Reinforcement takes place after an unpredictable number of responses
Interval	Reinforcement takes place at fixed time intervals	Reinforcement takes place at irregular time intervals

Figure 5.3 Combinations of the four partial schedules of reinforcement.

Fixed ratio: reinforcement takes place following a set number of responses.

E.g., being given a free coffee after receiving six stamps on a coffee card at a café.

Fixed interval: reinforcement takes place at fixed time intervals.

E.g., being paid for work fortnightly.

Variable ratio: when reinforcement takes place after an unpredictable number of responses.

E.g., students being rewarded for the completion of homework on occasions that the teacher remembers to bring in her box of lollies.

Variable interval: when reinforcement takes place at irregular time intervals.

E.g., checking for your class assessment marks to be released online.

Maddie the French bulldog quickly picks up any washing that has fallen to the ground outside and runs away with it, knowing she will be chased by a member of the household.

The chances of Maddie continuing this behaviour increases as she has learned that when she runs away with dropped washing, she is chased, an interaction that she enjoys.

This is an example of positive reinforcement; the added stimulus of being chased (positive) increases the likelihood of her continuing to run off with laundry items (reinforcement).

Maddie's behaviour is reinforced each time it is performed thus demonstrating **continuous reinforcement**.

STUDY: LAW OF EFFECT (THORNDIKE, 1898)

- The Law of Effect, proposed by Edward Thorndike describes how behaviours followed by desirable consequences have a greater likelihood of being repeated, whereas behaviours followed by unpleasant consequences are less likely to be repeated.

Aim

Thorndike wished to examine the influence reinforcement had on the behaviour of cats seeking to escape from a puzzle box in order to reach food.

Method

Subjects

Thirteen cats.

Materials

Puzzle boxes, food for the cats and a clock for timekeeping.

Design

The independent variable was the number of times the cats were placed in the puzzle boxes, and the dependent variable was the length of time it took for the cats to escape from the puzzle boxes.

Procedure

A cat was placed in a puzzle box, an enclosed wooden box with slats allowing the cat to look out from and reach a paw through. Fish was placed nearby the puzzle box. Thorndike used numerous puzzle boxes, each with a different method by which a door could be opened internally by the cat. Thorndike placed a hungry cat inside a puzzle box, closed the door of the box and set the mechanism holding the door shut. The time it took for the cat to trigger the release mechanism and exit the box was recorded. This was repeated many times with multiple cats and a range of puzzle boxes.

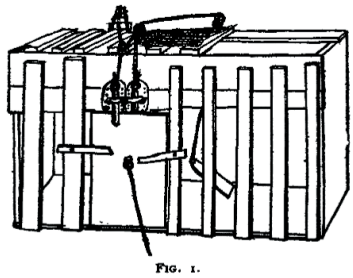

Figure 5.4 Thorndike conducted experiments with cats in experimental boxes he called puzzle boxes.

Key findings

- Cats initially worked out how to escape from the puzzle box using trial and error. Once placed back in the box they made the conscious decision to press the lever to open the door. This choice demonstrates operant conditioning, specifically, positive reinforcement. The cats received food when they pressed the lever to open the door of the puzzle box, thus increasing the likelihood of them continuing to press the lever each time they were placed inside the box. The stimulus being added is the food and the behaviour of pressing the lever is what Thorndike was trying to reinforce.
- The second time the cats were placed in a puzzle box, the time it took for them to press the lever and escape to reach the food drastically reduced, as shown in Figure 5.5.

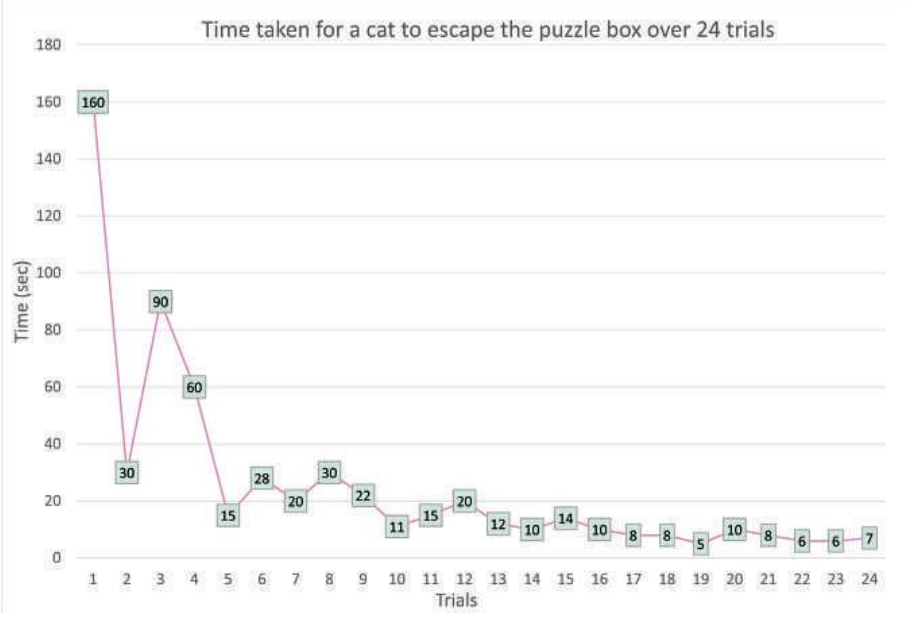

Figure 5.5 A representation of results from one of the cat subjects.

Contribution of the study to psychology

Thorndike's research with cats formed the foundation on which theorists built their understanding of operant conditioning. Skinner's work with pigeons (and other animals) was developed from Thorndike's experiments and findings.

Criticisms and limitations of the study

Thorndike's findings are based on an animal model of trial-and-error learning and reinforcement of behaviour. This simplified notion of learning cannot be generalised to humans who possess more sophisticated cognitive abilities.

It would be difficult today for similar experiments on cats to be approved by an ethics committee, as the repeated placing of cats into puzzle boxes while in a hungry state would be argued by some to be distressing.

STUDY: SKINNER BOX (SKINNER, 1948)

- Burrhus Frederic Skinner's work on operant conditioning was based on Thorndike's law of effect (1898) and the experimental box he developed, called the Skinner box, was similar to Thorndike's puzzle box.
- The Skinner box was used to assess the conditioning of behaviour in mice, rats and pigeons and schedules of reinforcement were evaluated. Variations of this equipment existed however they were generally bare on the inside to prevent undesired stimulation of the animal, with most including a tray that food was dispensed into.
- While some Skinner boxes included lights, levers or an electrified mesh floor, Skinner's 1948 experiments used the simplest design.

Aim

To demonstrate the process of operant conditioning in pigeons.

Method

Subjects

Eight pigeons.

Materials

Experimental cage with attached timer and food hopper, and bird feed.

Design

The independent variable was the time interval at which food was released, and the dependent variable was the observed behaviours of the pigeons.

Procedure

The amount of food the pigeons were fed was reduced to increase their hunger levels. Each pigeon was then placed individually into the experimental cage (Skinner box) for a few minutes each day. A timer was programmed to present food to the pigeon at set intervals via a hopper that tipped down through an opening in the cage wall.

While the regular interval at which the hopper would tip was manipulated by the researchers, the length of time the hopper remained lowered into position was 5 seconds, during which the pigeon would eat. A fixed interval schedule of reinforcement was used.

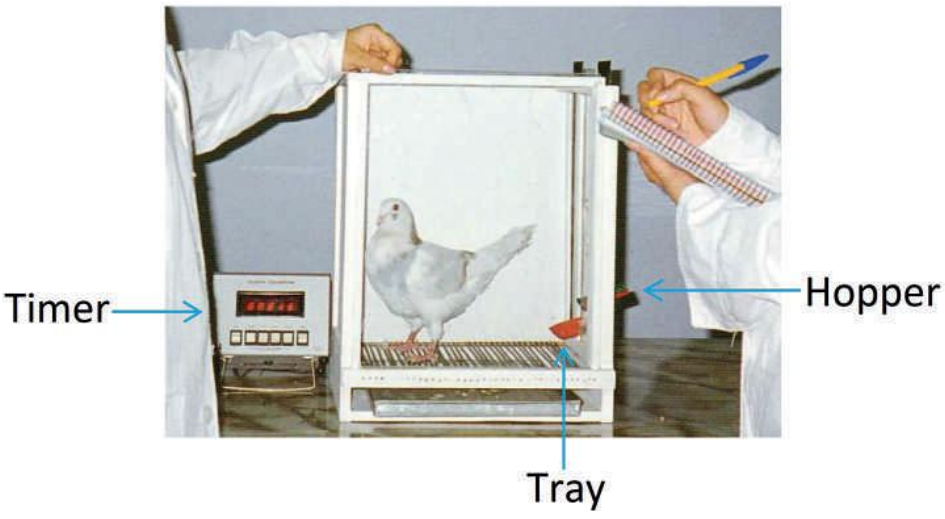

Figure 5.6 A Skinner box with the timer controlling the tipping of the hopper at set time intervals.

Key findings

- Operant conditioning was observed in six of the eight pigeons. Each of the six pigeons were conditioned to perform a unique behaviour – whatever particular action they were doing at the time the food hopper tipped into the cage. For two of the pigeons it was unclear whether a specific behaviour had become conditioned.
- Examples of behaviours included turning anti-clockwise, making partial pecking movements toward the floor, and tossing up and down of the head.
- Shorter intervals between the release of food proved more effective than longer intervals. Specifically, fifteen second intervals were found to successfully produce conditioned behaviours.
- While there appeared to be a cause-and-effect relationship between the behaviour of the pigeon and the release of food, there was in fact no relationship in effect.

Contribution of the study to psychology

- Skinner's pigeon experiments illustrate how animals can develop 'superstitious' (accidentally reinforced) behaviours similar to humans. A cause-and-effect relationship is evidently not required for the development of conditioned behaviour.

Criticisms and limitations of the study

- There was concern at the time of the study that the pigeons were mistreated by Skinner, causing them to starve. Skinner responded to these allegations by explaining the pigeons were still being fed regularly, however the amount was reduced over time until they weighed 25% less than they did originally.
- Animal studies of learned behaviour are not able to be generalised to humans as both pigeons and humans share differing cognitive and social characteristics.

COMPARISONS BETWEEN CLASSICAL AND OPERANT CONDITIONING

- A similarity of both classical and operant conditioning is the presence of an association between a stimulus and a response.

	Classical conditioning	Operant conditioning
Nature of the response	Involuntary/reflex response	Voluntary response
Role of the learner	Passive (has no control)	Active (has control)
Timing of stimulus and response	Stimulus occurs before the response (conditioned stimulus is paired with the unconditioned stimulus)	Stimulus occurs after the response (response is followed by reinforcing stimulus or event)
Nature of the learning	Neutral stimulus becomes a conditioned stimulus through pairing with an unconditioned stimulus	Making a response depends on the consequence

Question 1

(a) Stanley Kubrick banned his 1971 film A Clockwork Orange from cinemas in the United Kingdom due to a number of 'copycat' incidents that occurred, based on violent scenes from the film. Name the type of learning behind these incidents.

(1 mark)

(b) A 16-year-old boy murdered an elderly homeless man. When questioned, he claimed he did so after seeing a similar scene in the movie. Using learning terminology and specific examples, explain how placing the boy in jail can be a form of both positive and negative punishment.

(i) Positive punishment (2 marks)

(ii) Negative punishment (2 marks)

(c) The main character in the film, Alex, was caught and subjected to psychological conditioning to 'cure' him of his violent tendencies. Doctors injected him with drugs which made him feel nauseous, while at the same time forcing him to watch films of violence. Identify the classical conditioning terms below based on Alex's 'therapy'.

(i) Unconditioned stimulus (1 mark)

(ii) Unconditioned response (1 mark)

(iii) Neutral stimulus (1 mark)

(iv) Conditioned stimulus (1 mark)

(v) Conditioned response (1 mark)

(d) The doctors wish to extinguish Alex's conditioned response to violent films. Using learning terminology, explain how the doctors could accomplish this. (6 marks)

Question 2

(a) With direct reference to Thorndike's experiments on cats, explain the relationship between trial and error and operant conditioning. (3 marks)

(b) Apply the three phase model to Thorndike's cat experiments. (3 marks)

Antecedent: _____

Behaviour: _____

Consequence: _____

(c) Identify the schedule of reinforcement used in Skinner's pigeon experiment and justify your response. (2 marks)

6 BANDURA'S SOCIAL LEARNING THEORY AND APPLICATION AND EVALUATION OF LEARNING THEORIES IN BEHAVIOUR MODIFICATION

Key teaching points	Learn	Revise	Demonstrate
Theories of learning			
• Social learning theory – Bandura (1977)			
○ Process of observational learning – attention, retention, reproduction, motivation, reinforcement			
○ Modelling – vicarious reinforcement			
○ Study: 'Bobo doll' experiment (Bandura, Ross and Ross, 1961)			
• Application and evaluation of learning theories in behaviour modification			
○ Systematic desensitisation as a treatment for phobias			
○ Token economies			

SOCIAL LEARNING THEORY – BANDURA (1977)

PROCESS OF OBSERVATIONAL LEARNING

- Bandura believed that the ability for humans to learn through observation negates the need to accumuluate vast amounts of knowledge through time consuming trial and error, instead enabling us to be come to know about the world around us by watching the experiences of other people.

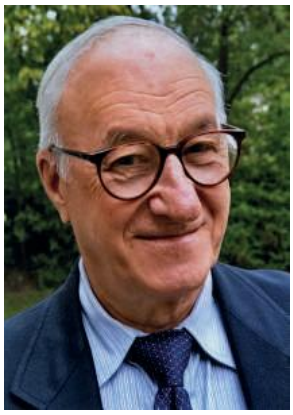

Figure 6.1 Albert Bandura

Observational learning (observational conditioning): where the learner watches a model, notices the consequences of their behaviour, and then decides whether they will imitate their behaviour.

Model: the person who sets an example for others to imitate through their actions.

Learner: the person who is observing the model.

MEDIATING PROCESSES

- Bandura outlined five mediating processes required for observational learning to proceed.

Attention

- The learner needs to find the model interesting enough to pay attention to them.
- Typically, the more the learner likes the model and/or the more similar they perceive themselves to be to the model, the more likely they will attend to their behaviour.
    - Examples of similarities with the model include life experiences, physical appearance, sex, gender identity, skill level, race, values, personality, nationality, religion, and age.

Retention

- The learner needs to be able to remember the model's observed behaviour, this relies on the cognitive level of the learner.
- Memory strategies, such as rehearsal techniques, need to be utilised.

Reproduction

- The learner needs to have the physical and cognitive abilities to reproduce the behaviour they have observed.
- Observing behaviour is not enough to guarantee the learner will be successful in imitating it, especially if the modelled behaviour is highly complex.

Motivation

- The learner requires an incentive and reason for repeating the modelled behaviour.
- An example of motivation is the belief that the reproduced behaviour will be reinforced.
- Motives are what push people to demonstrate what they have learned through observation.

Reinforcement

- If the learner expects the modelled behaviour will be reinforced, they are more likely to reproduce the modelled behaviour. This expectation may arise from the learner observing the model's actions being rewarded (vicarious reinforcement).
- Reinforcement of modelled behaviour may be motivation behind observational learning.

MODELLING – VICARIOUS REINFORCEMENT

Vicarious reinforcement: a form of observational learning in which the observed consequences of a model's actions can modify the behaviour of the learner.

- The learner will more likely adopt behaviours that they view the model being rewarded for, or reinforced, and will be less likely to copy behaviours they see the model punished for carrying out. This learning occurs without the learner receiving direct reinforcement or punishment.

Strengths of theory

- There are situations where it does not make sense to learn via trial and error solely, and when observational learning is highly useful, or in fact perhaps the only method of learning. There is only so far that learning can occur through the shaping of behaviour using rewards or punishment.
- There is empirical research that supports social learning theory, such as the Bobo doll experiments run by Bandura, Ross and Ross. Empirical research involves direct observation and measurements of events based on real life occurrences.

Limitations of theory

- The influence that biological processes, such as genetics, brain development, neurotransmitter functions and hormonal changes have on behaviour is barely recognised in social learning theory.
- Social learning theory does not account for all behaviours performed, as there are times when a suitable model is not available, or when there is no model at all. For example, the theory is unable to explain why individuals who have never seen a murder committed firsthand, or shown on television or in a movie, can carry out such acts.

Application of theory to a real-world context

- Teachers can utilise social learning theory in the classroom to shape student behaviours into those that are desirable, allowing for effective teaching and learning to take place. By reinforcing the desired behaviour of students, such as putting up a hand to answer or ask a question, the student being reinforced is the model that fellow students observe and imitate.

STUDY: 'BOBO DOLL' EXPERIMENT (BANDURA, ROSS AND ROSS, 1961)

Aim

To determine whether children who observe an adult behaving aggressively will imitate the aggressive behaviour.

Method

Participants

Thirty-six boys and thirty-six girls aged between three and four years old were selected via convenience sampling from the childcare centre at Stanford University.

Materials

A Bobo doll, craft items, a mallet with peg board, a dart gun, bears, a tea set, a ball, cars, behaviour checklist and a clock.

Design

The independent variable was the exposure of children to aggressive adult models versus non-aggressive adult models. The dependent variable was the observed aggressive behaviour in the children recorded every five seconds for twenty minutes.

Procedure

Stage one

After the children's parents gave consent for their participation, they were randomly allocated into three groups, the aggressive model condition, non-aggressive model condition, and control group. Children in the control group did not partake in the first stage of the experiment thus were not exposed to an adult model. Children from the experimental groups were individually brought into the experimental room, seated at a table and shown a craft activity they could complete. An adult model was taken to the opposite corner of the room with toys, including a Bobo doll and mallet with pegboard for them to play with.

In each of the two experimental groups, half of the children observed a model of the opposite sex and half watched a same-sex model.

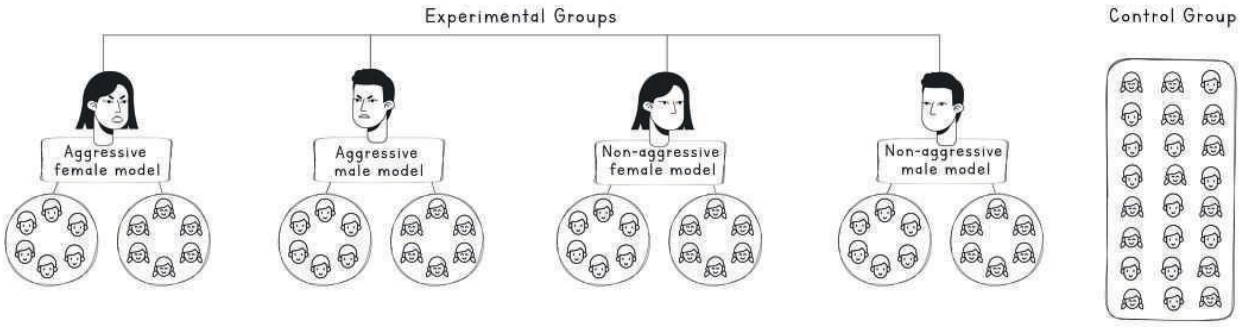

Figure 6.2 Group allocations for the Bobo doll experiment.

Children in the aggressive model condition were exposed to the adult model behaving aggressively towards the Bobo doll. Standardised actions were performed by the adult: sitting on the Bobo doll and punching its nose, hitting it on the head with the mallet, throwing it in the air and kicking it around the room. Between these actions, set statements were spoken including: 'Pow', 'Sock him in the nose', 'He keeps coming back for more' and 'He sure is a tough fella'. Note the two last statements are non-aggressive. The adult model in the non-aggressive condition played with other toys instead of the Bobo doll.

Stage two

After ten minutes of exposure the experimenter took the child to a second room with desirable toys, but soon after the child starts playing, she told them these toys are reserved for other children and that there are toys they can play with in the adjoining room. Frustrating the children instigated aggressive arousal in the children.

Stage three

This third experimental room contained toys including the Bobo doll, a dart gun, a mallet with peg board, a tea set, cars, a ball and bears. The room was set up the same for each child and all the children, including those in the control group, participated in this stage. The experimenter worked quietly in the corner of the room.

Each child was observed for twenty minutes by researchers watching through a one-way mirror and their behaviour was scored against a set of predetermined criteria.

Key findings

- Children who observed an aggressive adult model were more likely to mimic the physical and verbal actions they displayed toward the Bobo doll when in the absence of the model than the children who watched the non-aggressive adult model. These results support Bandura's social learning theory in that children learn the modelled actions of other people via observational mediating processes.
- The boys imitated more physically aggressive behaviour than the girls, however there was a similar level of imitative verbal aggression between the boys and girls.
- A higher rate of imitated aggressive behaviour was observed in the children who were exposed to the same-sex model than the children exposed to the adult model of the opposite sex.

Contribution of the study to psychology

- Home television sets became popular in the 1950s and 60s and Bandura's Bobo doll study provided a framework from which research grew into the effect violence shown on television had on aggressive behaviours in children.
- Previous studies demonstrated children imitated behaviour displayed by adult models when in the presence of the adult models. This study was unique as it showed that observational learning occurs in situations differing from that in which the model was initially observed, and even in settings that do not feature the observed model.

Criticisms and limitations of the study

- The study was performed in a laboratory setting and was not typical of a real-world situation, thus it is argued that it has low validity (specifically low **external validity**).
- Children in the aggressive model condition may have experienced a degree of psychological distress if they had not been exposed to aggressive behaviour previously.

APPLICATION AND EVALUATION OF LEARNING THEORIES IN BEHAVIOUR MODIFICATION

SYSTEMATIC DESENSITISATION AS A TREATMENT FOR PHOBIAS

- Phobias tend to originate from a pairing of stimuli through the process of classical conditioning whereby the conditioned response is fear.
- Systematic desensitisation is a form of therapy that is based on the principles of classical conditioning that aims to extinguish the fear response through graduated contact with the feared stimulus.
- The assumption that feeling fearful and relaxed at the same time is impossible underpins this therapy. Fear of a stimulus can be diminished over multiple exposures while maintaining a relaxed state.

Phobia: intense and irrational fear to an object or situation that continues over time.

Systematic desensitisation: type of therapy that combines relaxation techniques with gradual exposure to overcome a phobia.

Application of systematic desensitisation to treat phobias

- The following steps describe the treatment of phobias via systematic desensitisation.

1. Together the therapist and client develop a 'fear hierarchy' listing scenarios involving the feared stimulus that progress from least distressing to most distressing.
2. The client is taught relaxation techniques, e.g., deep breathing, guided imagery and progressive muscle relaxation.
3. Client is exposed to stimuli that are progressively more threatening. At the same time the client keeps themselves relaxed and calm using their relaxation techniques.

- The client can either imagine the exposures (in vitro) or they can be exposed to the stimulus in real life (in vivo). A mixture of both in vitro and in vivo exposure can also be utilised. Virtual reality exposure may be an option when in vivo exposure is not feasible.
- When the patient can manage the exposure and feel relaxed at the same time, they are able to move to the next level of the hierarchy. If the patient feels anxious or fearful, the session is stopped.

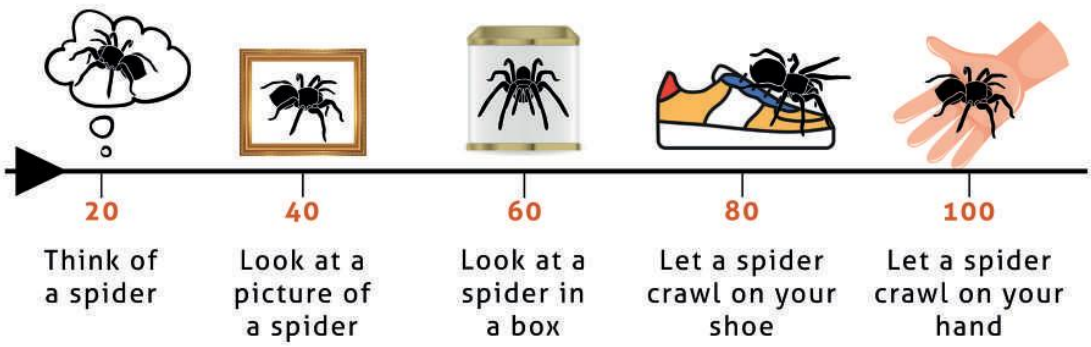

Figure 6.3 An example of a fear hierarchy for a phobia of spiders. The Subjective Units of Distress Scale (SUDS) is often used with a score of 0 representing no anxiety and 100 representing the greatest possible anxiety.

Evaluation of systematic desensitisation

Benefits of using systematic desensitisation to treat phobias	Limitations of using systematic desensitisation to treat phobias
Exposure can include visualising situations involving the feared stimulus through in vitro exposures. This eliminates many practical issues that come with organising and accessing real life exposure scenarios.	Exposures relying on visualisations are not suitable for clients who have difficulty imagining scenarios in their mind.
Continuation of therapy is likely to occur due to the high level of control the client has in their exposures.	The underlying cause of the phobia is not addressed.

TOKEN ECONOMIES

Token economy: behaviour modification technique based on operant conditioning principles whereby a symbolic reinforcer is used to encourage a particular behaviour.

- Token economies, also known as token economy systems, promote desirable behaviours using positive reinforcement.

Secondary reinforcer: the symbolic tokens used to motivate desired behaviour.

Primary reinforcer: the tangible reward.

Application of token economies

- This technique is widely used by caregivers and teachers to reduce discipline issues and promote independent behaviours in children.
- Examples of secondary reinforcers for children: stickers on a reward chart, points and marbles in a jar.
- Examples of primary reinforcers for children: class pizza lunch, movie night and toys.
- The child not only needs to know what the primary reinforcer is, but must also be motivated to receive it. This reward is highly individual for each child as what motivates one child may not seem desirable to another.
- Token economies are also often used in closed institutional settings. It may be used for patients with schizophrenia in psychiatric facilities to encourage useful behaviours that are typically challenging due to social withdrawal and lack of motivation. Prisons also utilise token economies where desirable privileges are offered as primary reinforcers.

Evaluation of token economies

Benefits of using token economies to modify behaviour	Limitations of using token economies to modify behaviour
It is a versatile behaviour modification technique as it can be customised to suit the varying needs of individuals. Once the desired behaviour is identified, the reward and tokens are selected, depending on what motivates the individual.	The reinforced behaviour is extrinsically motivated as the individual is performing the behaviour to receive the tokens and rewards. Once the token economy ceases, the desired behaviour may no longer be carried out.
The transparency of the process is beneficial for both participants and administrators who can easily track progress and determine when secondary and primary reinforcers are given.	It is possible for people participating in a token economy to lose motivation to continue the desired behaviour due to satiation of both secondary and primary reinforcers. This is because the technique is overly reliant on extrinsically motivated behaviour.

Question 1

(a) Name the psychological term given to the person who serves as an example or is being observed. (1 mark)

Four-year-old Chelsea is watching another girl, similar in age, push a young boy off the swing set and get on the swing herself. According to Bandura, there are five factors required for observational learning to occur.

(b) Identify each factor and relate each factor to the scenario. (10 marks)

One:

Two:

Three:

Four:

Five:

Question 2

(a) Explain how the token economy program is a form of operant conditioning. (3 marks)

(b) (i) Once token economy programs end, the behavioural changes achieved through taking part in them may vanish. What does this suggest about token economies being used as a treatment for schizophrenia? (2 marks)

(ii) There are ethical issues that arise when token economies are used to manage schizophrenia. Explain **one** potential ethical issue. (2 marks)

(c) (i) Outline and explain **one** limitation of using token economies in the prison setting. (2 marks)

(ii) In addition to providing the inmates with physical tokens, it is recommended that an independent record be kept, to keep track of the number of tokens each individual has earned. Suggest a reason for the recommendation. (1 mark)

(iii) Suggest **one** reason why the removal of tokens due to undesired behaviour is not recommended in prison-run token economies. (1 mark)

7 SOURCES OF MOTIVATION AND SELF-DETERMINATION THEORY

Key teaching points	Learn	Revise	Demonstrate
Motivation and wellbeing			
• Sources of motivation – physiological, cognitions, emotions, social			
• Self-determination theory – Deci and Ryan (1985)			
○ Amotivation, extrinsic and intrinsic motivation			
○ Psychological needs for motivation – autonomy, competence, relatedness			

SOURCES OF MOTIVATION

Motivation: the conscious or unconscious drive leading the behaviours that individuals initiate, direct, and maintain.

Motive: the desires behind goal-directed behaviour.

- There are physiological, cognitive, emotional and social forces that drive human behaviour.

Physiological

- This source of motivation is necessary for survival and they motivate most human behaviour.
- E.g., thirst, hunger and the need for sleep.

Cognitions

- Motivation derived from cognitions include intellectual challenges, due to the intrinsic satisfaction they produce, and the drive to satisfy curiosity and explore personal interests.
- E.g., the personal values an individual holds, their goals in life, and their expectations.

Emotional

- Emotional motivation can stem from trying to avoid pain and from seeking happiness.
- E.g., emotions that guide motivation include fear, anger and happiness.

Social

- Humans have the need to be with other people, this is what drives humans to develop social relationships and belong to groups.
- E.g., peer pressure, conforming to societal norms and receiving approval from others.

SELF-DETERMINATION THEORY – DECI AND RYAN (1985)

- Psychologists Edward Deci and Richard Ryan were instrumental in the overturning of the belief that humans perform behaviour for the sole purpose of being rewarded. Their theory outlined the concepts of amotivation, intrinsic motivation and extrinsic motivation as well as three psychological needs for motivation.
- According to their theory, self-determination is critical in the development and use of extrinsic and intrinsic motivation.

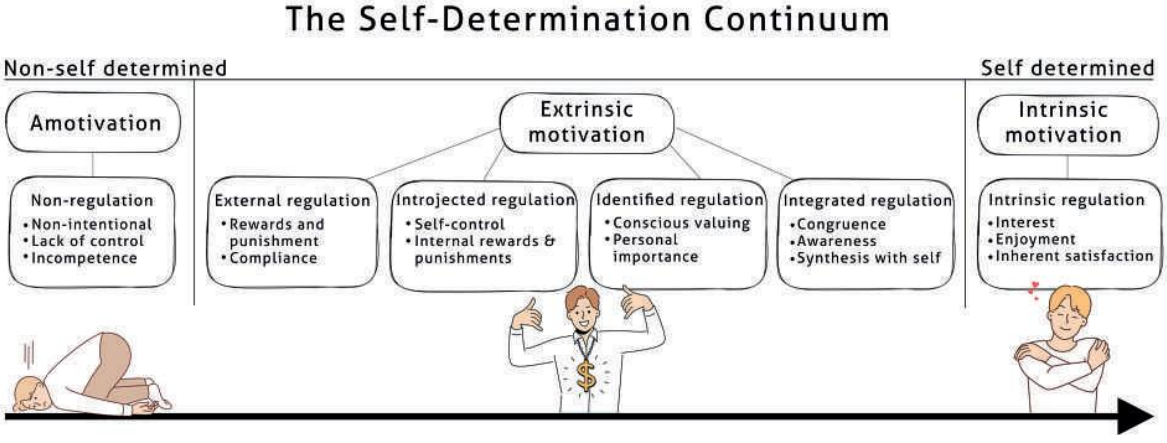

Figure 7.1 Adapted from Deci, E. L., & Ryan, R. M. (1985), *Intrinsic Motivation and Self-Determination in Human Behavior.*

Amotivation: the lack of intrinsic or extrinsic motivation.

- People become amotivated toward a behaviour when the environment does not allow for the behaviour to be carried out competently.

Extrinsic motivation: motivation that stems from a desire for external rewards.

- E.g., respect from other people, social recognition, money, awards or recognition.
- This motivation is a means to an end.

Intrinsic motivation: motivation driven by an inner desire for self-satisfaction arising from achieving a specific goal.

- E.g., self-gratification.
- This motivation is an end in itself.

PSYCHOLOGICAL NEEDS FOR MOTIVATION

- Deci and Ryan recognised that it is crucial for individuals to satisfy their needs to feel autonomous, competent and able to relate with others.

Autonomy

- Autonomy is the need for people to feel in control of their own actions.
- Satisfying this need improves well-being and leads to increased motivation.

Competence

- The desire to feel capable of mastering new skills and experiencing a sense of achievement.
- Satisfying the need for competence increases the likelihood an individual will feel satisfaction from overcoming obstacles and engaging in their pursuits.

Relatedness

- People have a longing to form social connections and be part of positive relationships with others.
- Fulfilling this need contributes to overall well-being.

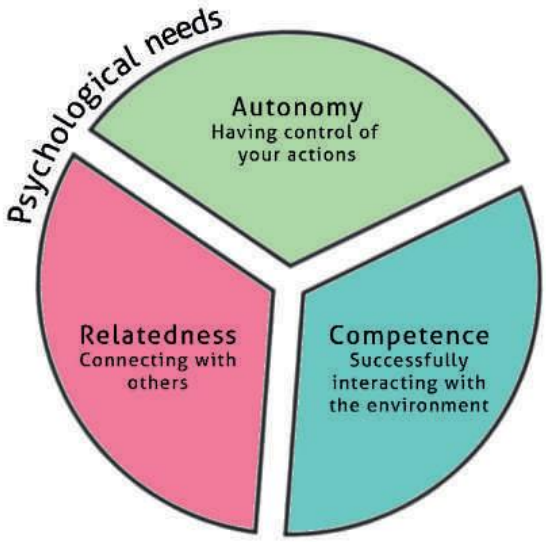

Figure 7.2 The three psychological needs for motivation.

Strengths of theory

- The theory is widely applicable across different cultures and contexts as the three fundamental psychological needs: autonomy, competence and relatedness, are viewed as being universal.
- Intrinsic motivation is the crucial aspect of the self-determination theory supporting the tendency for people to participate in activities that they find personally enjoyable and satisfying, as opposed to engaging in them to receive extrinsic rewards.

Limitations of theory

- The strong emphasis on autonomy is argued to minimise the influence that external rewards have on motivation.
- The multiple components within the theory are complex and may limit the ability to not only comprehend the theory but be able to apply it.

Application of theory to a real-world context

It is of the interest of educators to foster an environment for students that allows them to achieve the principles of autonomy, competence and relatedness. Students can be provided with opportunities to make decisions on what and how they will learn, be presented with meaningful and achievable challenges, and encouraged to develop positive relationships with their peers and educators. Upon meeting these three psychological needs, students will be able to experience strengthened self-determination, intrinsic motivation and improved well-being.

Question 1

For each of the scenarios below, identify the main source of motivation (physiological, cognitions, emotional, social) and provide a reason for your choice.

(a) (i) Stephen reluctantly has a few shots of alcohol at a bar, influenced by his friends who encourage excessive alcohol consumption. (2 marks)

(ii) Driven by a fear of inadequacy, Aaliyah dedicates long hours to nightly studies, fuelled by the anxiety of not meeting her academic aspirations. (2 marks)

(iii) Cooper spends a few hours a week learning Spanish via an app on his mobile phone, as he enjoys learning new skills that provides him with a sense of achievement and mastery. (2 marks)

Question 2

Sumaya, an avid art enthusiast, joins a local painting class where she can freely choose her preferred art style, such as abstract or photorealism. Guided by a skilled instructor and receiving positive feedback from fellow art students, Sumaya experiences a growing sense of proficiency in her artistic endeavours.

The collaborative and supportive atmosphere of the class fosters a sense of connection, as Sumaya builds relationships with like-minded individuals who share her passion for art.

Deci and Ryan theorised individuals are motivated by three psychological needs. Define each need and describe how each need is met by Sumaya. (6 marks)

Relatedness: _____

_____

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Autonomy: _____

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Competence: _____

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8

MASLOW'S HIERARCHY OF NEEDS

Key teaching points	Learn	Revise	Demonstrate
Motivation and wellbeing			
• Hierarchy of needs – Maslow (1954, 1970)			
○ Levels of motivation based on deficiency and growth needs (1954)			
• Deficiency needs – physiological, safety, love and belongingness, esteem			
• Growth needs – self-actualisation			
○ Expanded hierarchy of needs (1970) – cognitive, aesthetic and transcendence needs			
○ Concept of self-actualisation			

HIERARCHY OF NEEDS – MASLOW (1954, 1970)

- Abraham Maslow analysed the personality structures of sixty historical figures and personal friends that he felt had attained self-actualisation. Commonalities among the sample were discovered, specifically, fifteen personality characteristics. It was from these characteristics that Maslow proposed the hierarchy of needs and claimed they are required for self-growth to be achieved.

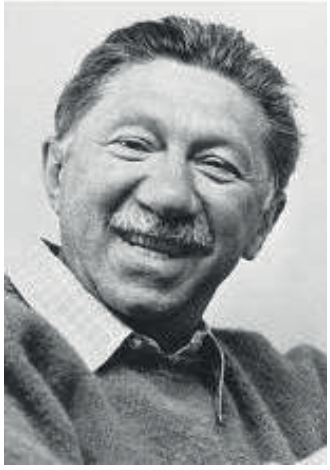

Figure 8.1 Abraham Maslow

- These needs are grouped into levels within a hierarchy, however the pyramid shape commonly illustrated was never described by Maslow. Moving up the hierarchy, the needs change from basic physiological needs to those that are psychological and help shape personality.
- Maslow described lower needs on the hierarchy as needing to be met, even if only partially, before needs higher in the hierarchy can be satisfied.
- The order of needs may vary amongst individuals and people can be motivated by more than one need simultaneously.
- There is continual movement up and down the hierarchy as partially or fully satisfied needs may become threatened and require attention. E.g., political unrest in a country could threaten safety and even physiological needs.

CONCEPT OF SELF-ACTUALISATION

Self-actualisation: the ultimate state of being that all individuals are striving to attain.

- Malsow explained how people strive to reach their full potential and continually seek personal growth – a state of being he termed 'self-actualisation'.

LEVELS OF MOTIVATION BASED ON DEFICIENCY AND GROWTH NEEDS (1954)

- There are two main types of motivations experienced by humans: deficiency needs and growth needs.

Deficiency needs: basic needs people are motivated to fulfil due to their absence.

- They are important for survival and stop acting as a motivator once they have been met. E.g., if we have insufficient food and we are hungry then food is a physiological need we are motivated to obtain.
- Once we have eaten and are no longer hungry then food ceases to be a motivator. Motivation decreases as each deficiency need is met.

Growth needs: needs that once met, act as the motivation for people to continue fulfilling them.

- Growth needs develop the personality of an individual and are unique to each person.
- Satisfying growth needs leads to happiness and fulfillment and in turn acts as the motivation to continue achieving them. Motivation increases as each growth need is met.
- In the 1954 hierarchy, level one to four are deficiency needs with level five, self-actualisation, being described as a growth need. The levels in his original 1954 hierarchy are as follows:

  Level one – physiological needs

  Level two – safety needs

  Level three – love and belongingness needs

  Level four – esteem needs

  Level five – self-actualisation

EXPANDED HIERARCHY OF NEEDS (1970)

- Continued research and reflection after his original theory led Maslow to expand his hierarchy of needs to include three additional growth needs: cognitive needs, aesthetic needs and the highest level, transcendence needs.

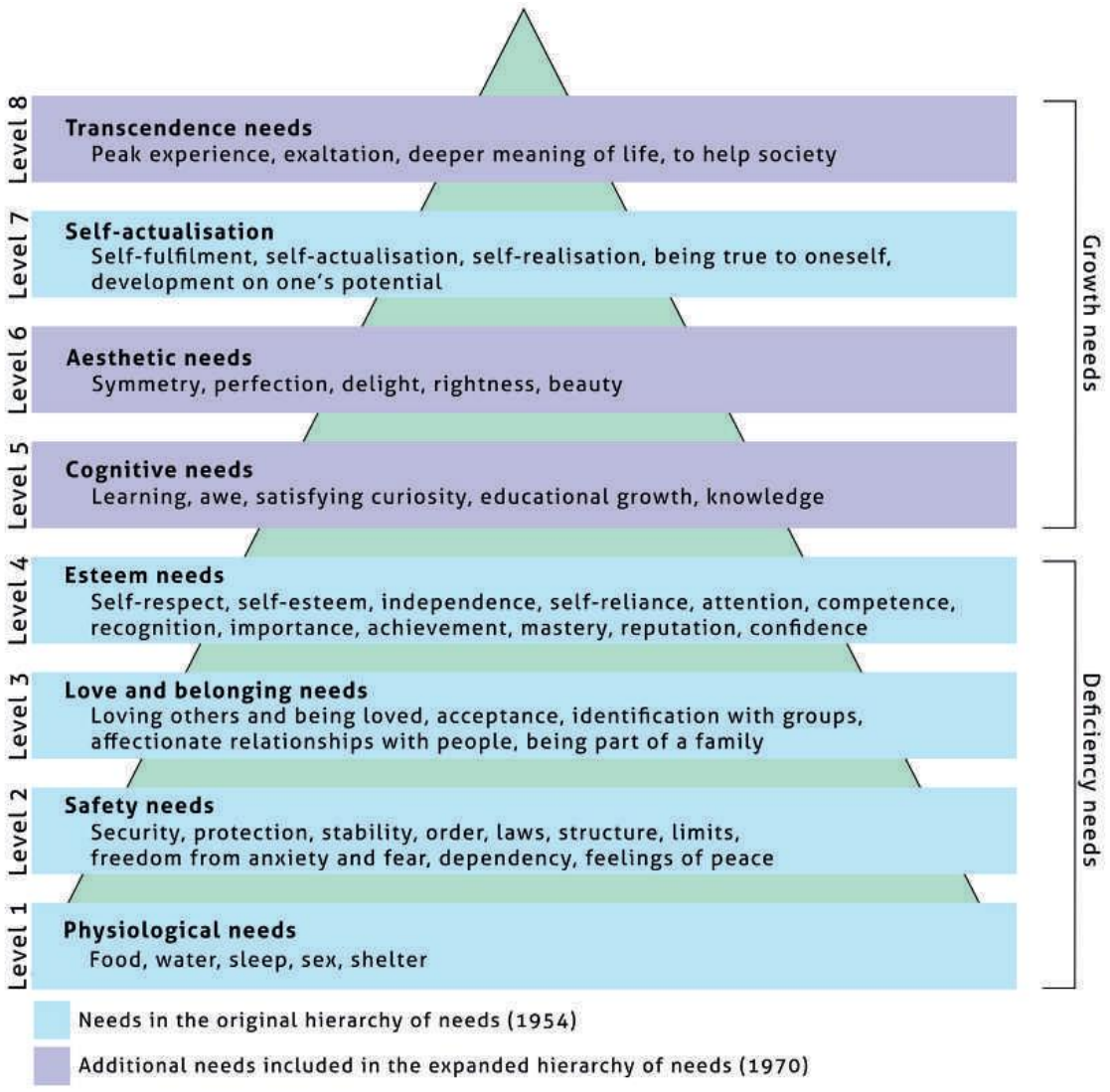

Figure 8.2 Maslow added three more growth needs (in purple) to the hierarchy. Notice how self-actualisation was level five in the original hierarchy and moved up to level seven in the updated version.

Deficiency needs

Level one: physiological needs

- These needs are basic biological requirements that provide individuals with energy, physical contentment and health.
- Most physiological needs, such as water and food are deficiency needs because once they are satisfied, there is no longer a desire to continue them. E.g., once you have eaten you are no longer hungry so are not motivated to eat anymore.

Level two: safety needs

- Safety needs involve physical safety and emotional safety. Emotional safety provides security allowing individuals to display their authentic self with others.

  Physical safety – including stability, order and limits.

  Emotional safety – feeling free from chaos, threats and fear.
- When safety needs have not been met, individuals may experience anxiety and a lack of confidence in their environment.

Level three: love and belongingness needs

- Love and belongingness needs incorporate the ways in which people receive love from others as well as give love.

  Receiving love – deeming oneself worthy of being loved, feeling accepted and loved by others, and having a place in a family or a group.

  Giving love – having feelings of love and affection toward others.
- The lack of connection with others can result in feelings of isolation and loneliness.

Level four: esteem needs

- Esteem needs can be broken into two categories; those that are based on the need for people to view themselves as capable and achieving, and those that come from the judgement of others.

  Self-esteem – there is a desire for achievement, to feel confident when faced with challenges and to experience freedom and independence.

  Respect from others – receiving recognition, attention and appreciation from other people is sought out by individuals.
- While people who satisfy this level feel they have a purpose in the world and feel self-confident, those who do not fulfill their esteem needs tend to feel weak, helpless and inferior.

Growth needs

Level five: cognitive needs

Cognition: the mental process of gaining knowledge and understanding through the senses, personal experiences and mental activity.

- There is a desire to gain knowledge through curiosity and a goal to understand. Understanding refers to the need for the theological, philosophical and a set of beliefs that one can use to help make decisions.

Level six: aesthetic needs

Aesthetic: beauty as well as the appreciation of anything beautiful.

- Meeting aesthetic needs contributes to well-being and a sense of fulfillment. These include a sense of symmetry, rightness, delight and perfection.
- Some individuals experience a unique form of discomfort when exposed to ugliness and actively yearn for beauty, finding solace in aesthetically pleasing environments.

Figure 8.3 For many people witnessing a beautiful sunrise, such as this one in South Fremantle, is a way to meet their aesthetic needs.

Level seven: self-actualisation

- Each person has their own distinct way in which they can experience feelings of self-realisation, self-fulfillment, self-actualisation and further development via the use of their own abilities. Satisfying these needs results in feelings of positive well-being and the sense that one is maturing, growing and becoming increasingly autonomous.
- Feeling restless and discontentment are consequences for individuals who fail to act in ways that allow them to be true to their unique nature and potential.
- While Maslow describes self-actualisation as the ultimate state of being people are motivated to reach, very few people satisfy this need. There are times throughout life, however, when individuals dip in and out of this level - through peak, or transcendence experiences. E.g., the birth of a child for a woman who believes her ultimate purpose in life is to become a mother.

Level eight: transcendence needs

Transcendence: the experience of going beyond the limitations of physical human experience.

- Transcendent experiences, also known as peak experiences, are used to describe religious, supernatural, mystical and transcendent encounters.
- People who have had a peak experience and recognised these encounters and are called peakers. Those who have not described having transcendent experiences are termed non-peakers. Not everyone experiences peak experiences, and many that have suppress or deny having them for fear of being viewed as mentally unstable.
- Transcendence needs can be met by using transcendent experiences for personal growth and fulfillment. Those who strive to feel transcendent experiences feel that their lives have deeper meaning because they are seeking to encounter something they do not have. They are more accepting, loving, and honest. This deeper meaning involves contributing to humanity rather than focusing on the self.

Figure 8.4 A spiritual encounter in a cathedral in Rome is an example of a peak-experience meeting the need for transcendence.

- Non-peakers are unable to make use of transcendent experiences for personal advancement and feel that life is meaningless because they have nothing to strive for.

Strengths of theory

- Maslow's hierarchy of needs focused on healthy human psychological development which was uncommon at the time.
- The humanistic concept that individuals have the capacity to undergo personal growth is supported by a meta-analysis conducted by Alexander and colleagues in 1991. Results from 42 studies revealed that transcendental meditation, a variant of yoga, was associated with significant progress toward self-actualisation in participants.

Limitations of theory

- The sample of participants Maslow interviewed was small and purposefully selected to be made up of those he believed to have self-actualised. No objective measures were used to gather his information, only subjective measures.
- The hierarchical categorisation of needs oversimplifies complex human behaviour and may not be the most suitable structure for describing Maslow's theory. While Maslow never described a pyramid shape for his hierarchy, this assumption has been made by many and fuels the idea of neatly compartmentalised needs that are independent from each other.

Application of theory to a real-world context

- Maslow's hierarchy of needs forms the bedrock of educational programs across the world. Providing an environment within which students can learn requires a whole school approach starting from the bottom of the hierarchy and working their way up to level four– esteem needs. Students who are hungry, thirsty or tired are unlikely to be in the right mindset to develop positive relationships with peers and educators, let alone successfully access taught content. School administration can help education and accomplishment become the priority of students by doing what they can to help them meet physiological, safety, and love and belongingness needs.

Question 1

(a) Name and describe the **three** additional levels Maslow added to his expanded 1970 hierarchy of needs. (6 marks)

One: _____

_____

_____

Two: _____

_____

_____

Three: _____

_____

_____

Gabe is on the way to mastering a fourth language and is completing a doctorate at university while working part time. His wife recently sustained an injury and is unable to work. Gabe needs to decide whether he will continue his educational endeavours and his part time job, or if he should pause his studies and take on a second job to keep up with mortgage repayments on their house.

(b) Use your understanding of deficiency and growth needs to speculate what Gabe will place more importance on in his current situation and provide your reasoning. (4 marks)

_____

_____

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_____

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_____

(c) Kirra has moved to Perth after growing up in Kununurra. She has moved into a student hostel close to a large high school. She has main meals provided for her in the hostel and is able to prepare her own food in the shared kitchen. There are set times to do homework and curfews set. She has made friends with the other girl sharing her room and her house mother is helping her to settle in.

Complete the table below by naming the first three levels of Maslow's hierarchy of needs and including **one** piece of evidence demonstrating that Kirra has satisfied each level. (6 marks)

Level of hierarchy	Name of level	One piece of evidence that level has been satisfied
First level		
Second level		
Third level		

9

MODELS OF WELLBEING

Key teaching points	Learn	Revise	Demonstrate
Motivation and wellbeing			
• Models of wellbeing			
○ Subjective wellbeing – model of subjective wellbeing – Diener (1984)			
• Key components – life satisfaction, affective balance			
○ Psychological wellbeing – six factor model of wellbeing – Ryff (1989)			
• Autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, self-acceptance			

MODELS OF WELLBEING

SUBJECTIVE WELLBEING – MODEL OF SUBJECTIVE WELLBEING – DIENER (1984)

Subjective wellbeing: the mixture of negative and positive measures and overall emotional and cognitive assessment of life that is personal to the individual.

- Subjective wellbeing is based on the personal experience of an individual therefore is 'subjective' for each person.
- According to Diener, there are three main components that make up the concept of subjective well-being. Life satisfaction is the cognitive component involving the judgements a person makes, and the affective balance, being the emotional component – made up of positive and negative affect.
- Diener explained that the absence of negative affect is not the same as the presence of positive affect – as described by many measures of mental health. Subjective wellbeing includes positive measures.
- Objective measures of wellbeing including financial wealth, comfort and health influence subjective wellbeing, however, are not included in the definition of subjective wellbeing.

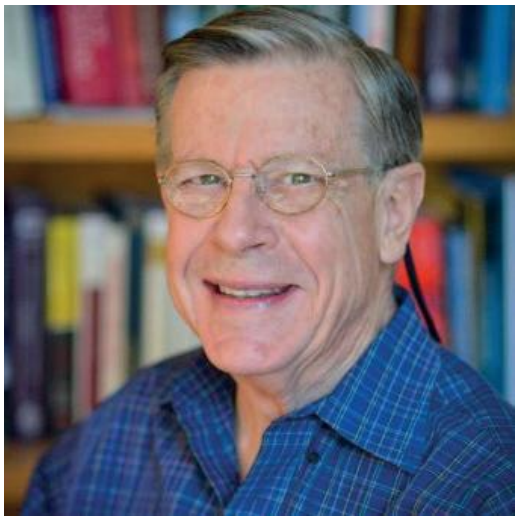


Figure 9.1 Psychologist Ed Diener

Life satisfaction

- Life satisfaction refers to the overall assessment a person makes of their life and their own life experiences.
- These global judgements of one's life make up the 'cognitive' measure of wellbeing.

Affective balance

Affect: the experience and outward expression of emotions.

- The moods and emotions individuals experience make up the 'emotional' measure of wellbeing.

Positive affect: pleasant emotions such as happiness, excitement, joy and contentment.

Negative affect: distressing emotions such as anger and sadness.

- People undergo both positive and negative affect and attempt to enhance their lives by reducing negative affect and increasing positive affect.
- A global judgement of happiness is continually assessed by people comparing their negative affect with their positive affect and this overall equilibrium between the two affects is called the hedonic balance.

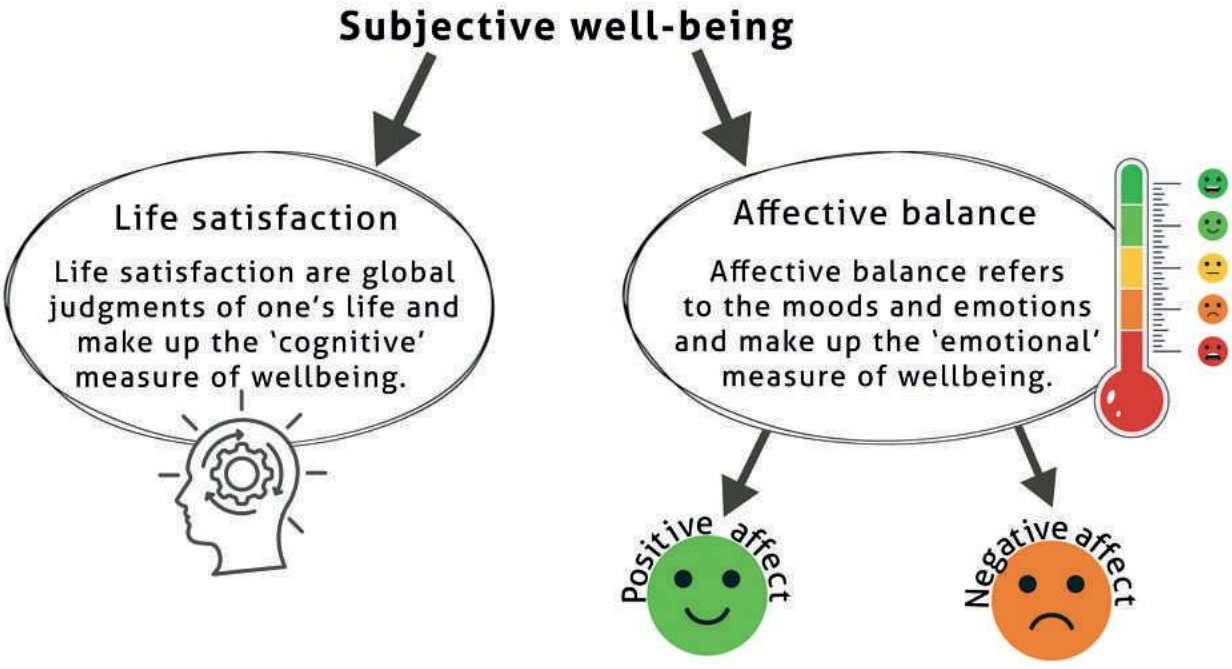


Figure 9.2 According to Diener, everyone evaluates their own life against a cognitive measure of wellbeing – life satisfaction, and an emotional measure of wellbeing – affective balance.

Strengths of theory

- The theory is applicable across multiple cultural contexts as its main components, life satisfaction and affective balance, can be applied to different cultures. This notion is known as cultural universality. The ease of which the theory can be modified to suit different cultures is also advantageous.
- Diener's model of wellbeing is a comprehensive and holistic approach to wellbeing due to the three components it entails: life satisfaction, positive affect and negative affect.

Limitations of theory

- This model of wellbeing mainly focuses on the emotions and personal experiences of the individual. External factors also affect wellbeing, yet these are not considered in this model. Examples of external factors include social relationships, finances, work conditions and cultural influences.
- Self-report measures act as the basis for the model and these measures specifically assess explicit attitudes. Explicit attitudes are conscious judgements held toward an attitude object and tend to be less accurate representations of true attitudes (compared to implicit attitudes which are unconscious judgements) as their holder may exaggerate responses to seem socially desirable.

Application of theory to a real-world context

- The effectiveness of public health initiatives and policies can be guided and assessed using subjective well-being measures. Administering subjective well-being surveys (such as the Satisfaction with Life Scale) provides policy makers with data that can be used to compare the wellbeing of targeted populations before and after initiatives have been put in place. Gathering data in this way utilises a longitudinal study design.

PSYCHOLOGICAL WELLBEING – SIX FACTOR MODEL OF WELLBEING – RYFF (1989)

- Ryff evaluated aspects of positive psychological functioning within numerous theories of maturity, self-actualisation (Maslow), life-span development, positive mental health, individuation and the fully functioning person. She identified the overlapping concepts across the theories, and these developed into the six factors of wellbeing.
- Not satisfied with providing only a theoretical and somewhat philosophical underpinning of wellbeing, Ryff designed the Psychological Wellbeing Scale (PWB) based on her theory of psychological wellbeing. She wrote definitions for high and low dimensions for each of the six factors, with higher scores on each scale indicating greater wellbeing for that factor.
- While there are variations of the scale in terms of number of statements (also known as 'items'), they are all applicable to a range of demographics and ages.

Figure 9.3 American psychologist Carol Ryff.

	Description	Dimensions
Autonomy	Autonomy refers to individuals seeking personal evaluation not from others but from within themselves using their own standards.	↑ High autonomy Is independent and able to make their own choices based on their self-accepted moral principles, rather than feeling pressured to conform to social norms ↓ Low autonomy Is highly concerned by what society thinks of them so is easily pressured to conform to social norms and makes decisions based on the opinion of others
Environmental mastery	Rather than accepting things for how they are, especially when they are not desirable, environmental mastery involves manipulating the surroundings to best suit personal needs.	↑ High environmental mastery Feels confident in manipulating their environment, manages complicated tasks, and makes the most of situations they find themselves in ↓ Low environmental mastery Feels unable to manipulate their surroundings, finds complex tasks overwhelming, and feels little control over their external environment
Personal growth	Utilising past and present experiences allows one to continually develop as a person.	↑ Strong personal growth Has a sense of continual development and self-improvement, welcomes new experiences and reflects upon them to increase knowledge ↓ Weak personal growth Feels a sense of stagnation due to a lack of personal improvement, is unmotivated to try to better themselves, finds life boring, and feels unable to shift this mindset
Positive relations with others	Individuals who self-actualise find importance in forming genuine relationships with other people and also in guiding the younger generation (generativity). Such individuals believe in the significance of forming empathetic connections with others.	↑ Strong positive relations Understands relationships involve a balance of give and take, is empathetic, affectionate and caring, and can participate in trusting relationships ↓ Weak positive relations Is unwilling to make compromises in relationships, has difficulties caring for others and forming intimate and trusting human connections
Purpose in life	Meaning in life evolves over time and requires the individual to continually re-evaluate its intentionality and direction.	↑ Strong purpose in life Believes that past and present life is meaningful, sets life goals to follow and has a sense of direction ↓ Weak purpose in life Feels life lacks purpose so does not reflect on past or present experiences or set personal goals
Self-acceptance	**Self-acceptance:** an individual's acknowledgment of their personal strengths, weaknesses and past decisions and behaviours.	↑ High self-acceptance Is accepting of good and bad personal characteristics, has high self-esteem, and has a positive view of the life they have lived ↓ Low self-acceptance Is concerned by certain parts of their character, has low self-esteem, and is disappointed in their past life

Strengths of theory

- Previous research on wellbeing, including Diener's subjective wellbeing model, lacked specific detail on psychological wellbeing and instead focused solely on life satisfaction and affect. The six-factor model proposed by Ryff encompasses multiple dimensions of wellbeing including self-acceptance, the recognition of personal abilities, and the capacity for personal growth.
- Not only is the model theory-based, but it is also supported empirically via the PWB. The PWB has been found to have high reliability and validity, thus is a credible assessment tool. At the time that Ryff developed her model, current theories were unable to be tested.

Empirical evidence: evidence that uses observations rather than being based on theories and hypotheses (theoretical).

Limitations of theory

- Additional factors that influence wellbeing are not accounted for in detail in the model, such as social and economic factors.
- There is a strong emphasis on positive aspects of wellbeing and minimal consideration for negative affect and the ways in which people are able to cope with adversity and hardship.

Application of theory to a real-world context

- The Psychological Wellbeing Scale (PWB) developed by Ryff has been used to explore ways in which the quality of sleep impacts psychological wellbeing. Research has shown that people with optimal sleep indicated higher levels of personal growth, purpose in life, environmental mastery, self-acceptance and positive relations with others. These results demonstrate the relationship between sleep quality and the management of stress and self-regulation.

Psychological Wellbeing Scale (PWB)

Instructions

Below are eighteen statements that you may agree or disagree with. Indicate your agreement with each statement by circling the appropriate number alongside the statement. Please be open and honest in your responding. This is the short version and is designed for adults.

	Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Disagree	Strongly disagree
1. I like most parts of my personality.	1	2	3	4	5	6	7
2. When I look at the story of my life, I am pleased with how things have turned out so far.	1	2	3	4	5	6	7
3. Some people wander aimlessly through life, but I am not one of them.	1	2	3	4	5	6	7
4. The demands of everyday life often get me down.	1	2	3	4	5	6	7
5. In many ways I feel disappointed about my achievements in life.	1	2	3	4	5	6	7
6. Maintaining close relationships have been difficult and frustrating for me.	1	2	3	4	5	6	7
7. I live life one day at a time and don't really think about the future.	1	2	3	4	5	6	7
8. In general, I feel I am in charge of the situation in which I live.	1	2	3	4	5	6	7
9. I am good at managing the responsibilities of daily life.	1	2	3	4	5	6	7
10. I sometimes feel as if I've done all there is to do in life.	1	2	3	4	5	6	7
11. For me, life has been a continuous process of learning, changing and growth.	1	2	3	4	5	6	7
12. I think it is important to have new experiences that challenge how I think about myself and the world.	1	2	3	4	5	6	7
13. People would describe me as a giving person, willing to share my time with others.	1	2	3	4	5	6	7
14. I gave up trying to make big improvements or changes in my life a long time ago.	1	2	3	4	5	6	7
15. I tend to be influenced by people with strong opinions.	1	2	3	4	5	6	7
16. I have not experienced many warm and trusting relationships with others.	1	2	3	4	5	6	7
17. I have confidence in my own opinions, even if they are different from the way most other people think.	1	2	3	4	5	6	7
18. I judge myself by what I think is important, not by the values of what others think is important.	1	2	3	4	5	6	7

Scoring

1. Reverse score the following items: Q1, Q2, Q3, Q8, Q9, Q11, Q12, Q13, Q17, and Q18.

These items are worded in the opposite direction of what the scale is measuring.

The formula for reverse-scoring an item is: (number of scale points + 1) – respondent's answer.

Each item is a seven-point Likert scale.

E.g., if the respondent answered 2 on an item, re-score the item as 6.

(7 + 1) – 2 = 6

2. Sum the following sets of items to produce subscale totals.

Autonomy: Q15, Q17, Q18 _____

Environmental mastery: Q4, Q8, Q9 _____

Personal growth: Q11, Q12, Q14 _____

Positive relations with others: Q6, Q13, Q16 _____

Purpose in life: Q3, Q7, Q10 _____

Self-acceptance: Q1, Q2, Q5 _____

Higher scores indicate greater levels of wellbeing for each subscale. Descriptions of high and low dimensions are found in the table on page 86.

3. Sum the subscale totals to produce the total score. _____

The total score has a range of 18 to 126, a higher total score indicates greater overall psychological wellbeing.

Question 1

(a) List the **two** key components of subjective wellbeing, according to Diener. (2 marks)

One: _____

Two: _____

(b) Distinguish between the cognitive and affective components of subjective wellbeing. (2 marks)

_____

_____

_____

_____

Question 2

(a) Define the term 'self-acceptance'. (1 mark)

_____

_____

(b) According to Ryff, there are six factors of wellbeing and each can be described as having low and high dimensions. For the following scenarios, identify the factor of wellbeing and the dimension (high, low, strong or weak).

(i) Vivian, a passionate environmental activist, tirelessly works towards sustainable initiatives and inspires positive change in her community. She has a list of accomplishments she wants to make in the next ten years and has them stuck on her fridge where she can be reminded of them. (2 marks)

_____

_____

(ii) Aziah, constantly plagued by self-doubt, is highly critical of his abilities to make meaningful connections with people and finds it difficult to embrace his own strengths and qualities that make him unique. (2 marks)

_____

_____

(iii) Anna is a self-reliant entrepreneur who has managed to make decisions in the business she runs, even though sometimes she felt pressured by other business owners to follow their suggestions. (2 marks)

_____

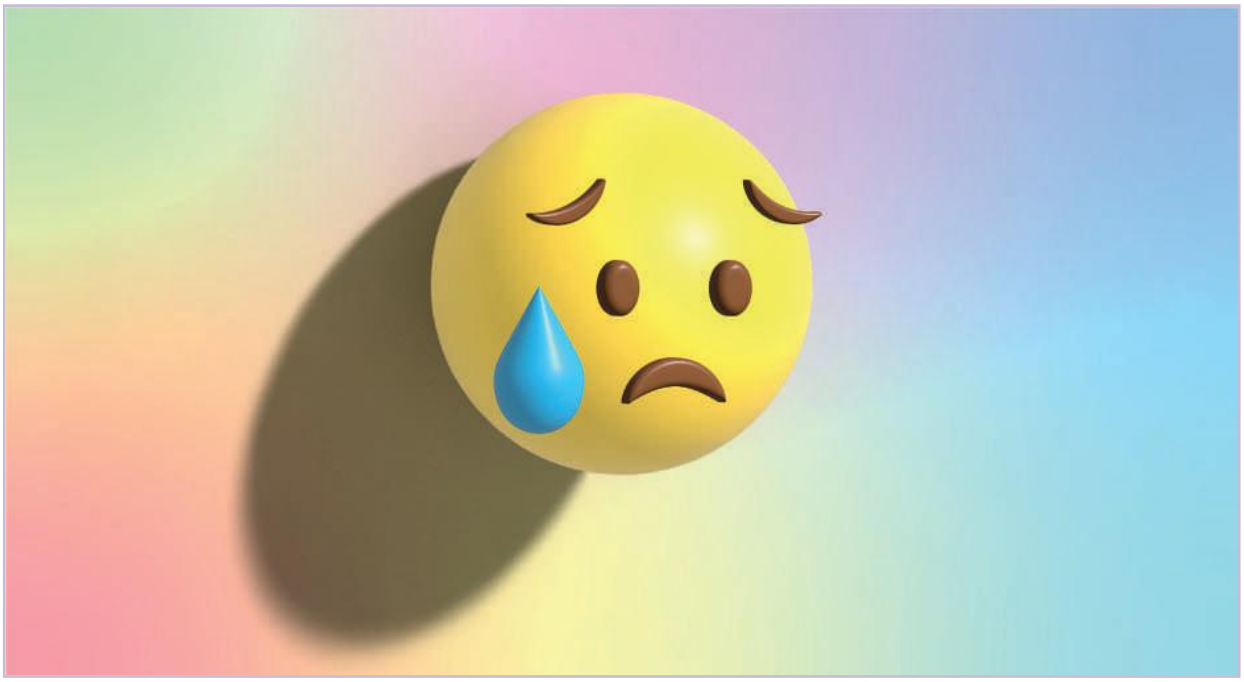
_____

(c) Place ticks in the relevant boxes below to indicate similarities and differences between Diener's model of subjective wellbeing and Ryff's six factor model of wellbeing. (8 marks)

Characteristic	Diener's model of subjective wellbeing	Ryff's six factor model of wellbeing
Emphasis on positive aspects of wellbeing		
Acknowledges that wellbeing is a multi-dimensional concept involving different parts of an individual's life		
Strongly focuses on psychological wellbeing		
Describes wellbeing as subjective in nature		
Emphasis on life satisfaction and affect		
Has three components that make up wellbeing		
External factors, such as social, economic, and cultural influences on wellbeing are not considered		
Has six components that make up wellbeing		

10

STRESS



Key teaching points	Learn	Revise	Demonstrate
Applications of psychology to health			
• Stress as defined by Selye (1936)			
○ Types of stress – distress and eustress (Selye, 1983)			
• Stressors			
○ Types of stressors – environmental, psychological, social, cultural			
○ Characteristics of stressors – nature, duration, strength			
• Models of stress			
○ Stress as a response – General Adaptation Syndrome (GAS) model (Selye, 1936, 1983)			
• Physiological response to stress – heart rate, breathing rate			
• Stages – alarm, resistance, exhaustion			
○ Stress as a stimulus			
• Application of the Social Readjustment Scale (Holmes and Rahe, 1967) to assess the impact of stressors on individual health and wellbeing			
○ Stress as a transaction – Transactional Theory of Stress and Coping (Lazarus and Folkman, 1984)			
• Interaction between individual and environment			
• Role of cognitive appraisal – primary and secondary appraisal			
• Methods of coping – problem-focused, emotion-focused			
• Health related consequences of stress – maladaptive and adaptive coping strategies			

STRESS AS DEFINED BY SELYE (1936)

- Selye defined **stress** as the nonspecific response of the body to any demand.
- These demands can be psychological or physiological.

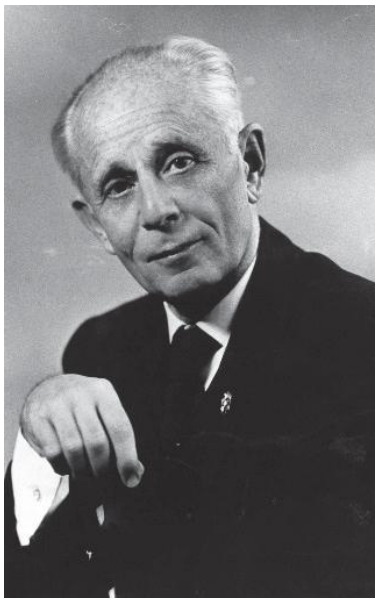


Figure 10.1 Hans Selye

TYPES OF STRESS (SELYE, 1983)

- Selye, along with other researchers, have suggested that not all stress is detrimental to our health and that along with the negative distress, there is also eustress which is a positive stress response.

Distress

Distress: a negative stress response typically accompanied by physiological reactivity and negative emotions.

- Physiological changes triggered by distress can lead to significant health risks, particularly when combined with maladaptive ways of coping.
- Experiences that could potentially trigger distress include the death of a loved one, conflicts with a family member or financial difficulties.

Eustress

Eustress: a positive stress response that motivates and enhances functioning.

- This form of stress is experienced when an individual feels stressed, yet prepared, to complete a task or deal with a situation.
- Graduating from high school, passing your driving test or starting a new job are examples of situations that may trigger eustress.

STRESSORS

Stressors: sources of stress from internal or external factors.

TYPES OF STRESSORS

Environmental stressors

- Environmental stressors arise from the conditions and physical surroundings of an individual.
- E.g., noise, extreme temperatures, pollution, natural disasters such as flooding, or manmade disasters including war.

Psychological stressors

- These stressors are caused by emotional and cognitive factors.
- E.g., buying a house, pressure at work and relationship changes.

Social stressors

- Social stressors stem from relationships and interactions with society.
- E.g., pressure to be accepted by others and conflicts with family and friends.

Cultural stressors

- Stressors that emerge from cultural identity, values and cultural norms.
- E.g., discrimination due to cultural beliefs and practices.

CHARACTERISTICS OF STRESSORS

Nature

- Stressors can be categorised as being environmental, psychological, social or cultural.

Duration

- Stressors can be short-term (acute) or long-term (chronic).

Strength

- The severity or intensity of stressors can range from being mild to severely distressing. The ability to cope with the stressor is affected by its severity.

MODELS OF STRESS

STRESS AS A RESPONSE – GENERAL ADAPTATION SYNDROME (GAS) MODEL (SELYE, 1936, 1983)

- Hans Selye named the set of physical defences that react to harmful physical and psychological stimuli the General Adaptation Syndrome (GAS). His theory was that stress was not simply an environmental stressor, but a set of processes that act as a response.

  Stressor → physiological reactions → **stress as a response (alarm, resistance, exhaustion)**

Physiological response to stress

- Heart rate increases.
- Breathing rate increases.

Stages

- Selye described stress as comprising of three stages.

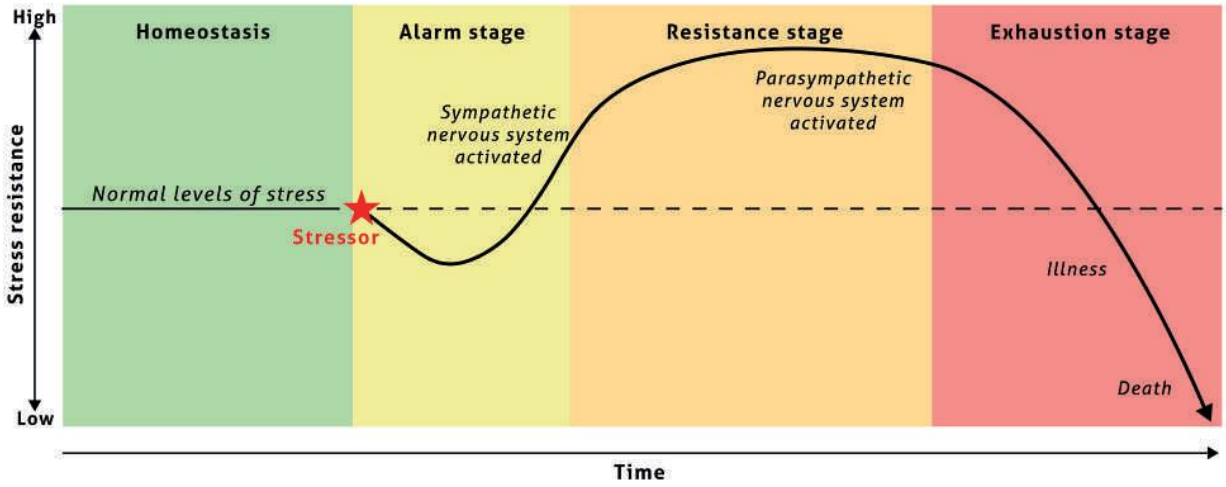


Figure 10.2 The three stages of general adaptation syndrome are depicted in the graph above.

Alarm stage

- The first stage is an initial response to a stressor. A threat is detected by the amygdala in the brain which sends a signal to the hypothalamus to initiate the sympathetic nervous system, and a signal is sent to the adrenal glands via the bloodstream.
- Upon reaching the adrenal glands, the signal stimulates the release of cortisol, adrenaline and noradrenaline, among other stress hormones. This is known as the fight-or-flight response.

Sympathetic nervous system: the branch of the autonomic nervous system that regulates the glands and internal organ function to physically prepare the body for increased activity during heightened physical or emotional arousal.

Hormones: chemical substances secreted into the blood by endocrine glands to stimulate the function of organs.

Cortisol: a steroid hormone secreted from the adrenal glands when the body experiences stress.

- Known as the body's main stress hormone, cortisol enables a continual blood sugar supply, providing energy for the body to deal with stressors.
- Cortisol is beneficial in that it increases pain tolerance, however it also reduces the performance of the immune system and impairs cognitive ability.

Adrenaline: a hormone secreted from the adrenal glands that increases heart rate and supports the conversion of glycogen (a stored form of energy) into glucose in the liver.

Noradrenaline: a hormone secreted from the adrenal glands that causes blood vessels to constrict (become narrower) and blood pressure to increase.

- This first stage occurs 6–48 hours after the initial stressor is detected.

Resistance stage

- The body tries to repair itself from the initial shock by reducing the activity of the sympathetic nervous system and initiating the parasympathetic nervous system which works to reverse the bodily functioning produced by the sympathetic nervous system.
- Adrenaline, noradrenaline and cortisol continue to be secreted.

Parasympathetic nervous system: the branch of the autonomic nervous system that reverses bodily functioning produced by the sympathetic nervous system by calming the body and maintaining an energy level suitable for normal bodily functioning.

- If the stress continues and is not resolved, the third stage is reached.

Exhaustion stage

- If there is a prolonged period of stress, the body's physical and mental reserves deplete, limiting the effectiveness of the adrenal glands, causing a drop in blood-sugar levels, and negatively impacting physical health.
- Immediate effects include fatigue and reduced motivation, while prolonged (chronic) stress can increase the risk of developing depression or anxiety and consequent weakening of the immune system raises chances of developing conditions like heart disease and diabetes.

STRESS AS A STIMULUS

- Holmes and Rahe described stress as a significant change in life that requires a response or adjustment to be made.
- There is an assumption that life changes are stressful events, that individuals will develop a physical or mental illness beyond a general limit of adjustment to the stressful event and that levels of adjustment needed for life changes are similar among people.
- According to this theory personality, life experiences, and social support do not effect the impact of stress nor the response or adjustments made as a result.

Stress as a stimulus → physiological and psychological reactions → alarm, resistance, exhaustion

Application of the Social Readjustment Scale (Holmes and Rahe, 1967) to assess the impact of stressors on individual health and wellbeing

- The Social Readjustment Scale (Holmes and Rahe Stress Scale) assesses the amount of stress that has been experienced in the past year by an individual.
- Comprising a list of forty-three common life events, respondents indicate which of these events they have experienced over the last year. A score of 10 to 100 Life Change Units (LCU) are allocated to each event and the scores are added up to determine a final score.
- The LCU scores estimate the level of response and adjustment required by the individual experiencing them.
- The life events range from minimally stressful to extremely stressful and the likelihood of developing a physical or mental stress-related illness can be calculated.
- E.g., going on a vacation has an allocation of 13 LCU while the death of a close family member is scored at 63 LCU.

Strength of measurement tool	Limitations of measurement tool
• Quantitative data is collected, allowing for results to be statistically analysed.	• Results provided by respondents are based on a subjective measure allowing for exaggerated responses. • Respondents are only able to select which of the life events they have experienced and are not able to include reasoning for their responses. This is a common limitation of collecting quantitative data.

STRESS AS A TRANSACTION – TRANSACTIONAL THEORY OF STRESS AND COPING (LAZARUS AND FOLKMAN, 1984)

- According to Lazarus and Folkman, individuals utilise their perception of a stressful situation and their subjective past experiences to help them cope.
- Stress is not an event but a consequence of the dynamic process where primary and secondary appraisals work to assess the significance of a situation as well as evaluate ways to deal with it.

  Stressor → **stress (individual versus their cognitive appraisal of event)** → response (coping)

Coping: the process by which an individual manages the challenges they perceive as stressful along with the emotions associated with them.

Interactions between individual and environment

- Lazarus and Folkman described how individuals interact with their environment and that stress arises from the continual need to assess their current situation.
- The emphasis is on the relationship between the person, including their unique traits, and the characteristics of the environmental event taken place.

Role of cognitive appraisal

- Individuals make judgements on the environmental event via cognitive appraisal – the cognitive abilities used to assess situations.
- Psychological stress emanates from the relationship between the individual and their cognitive appraisal of the environmental event, and whether or not the person-environment relationship is stressful depends upon this cognitive appraisal.

Primary appraisal

- An initial assessment of the situation is conducted to determine whether the situation is a potential threat, challenge or may cause harm.

Secondary appraisal

- Available resources and coping options are evaluated to see what can be used to manage the situation.
- Occurs **alongside** primary appraisal – Lazarus and Folkman explained that the name 'secondary' does not infer it occurs after primary appraisal.

Methods of coping

Emotion-focused coping

- The goal is to manage emotional reactions to stress.
- Individuals will use emotion-focused coping if they perceive they do not have the resources to effectively respond to, or cope with the stress.
- E.g., meditation and relaxation techniques or booking an appointment to speak with a counsellor.

Problem-focused coping

- Addressing the root cause of the stress is the main focus.
- Problem-focused coping responses are typically utilised by individuals who believe they have the resources to deal with the stress.
- E.g., conducting research to find solutions to the issue or working on a plan to resolve it.

HEALTH RELATED CONSEQUENCES OF STRESS

Maladaptive coping strategies

Maladaptive coping strategies: coping strategies involving harmful and unhealthy stress management that exacerbates its adverse effects.

- These strategies avoid dealing with the stressors that are causing problems.
- E.g., negative self-talk, denial, substance abuse, withdrawing from society, rumination (repetitive thoughts), self-blame and procrastination.

Figure 10.3 Substance abuse is an example of a maladaptive coping strategy for stress

Adaptive coping strategies

Adaptive coping strategies: beneficial and productive methods for managing stress that can decrease the adverse impacts of stress.

- Adaptive strategies face stressors allowing them to be dealt with.
- E.g., meditation, exercise, positive reframing, planning, acceptance, humour and finding emotional support by talking to others.

Question 1

(a) (i) Identify the stage of the GAS model during which the sympathetic nervous system is activated. (1 mark)

_____

(ii) The sympathetic nervous system prepares the body for the fight-or-flight response and in doing so causes the release of hormones, such as cortisol. Name the structure of the body that secretes cortisol. (1 mark)

_____

(iii) List **two** benefits of cortisol secretion during a stressful experience. (2 marks)

One: _____

_____

_____

Two: _____

_____

_____

(iv) List **two** negative effects that cortisol secretion has during a stressful experience. (2 marks)

One: _____

_____

_____

Two: _____

_____

_____

(b) Identify the stage of the GAS model when the body is under control of the parasympathetic nervous system. (1 mark)

_____

Question 2

(a) Name the type of self-report measure used in the Social Readjustment Scale. (1 mark)

_____

Question 3

(a) (i) Project deadlines at work have been causing Marlise a great deal of stress. Suggest **two** adaptive coping strategies that Marlise could use. (2 marks)

One: _____

_____

Two: _____

_____

(ii) List **two** maladaptive coping strategies Marlise may utilise. (2 marks)

One: _____

_____

Two: _____

_____

PURPOSE OF SLEEP AND THE SLEEP-WAKE CYCLE

Key teaching points	Learn	Revise	Demonstrate
Applications of psychology to health			
• Purpose of sleep – evolutionary and restorative			
• Sleep-wake cycle			
○ Four stages of non-rapid eye movement (NREM) and rapid eye movement (REM) sleep			
• Characteristics – sleep state, heart rate, eye movement, muscle tension			
• Length and repetition of the sleep cycle			

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PURPOSE OF SLEEP

EVOLUTIONARY

- According to adaptation theories of sleep, there are two main reasons why humans became motivated to sleep during the night.
- Firstly, early humans used the daytime rather than nighttime to eat, drink and reproduce as there was greater risk of injury in the dark, as well as predators at night that could threaten their survival.
- Secondly, sleeping at night allowed for energy to be conserved.

RESTORATIVE

- Recuperation theories of sleep claim that homeostasis of the body (the ability to balance internal physiological functioning) is disrupted when humans are awake and that sleep acts to restore it.
- Sleeping allows the energy levels that decline during wakefulness to be restored.

SLEEP-WAKE CYCLE

Sleep-wake cycle: the recurring pattern of wakefulness and sleep that individuals undergo on a daily basis.

- The sleep-wake cycle is usually measured by recording the times of regular events like when we eat and go to sleep.
- This cycle is regulated by the circadian rhythm and is regulated by body temperature, metabolic rate and the release of hormones including melatonin.

Circadian rhythm: the bodily cycle that last around 24 hours and controls the nocturnal release of hormones including melatonin.

Melatonin: the hormone that regulates the sleep-wake cycle.

STAGES OF NON-RAPID EYE MOVEMENT (NREM) AND RAPID EYE MOVEMENT (REM) SLEEP

- A night's sleep consists of four to six sleep cycles lasting approximately 90 minutes each, however the sleep cycles alter in length throughout the night as does the time spent within the different stages.
- The sleep cycle is made up of four distinct stages, three non-REM stages and one REM stage.
- REM is an abbreviation for 'rapid eye movement', while NREM stands for 'non-rapid eye movement'.

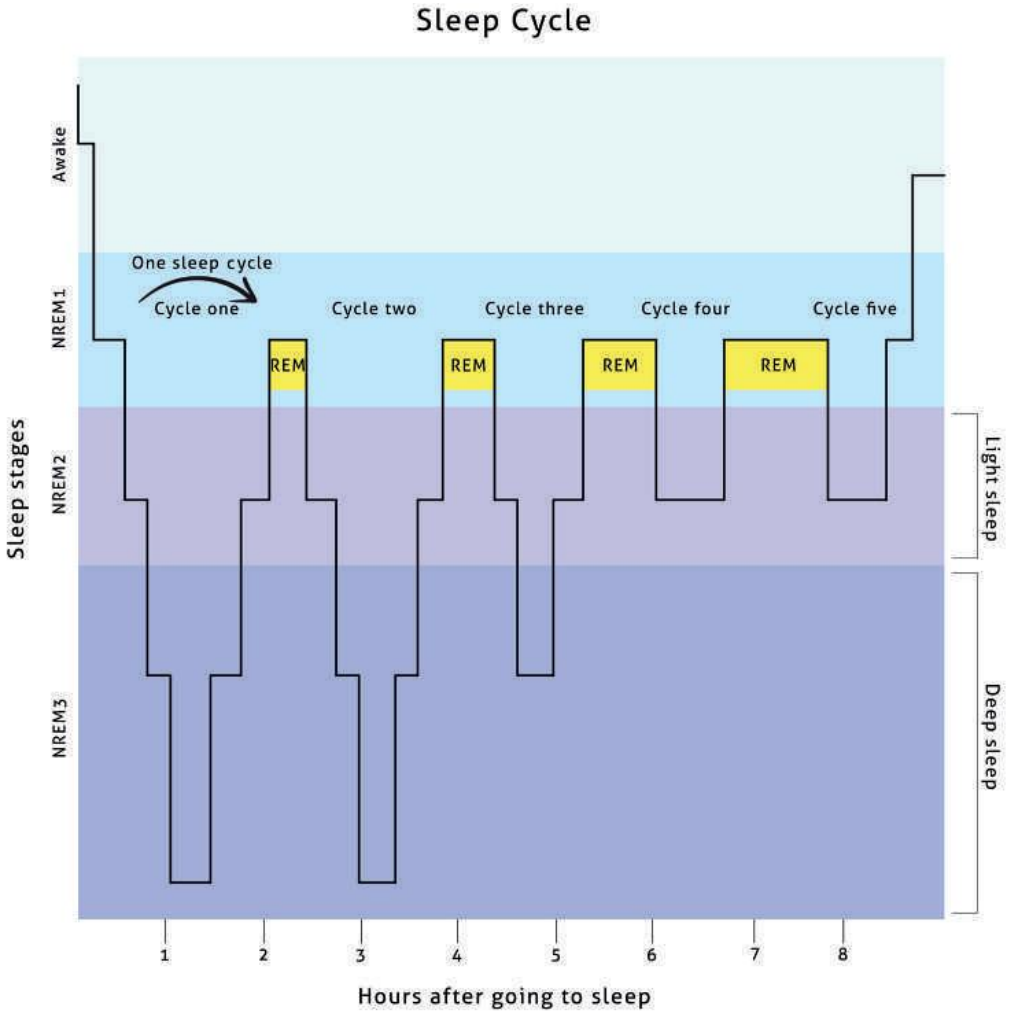


Figure 11.1 The sleep-wake cycle.

Beyond the syllabus

There are several brain structures that play a role in the sleep-wake cycle.

The onset of sleep is controlled by the **hypothalamus** while the **amygdala**, which aids in emotional information processing, and the **hippocampus**, a part of the brain relating to memory, are both active during dreaming. The **thalamus** serves to block sensory signals from reaching the cortex, the **reticular formation**, located along brainstem, regulates the transition between being awake and being asleep and the **pons** helps initiate REM sleep. The movements of extraocular structures (e.g., eyelids and muscles controlling the external movements of the eyes) that occur during REM are due to the activity of the conjugate gaze centre, a collection of cells located in the pons.

Sleep stage	Characteristics	Length of stage
Stage one **NREM 1**	Sleep state Transitional period between wakefulness and sleep Heart rate Decreased heart rate Eye movement Eyes slow rolling movement – once they fall asleep, eyes stop moving Muscle tension Muscles relax	1–7 minutes If uninterrupted, individuals quickly move into NREM 2 and minimal time is spent in this stage.
Stage two **NREM 2**	Sleep state Light non-REM sleep Heart rate Starts to slow down Eye movement Eye movement stops Muscle tension Muscles continue to relax and there are occasional muscle twitches	10–25 minutes The first time this stage occurs in the night it lasts 10–25 minutes, then increases in length with each repetition of the stage.
Stage three **NREM 3**	Sleep state Deep non-REM sleep Heart rate Heart rate continues to decrease Eye movement Minimal eye movement Muscle tension Muscles are at their most relaxed	20–40 minutes Time spent in this stage is 20–40 minutes for the first few sleep cycles and then they reduce in length.
Stage four **REM**	Sleep state Dreams occur during this stage Heart rate Generally increases to match the rate when awake but also varies greatly depending on dream content Eye movement Rapid eye movement, visual information is not transmitted to the brain Muscle tension Muscles are temporarily paralysed (atonia) except for muscles involved in breathing and the muscles of the eye	10–60 minutes Stage increases in duration over the night ranging from a few minutes to one hour.

Question 1

(a) Outline the **two** main purposes of sleep in humans. (2 marks)

One: _____

_____

Two: _____

_____

(b) Describe the way in which the sleep cycle progresses through the stages of sleep. (1 mark)

_____

_____

_____

(c) Comment on the typical number of sleep cycles experienced each night and the length of time each cycle lasts. (2 marks)

_____

_____

_____

_____

(d) Explain why sleepwalking would not be possible during REM sleep. (2 marks)

_____

_____

_____

12 SLEEP DEPRIVATION AND TECHNIQUES TO IMPROVE SLEEP HYGIENE

Key teaching points	Learn	Revise	Demonstrate
Applications of psychology to health			
• Sleep deprivation			
○ Causes of sleep deprivation – shift work, drugs, sleep environment, stressors			
• Partial sleep deprivation – mood, attention, reflex speed, vision			
• Chronic sleep deprivation – heart disease, obesity, insomnia, anxiety			
• Techniques to improve sleep hygiene – management of electronic devices, consistent sleep patterns, creation of a healthy sleep environment			
○ Study: Effect of restricting bedtime mobile phone use on sleep, arousal, mood and working memory (He et al., 2020)			

SLEEP DEPRIVATION

Sleep deprivation: the condition of not getting sufficient sleep.

CAUSES OF SLEEP DEPRIVATION

Shift work

- Humans have hormones, such as melatonin, that help to regulate the sleep-wake cycle so that people are awake during the day and feel tired at night.
- Shift work involves altering the sleep-wake cycle and consequently reduces the quality and amount of sleep.
- People who work night shifts may have trouble sleeping during the day because exposure to light at night and the dark during the day affects the circadian rhythm.

Drugs

- Particular drugs impact sleep stage progression, for example, reducing the amount of NREM, or affecting REM sleep.
- Caffeine is a stimulant drug that increases the activity of the central nervous system and is commonly found in coffee, soft drinks, energy drinks and tea.
- Alcohol is a depressant that can disrupt sleep when it wears off, causing people to wake up. People also wake up when their throat muscles relax and breathing becomes restricted.

Sleep environment

- Being in brightly lit environments at night time may reduce levels of melatonin, thus disrupting sleep-wake cycles.
- Environmental noise, either inside the home or outside the home, can cause people to wake up and decrease the intensity of sleep.

Stressors

- Stressors such as marital or family difficulties, problems at work or school, major illness or death of a loved one can make it more difficult to fall asleep and stay asleep due to feelings of anxiety.
- Additionally, stressors may impact sleep routines and result in less sleep overall.

Sleep latency: the time it takes to fall asleep.

PARTIAL SLEEP DEPRIVATION

- Partial sleep deprivation, also known as acute sleep deprivation, occurs because of a short-term lack of sleep over a 24-hour period or up to a few consecutive nights. There is no exact number of hours of sleep constituting partial sleep deprivation, however less than five hours of sleep within a 24-hour period is a general amount.
- Common causes include staying up late to finish an assignment, illness, pulling an all-nighter, jet lag and stress. The immediate effects of this type of sleep deprivation can typically be reversed with adequate sleep.

Partial (acute) sleep deprivation: the severe reduction or complete lack of sleep over a short period of time.

Effects of partial sleep deprivation

Attention	Lapses in attention increase when sleep deprived.
Mood	Partial sleep deprivation can decrease mood and cause irritability in people.
Reflex speed	Reaction times tends to become higher which means it takes longer to react to stimuli.
Vision	Vision can become blurry, eye twitches (spasms) may occur and eyes may become more sensitive to light.

CHRONIC SLEEP DEPRIVATION

- Chronic sleep deprivation is characterised by inadequate sleep for more than a few weeks at a time, sometimes lasting for years.
- Sleep disorders, such as insomnia, can cause chronic sleep deprivation, as can continual disturbances to sleep or extensive periods of insufficient sleep due to long work hours or lifestyle choices.
- The consequences on overall health are more detrimental than those caused by partial sleep deprivation, with outcomes being more difficult to reverse.

Chronic sleep deprivation: the persistent reduction of sleep over a long period of time.

Effects of chronic sleep deprivation

Heart disease	Increased blood-pressure and high cholesterol levels are common side effects of chronic sleep deprivation, both of which can lead to heart disease.
Obesity	Sleep deprivation can lead to individuals increasing their intake of high energy foods as well as the overall amount of food they eat.
Insomnia	A sleep disorder characterised by difficulties falling asleep or difficulties staying asleep (low sleep latency). It is also common to wake up not feeling well rested.
Anxiety	Emotional regulation is negatively affected by chronic sleep deprivation, and this can exacerbate symptoms of anxiety.

TECHNIQUES TO IMPROVE SLEEP HYGIENE

Sleep hygiene: the behaviour and sleep environment that result in healthy sleep.

MANAGEMENT OF ELECTRONIC DEVICES

- To maintain the sleep-wake cycle, it is a recommended to stop looking at electronic screens at least one hour before bedtime.
- Electronic devices emit blue light which inhibits melatonin production, disrupting the circadian rhythm and making it difficult to fall asleep.
- Brain stimulation results from electronic device use, especially browsing on social media or playing games. The heightened cognitive alertness and arousal increases sleep latency and may reduce sleep duration and overall sleep quality.

CONSISTENT SLEEP PATTERNS

- Having a consistent sleep pattern is a critical aspect of good sleep hygiene as it aids in regulating the circadian rhythm (internal body clock).
- Consistent sleep patterns can increase the amount of sleep and duration of sleep. This can be done by setting a bedtime that allows for the recommended amount of sleep according to the age of the individual.
- Consistent sleep patterns can help to prevent sleep deprivation.

CREATION OF A HEALTHY SLEEP ENVIRONMENT

- Circadian rhythms can change due to an uncomfortable sleeping space.
- It is recommended that the bedroom be kept free of distractions, including electronic devices.
- The bed should be used for sleep or intimacy only, this helps create a cognitive link between the bed and sleep.

STUDY: EFFECT OF RESTRICTING BEDTIME MOBILE PHONE USE ON SLEEP, AROUSAL, MOOD AND WORKING MEMORY (HE ET AL., 2020)

Aim

To determine how limiting the use of mobile phones before bedtime affects mood, working memory, pre-sleep arousal, sleep quality, and sleep habits.

Method

Participants

Thirty-eight university students who had the habit of using their mobile phone before bed as well as experiencing poor sleep quality.

Materials

Positive and Negative Affect Schedule (PANAS), n-back task, Pre-sleep Arousal Scale (PSAS), Pittsburgh Sleep Quality Index (PSQI) and an online sleep diary.

PANAS: self-report measure consisting of 20 statements each requiring the completion of a 5-point Likert scale. Positive and negative emotions over the past week are assessed.

n-back task: working memory is tested using a computer program where participants are presented with series of numbers and are required to respond when a specified number is presented, when two identical numbers are presented one after the other, and finally, when a number is identical to the one that appeared two numbers prior.

PSAS: self-report measure utilising a 5-point Likert scale for each of the 16 statements that pertain to cognitive and somatic arousal experienced when trying to fall asleep in bed. Cognitive arousal refers to thoughts, e.g., worrying about falling asleep, whereas somatic arousal is related to physiological symptoms, e.g., increased heart rate.

PSQI: self-report measure with 19 items that assess sleep quality and disturbances over the past month where a high score out of 21, indicates poor sleep quality. *A score above 5 indicates sleep disturbances.*

Online sleep diary: a daily record including bedtime, time taken to fall asleep, wake time, time arisen from bed, sleep duration, length of time mobile phone was used during the day, and length of time mobile phone was used between 9pm and sleep time.

Design

The independent variable was the use of mobile phones during bedtime versus no mobile phone use for 30 minutes before bedtime. The dependent variables were mood, working memory, pre-sleep arousal, sleep quality and sleep habits measured using the Positive and Negative Affect Schedule, n-back task, Pre-sleep Arousal Scale, Pittsburgh Sleep Quality index and online diary, respectively.

Procedure

Researchers obtained ethics approval from the Ethical Committee of the Second Military Medical University. Students from this university responded to details posted on social media and provided their written informed consent to participate in the study.

All participants completed the beforementioned tests measuring their mood, working memory, pre-sleep arousal and sleep quality, additionally they recorded their sleep habits via an online diary for a week. Participants were randomly assigned into experimental and control groups with nineteen participants allocated to each.

For the next four weeks, participants in the experimental group abstained from using their mobile phone 30 minutes before they planned to go to sleep while those in the control group continued to use their mobile phones as per usual. At the four-week mark, participants completed the same tests as sat during pretesting and these were compared.

Key findings

- Participants who did not use their mobile phone 30 minutes before bedtime were shown to take less time to fall asleep, stayed asleep for longer, had improved quality of sleep, reduced pre-sleep arousal, improved positive affect, reduced negative affect and showed an improvement in their working memory.

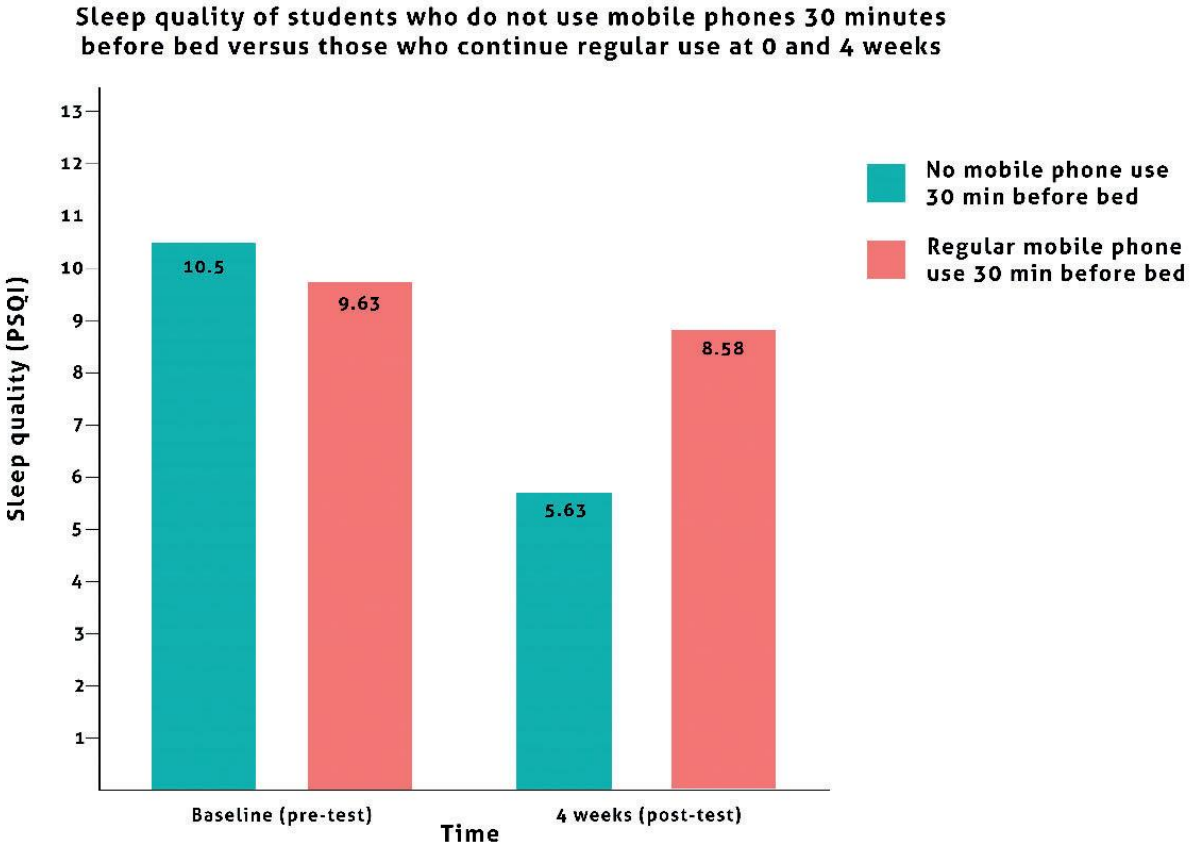


Figure 12.1 Pre-test of sleep quality, measured using the Pittsburgh Sleep Quality Index, and again at four weeks, shows an improvement in sleep quality for students who did not use their mobile phone 30 minutes before bed. Lower scores indicate higher sleep quality.

Contribution of the study to psychology

- This is a relatively recent study that utilises well established measures, allowing it to be replicated by other researchers. With replication comes the ability to assess for reliability.

Criticisms and limitations of the study

- The sample size for the study was small, thus limiting the ability to generalise results to the population the sample was taken from.
- All measures, except for the n-back test, gathered subjective data from the participants as they included self-report measures and online diary entries. Subjective methods should ideally be used in combination with physiological measures as these collect objective data that are less likely to be biased.

Question 1

(a) Contrast partial (acute) sleep deprivation and chronic sleep deprivation in regards to their duration and severity of their impact. (4 marks)

(b) Outline **two** reasons it is important for individuals to have consistent sleep patterns. (2 marks)

One:

Two:

Question 2

(a) Describe the relationship between sleep quality, measured using the PSQI, and the use of mobile phones 30 minutes before bed, as seen in the sleep study by He and colleagues (2020). (2 marks)

(b) (i) Identify the measurement tool that assessed the level of mood in participants. (1 mark)

(ii) Provide an evidence-based conclusion relating to mood and mobile phone use 30 minutes before bed. (2 marks)

(c) Complete the table below identifying the characteristics of measurement tools used in the study. (10 marks)

Measurement tool	Subjective or objective data collected	Data collected is qualitative, quantitative or both
PANAS		
n-back task		
PSAS		
PSQI		
Online sleep diary		

(d) Identify whether the study utilised a cross-sectional or longitudinal study design and provide justification for your response. (2 marks)

13

ETHICAL GUIDELINES

Key teaching points	Learn	Revise	Demonstrate
Ethical guidelines and practices for psychological research			
• The role of ethics/ethical guidelines in psychological research			
○ The role of ethics committee approval and monitoring of conduct for all psychological research			
• Understand and apply ethical guidelines and practices related to human participants			
○ Protection from harm (physical and psychological)			
○ Informed consent			
○ Withdrawal rights			
○ Deception			
○ Confidentiality			
○ Privacy			
○ Voluntary participation			
○ Debriefing			
• Use of animals in research			
○ Refinement, reduction, replacement			

THE ROLE OF ETHICS/ETHICAL GUIDELINES IN PSYCHOLOGICAL RESEARCH

Ethical guidelines are codes of practice that are designed to be followed as a guide by people involved in psychological research. They allow people to understand what is deemed right or wrong and how to apply this knowledge to their research procedures.

THE ROLE OF ETHICS COMMITTEE APPROVAL AND MONITORING OF CONDUCT FOR ALL PSYCHOLOGICAL RESEARCH

- There are more than two hundred human research ethics committees (HREC) in Australia. Most research organisations, such as hospitals and universities, have one.
- The role of these ethics committees is to review research proposals that plan to use human participants in order to make sure that they meet the guidelines in the Australian code of ethics.
- The ethics committee will decide whether there has already been similar completed research that nullifies the purpose of the current proposal and whether the risk to participant welfare outweighs any benefit the research would have to society.
- Once approved, the ethics committee will monitor the research study and is able to step in and stop the study from continuing if they suspect that any ethical guidelines have been breached.

UNDERSTAND AND APPLY ETHICAL GUIDELINES AND PRACTICES RELATED TO HUMAN PARTICIPANTS

Protection from harm: researchers must protect the physical and psychological wellbeing of participants, following ethical guidelines can help accomplish this.

- One way to reduce the risk of continued psychological harm after a study is to debrief participants.

Informed consent: the necessity for researchers to obtain written consent from participants (using a consent form).

- Participants under eighteen years of age, or those lacking the intellectual ability to give informed consent, need to have their legal guardian provide consent on their behalf.
- The consent form should include the purpose of the study, what the participant is required to do, whether there are potential risks of participating in the study, the length of time the study will take and explain the withdrawal rights of the participant.

Withdrawal rights: the principle of ethics whereby participants can end their participation in a study, or have their results removed during or at the completion of the study without pressure or penalty.

- Withdrawal rights must be explained within the informed consent procedure.

Confidentiality: the need for information collected from participants to be stored in a secure manner and then disposed of when no longer required.

- Confidentiality is concerned with **HOW** information collected from participants is safeguarded.
- If the researcher wishes to publish or share results, participant names are not able to be used (a number may be allocated to each participant), and written consent from the participant (or legal guardian when relevant) must be obtained.

Privacy: the principle that only information relevant to the study should be collected from participants.

- Privacy is concerned with **WHAT** information from participants is collected.

Voluntary participation: where participants partake in a study because it is their choice to do so.

- Participants cannot be bribed to participate or be at risk of failing a course (at university, for example) if they do not take part.

Deception: lying to participants about the true nature of a study of their role in it; this is used when the participants knowing the true purpose of the study would affect the results.

- If using deception causes the risks to participants to outweigh the potential benefits of the research to society, it should not be used.

Debriefing: an explanation given to participants at the conclusion of a study.

- If there was deception in the study, participants need to be informed of this, an opportunity for counselling should be provided, any mistaken beliefs participants may have formed during the study must be dispelled, and the participant's right to remove their results from the study needs to be upheld.

USE OF ANIMALS IN RESEARCH

- Just like there is a code of ethics for the use of human participants in research in Australia, there is also a code for the care and use of animals for scientific processes.
- The priority when making decisions involving the use of animals for scientific purposes is respect for the animals.
- At every stage of animal care and use, respect can be demonstrated by applying the 3Rs; refinement, reduction and replacement.

Refinement: the principle in animal research ethics of utilising methods that will minimise potential distress or pain in animals in research.

Reduction: the principle in animal research ethics of obtaining more information from the number of animals planned for research or using alternative methods to gather similar information by using fewer animals.

Replacement: the principle in animal research ethics of the use of alternative methods that eliminate the need for animals in research.

Question 1

Aoife, a student studying sport psychology was given approval by the ethics committee at her university to run a study investigating whether exercise had an effect on mood. Aoife put up flyers at the university gymnasium asking for students interested in the benefits of sport to contact her via the provided email address. Participants who contacted Aoife were met individually at the university gymnasium and asked to identify on a scale from 1 (sad) to 5 (happy) where they felt their mood at the time could be best described. Participants were then asked to ride a stationary bicycle as fast as they could for 2 minutes. After cycling, they were asked to identify their mood using the same mood rating scale as used before exercise.

(a) Explain how Aoife could apply the ethical guideline of informed consent in her study. (2 marks)

(b) State whether voluntary participation was upheld in the study and justify your response. (2 marks)

(c) Distinguish between confidentiality and privacy. (2 marks)

(d) (i) Describe how Aoife could maintain confidentiality in her study. (2 marks)

_____

_____

_____

_____

(ii) List **three** items that would need to be kept confidential throughout the study. (3 marks)

One: _____

Two: _____

Three: _____

(e) Suggest how Aoife could ensure privacy is maintained in her study. (1 mark)

_____

_____

(f) After each participant has completed the second mood rating scale, Aoife debriefs them. For Aoife's particular study, outline **three** pieces of information she must include in her debrief. (3 marks)

One: _____

_____

Two: _____

_____

Three: _____

_____

(g) In addition to universities, list another organisation that would have an ethics committee. (1 mark)

_____

FORMULATING RESEARCH AND METHODOLOGY

Key teaching points	Learn	Revise	Demonstrate
Formulating research			
• Identify the aim/s of the research			
• Develop a research question based on the aim/s			
• Identify variables (independent, dependent, control, extraneous)			
• Construct/formulate a hypothesis or inquiry question			
○ Directional and non-directional hypothesis (quantitative)			
○ Inquiry questions (qualitative)			
Methodology			
• Types of research designs – application, method, strengths and limitations			
○ Experimental (control and experimental group) and non-experimental			
○ Observational			
○ Case study			
○ Correlational			
○ Longitudinal			
○ Cross-sectional			

continued over

Key teaching points	Learn	Revise	Demonstrate
• Selection of participants			
○ Identification of sample and population			
○ Methods to sample participants – application, method, strengths and limitations			
• Convenience sampling			
• Snowballing			
• Random sampling			
• Stratified sampling			
• Allocation of participants – application, method, strengths and limitations			
○ Random allocation			
• Variables			
○ Independent			
○ Dependent			
○ Control			
○ Extraneous – participant, environment, researcher			
○ Confounding			
• Sources and effects of extraneous variables and confounding variables			
○ Experimenter effect			
○ Demand characteristics			
• Minimise the effects of extraneous and confounding variables			
○ Random allocation of participants			
○ Single-blind procedures			
○ Standardisation of procedures and instructions			

FORMULATING RESEARCH

EXAMPLE RESEARCH STUDY

A lecturer at a university placed posters around the university campus inviting students to be involved in a study testing whether hemp seed oil increased sleepiness in students. One group of students ingested one capsule of hemp seed oil just before bed for two weeks, while a second group of students took a capsule containing hemp-flavoured water before bed for two weeks. The length of time it took for students to fall asleep was recorded each night for two weeks.

Figure 14.1 Hemp seed oil capsules were ingested by participants in the experimental group.

Steps	Example
Identify the aim of the research The aim of the research is written as a general statement explaining the purpose of the research.	To investigate whether hemp seed oil affects sleepiness in students.
Develop a research question based on the aim The research question should be a well-defined question based on background information, such as a literature review or covered concepts in the syllabus, that are intended to be answered by collecting and analysing data. While it may include an independent and dependent variable, it is not required. The population of research interest is specified.	What is the relationship between hemp seed oil consumption and sleepiness in students?
Identify variables In order to develop a testable hypothesis, operational definitions of both independent and dependent variables are required. An operational definition specifies the activities of the researcher in measuring and/or manipulating a variable.	Hemp seed oil is provided in capsule form. **Independent variable:** ingesting hemp seed oil versus not taking hemp seed oil. An operational definition of sleepiness is 'length of time it takes to fall asleep over two weeks'. **Dependent variable:** length of time it takes to fall asleep each night for two weeks. **Controlled variable:** capsule taken at the same time of day by participants. **Extraneous variable:** the amount of screentime participants have before they go to bed (participant variable).

Steps	Example
Construct a hypothesis (quantitative) A hypothesis is used in research that produces quantitative data and informs the methodology that will be followed. Construct a hypothesis by taking the research question and using it to specify the kind of relationship between the two variables. The hypothesis should include the population of research interest (it does not require details of the sample), as well as the way in which the independent and dependent variable will be measured (operational definitions).	
Directional hypothesis: a statement that compares the predicted outcome of each condition. This type of hypothesis is used when past research provides a clue as to what results will show.	It is hypothesised that students who take hemp seed oil before bed for two weeks will take **LESS** time to fall asleep compared to students who do not take hemp seed oil.
Non-directional hypothesis: a statement that there is a difference between conditions but does not specify the type of difference. This type of hypothesis is used when there is no previous research, or previous research has provided contradictory results.	It is hypothesised that students who take hemp seed oil before bed for two weeks will **DIFFER** in the time taken to fall asleep compared to students who do not take hemp seed oil.
Construct an inquiry question (qualitative) Instead of a formulating a hypothesis, an inquiry question can be constructed. Unlike a hypothesis, an inquiry question does not make research outcome predictions, instead it prompts broad exploration of the research topic. Inquiry questions are used in research that produces qualitative data and informs the methodology that will be followed. The inquiry question is an open-ended question, starting with a question word, that the research is aiming to explore.	What effect does hemp seed oil have on sleep?

Note: at times it may be more suitable to start research by developing a research question and then using this to write a hypothesis and aim. This is because the aim, research question and hypothesis are interrelated.

Note: both 'research questions' and 'inquiry questions' guide the investigatory process of research, so unless a clear distinction is warranted (the former being a focused question narrowing the scope of research and the latter a general, open-ended question), the terms can be used interchangeably.

METHODOLOGY

TYPES OF RESEARCH DESIGNS

	Description	Strengths	Limitations
Experimental	• Research where the independent variable can be manipulated, a cause-and-effect relationship can be found and participants can be randomly allocated. **Control group:** a group of participants exposed to all conditions except the independent variable. **Experimental group:** a group of participants exposed to the independent variable. • E.g., experiment run by He et al., (2020) assessing the effects of restricting mobile phone use before bed on the sleep quality of university students.	• Researchers can have control over variables. • Cause-and-effect relationships can be found.	• Having a controlled environment (such as a laboratory environment), reduces realism and may impact participant behaviour. • In trying to control variables in research, there is risk of human error occurring.
Non-experimental	• Research where the independent variable cannot be manipulated, a cause-and-effect relationship cannot be found, and participants cannot be randomly allocated. • Examples of non-experimental research methods include case studies, observational research, and correlational studies. • E.g., Watson and Rayner's 'Little Albert' experiment is non-experimental as there is no independent variable being manipulated.	• Observing what occurs naturally in the environment means a controlled setting does not have to be created. • This allows for research applications in which the manipulation of variables would be unethical for participants.	• Reliable causal conclusions are not able to be made because there is no evidence of a cause-and-effect relationship. • As there is no variable manipulation, larger sample sizes are required so more participants are able to be observed.

Importance of having a control group

- Enables the researcher to determine whether the independent variable has had an effect on the dependent variable.
- The control group provides a basis for comparison with the experimental group.

Beyond the syllabus

There are different types of observational research, two of which are naturalistic observation and controlled observation.

Naturalistic observation: researchers observe participants in their natural setting in an unobtrusive manner. Advantages of naturalistic observation are that they have a high external validity and are suitable for studying concepts not able to be studied in a laboratory setting. Limitations to naturalistic observation include the observer effect where the awareness of being watched causes participants to alter their behaviour and observer bias where the observer's expectations or beliefs influence what they record during observational research. The Robbers Cave study utilised this type of observation.

Controlled observation: researchers observe participants in an environment that is structured, such as a laboratory. While this method allows for increased accuracy in observations due to greater environmental control, participants may alter their behaviour because they know they are being watched. Ainsworth's strange situation studies, Milgram's behavioural study of obedience and the Bobo doll experiment by Bandura, Ross and Ross utilised controlled observations.

	Application	Method	Strengths	Limitations
Observational	• Type of technique used to study behaviour. • E.g., Bandura, Ross and Ross' Bobo doll experiment.	• Researchers monitor participants and record notes.	• Controlled observations can be replicated by other researchers. • Participants are more likely to behave naturally rather than consciously or unconsciously act in a way that is socially appealing.	• When the researcher only sees what they expect to see, or records selected details, observer bias may occur. • Participants may change their behaviour if they are aware of being observed. • Voluntary participation and informed consent are ethical guidelines that may be breached when participants are unknowingly observed in research.
Case study	• An in-depth investigation of an individual person, group of people or a single event. • Case studies are useful for examining unusual events that cannot be replicated in a laboratory. • E.g., Case study of Henry Molaison.	• A large amount of data (mostly qualitative) is collected, providing information on one person, a group of people or an event.	• Detailed information is collected. • Information is gathered from a range of perspectives.	• Results are unable to be generalised to the population the sample was taken from. • Conclusions drawn from case studies are limited due to the lack of formal control groups.
Correlational	• Measures the linear relationship between two variables. • E.g., a positive correlation was found between birth weight and childhood intelligence in a 2020 study of 1719 children from the Danish National Birth Cohort.	• The relationship between two variables is measured.	• Potential hypothesis based on correlation can be tested using an experimental design. • It can be used when manipulating variables in experimental research is unethical.	• Correlations do not show how variables are related because there is no cause and effect between two variables (correlation does not infer causation). • Extraneous variables are not controlled and could intervene with the relationship between the variables making it hard to know if the relationship would exist otherwise.

	Description	Strengths	Limitations
Longitudinal	• Data is collected more than once, using the same participants. • This period could be several days, weeks, years or even decades. This type of study is often used in psychology to study development trends across the lifespan. • E.g., Harvard Study of Adult Development that followed 268 participants for almost eighty years.	• Developmental trends can be studied over a lifetime. • The frequency, timing or duration of events can be assessed, e.g., when depressive symptoms of an individual began and how long they lasted for.	• It takes a longer time to get results than with cross-sectional studies. • Participants may drop out of the study along the way.
Cross-sectional	• Data from participants is collected at one point in time. Participants may be from one sample or from a number of samples. • E.g., the Australian Census gathers information via a survey from every Australian household at one point in time.	• It is quicker to conduct than longitudinal studies as there are no follow-up periods required. • It costs less to conduct than longitudinal studies.	• Only a snapshot in time is chosen and results may differ if another time for collecting data was chosen. • The sample size may not be large enough to generalise results to the population that the sample was taken from.

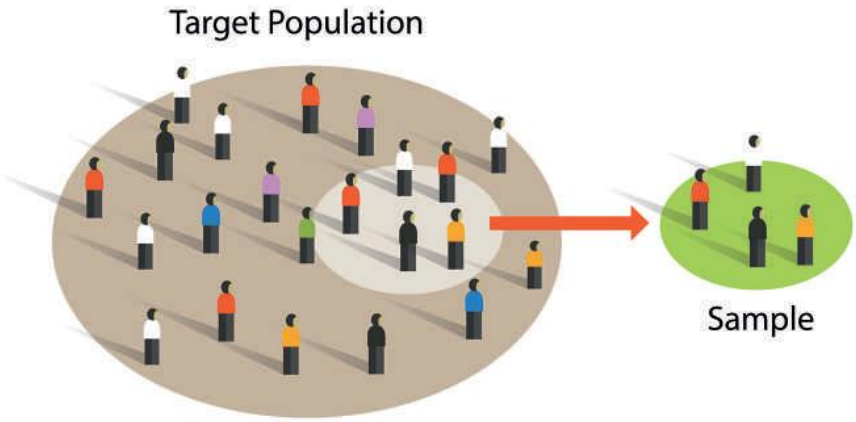
SELECTION OF PARTICIPANTS

Population: the entire group of people that is of interest to a researcher.

Sample: a subsection of the population.

- The sample should be representative of the population it was taken from.

Sampling: the process of selecting participants from a population of research interest that will be used in a study.



METHODS TO SAMPLE PARTICIPANTS

Convenience sampling

Method

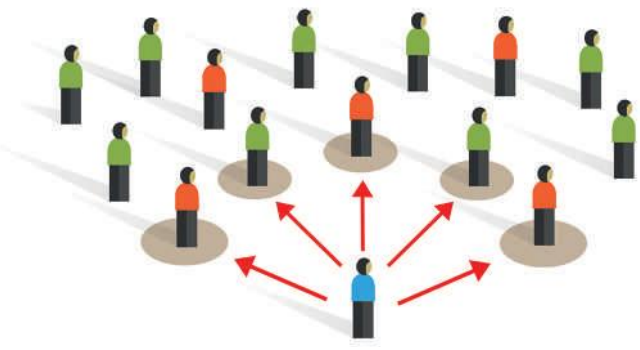
- Participants who are easily accessible are selected.

Strengths

- The time and effort required to collect the sample is low compared to random and stratified sampling.
- Costs associated with gathering the sample are low.

Limitations

- There may be a high level of researcher bias due to the researcher subjectively selecting participants.
- The sample is unlikely to be representative of the population it was taken from.



Snowball sampling

Method

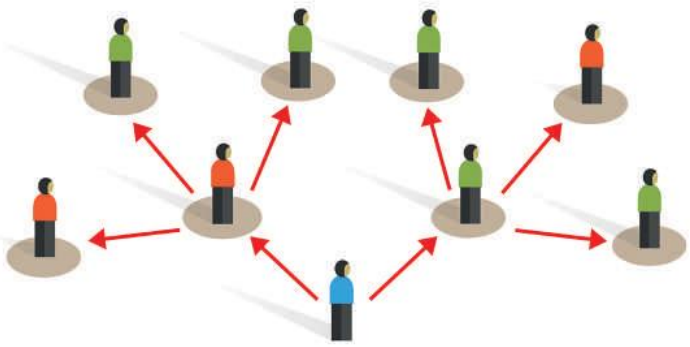
1. Initial participants are chosen.
2. Each participant encourages other people to contact the researcher and join the sample.

Strengths

- It allows researchers to find a sample that may otherwise be difficult to recruit due to the nature of the study, for example research looking at drug users or sex workers.
- Less time is needed for the researcher to gather a sample is reduced because initial participants recruit additional participants.

Limitations

- The sample is unlikely to be representative of the population it was taken from because researchers are minimally involved in participant recruitment.
- The sample may be biased as only those who are in direct contact with the original participants can be recruited.



Random sampling

Method

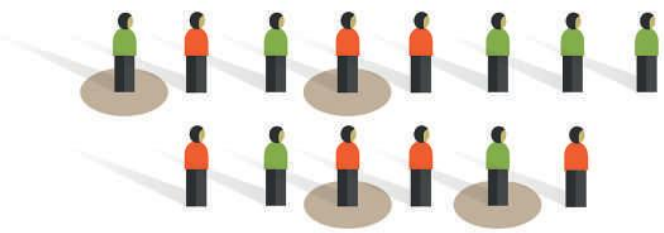
1. Names of all members in a population are collated.
2. Names are randomly selected by drawing them out of a hat or using a computer-generated program.

Strengths

- Researcher bias is minimised.
- Each participant has an equal chance of being selected to be part of the sample.

Limitations

- The time and effort required to conduct this type of sampling is high.
- The sample is unlikely to be representative of the population it was taken from if the sample size is not adequate.



Stratified sampling

Method

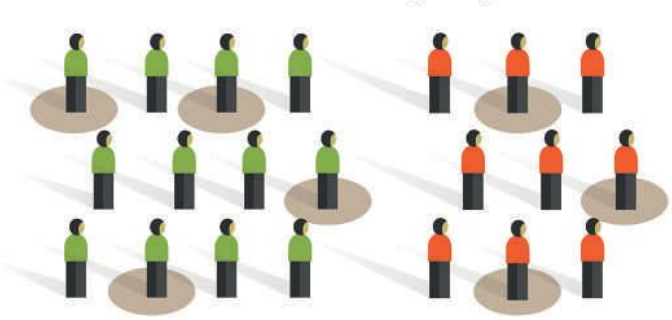
1. The population is broken into subgroups based on characteristics relevant to the study.
2. Participants from each subgroup are randomly selected in the same proportions they appear in the population.

Strengths

- The sample is likely to be representative of the population it was taken from.
- Researcher bias is minimised.

Limitations

- The time and effort required to conduct this type of sampling is high
- Researchers may not always be able to classify each participant of the population into subgroups.



Random allocation

Random allocation: random distribution of participants into experimental and control groups to reduce researcher bias and increase generalisability of results.

Method

1. Names of participants in the sample are collated.
2. Names are randomly selected by drawing them out of a hat or using a computer-generated program and assigned to groups.

- Alternatively, participants can be randomly selected using a computer-generated program programmed to select a participant at regular intervals from a list of participants. E.g., every fifth participant is selected.

Strengths

- It can allow for good generalisability of results because equivalent groups of participants are created.
- Prevents selection bias because each participant has an equal chance of being placed in the different conditions.

Limitations

- It is not possible to use this form of allocation when the independent variable is not able to be manipulated by the researcher.
- While unbiased groups are created, equality of groups in relation to participant characteristics is not guaranteed.

VARIABLES

Independent variable: the variable that is being manipulated by the experimenter to observe its effect on the dependent variable.

Dependent variable: the variable that is being measured by the experimenter.

Controlled variables: the variables that stay consistent throughout an experiment.

Extraneous variables: unwanted variables that may impact the dependent variable.

- Researchers may not be aware of extraneous variables in a study until after the study is completed.
- Any extraneous variables that the researcher controls turns into controlled variables.

TYPES OF EXTRANEOUS VARIABLES

Participant variables: type of extraneous variables relating to the individual characteristics of participants.

- It is important that the researcher controls participant variables as they can potentially confound results from an experiment.
- Researchers can help control participant variables by making sure participants selected for the sample have similar personal characteristics suitable for the study, or by using random allocation to ensure equivalent groups are created.
- E.g., motivation, educational background, age, gender, self-esteem, intelligence, memory, prior experience, personality characteristics, health, physical ability and mood.

Environment variables: type of extraneous variables relating to the environment the study takes place in and how this affects participant responses.

- E.g., testing venue, background noise, air temperature of the room the test is taken in, time of day of that testing takes place and testing conditions.

Researcher variables: type of extraneous variables relating to the personality characteristics, appearance and conduct of the researcher that unintentionally impact participant response.

- E.g., the accent, gender, attractiveness, personality characteristics, health, age of the researcher as well as how the researcher interacts with and treats participants.

Confounding variables

Confounding variable: variables that impact the dependent variable and also have a causal or correlational relationship with the independent variable.

- Confounding variables alter the relationship between independent and dependent variables and can complicate results making them difficult to interpret.
- There is a possibility for some extraneous variables that are not controlled to become confounding variables.

- In the study described later in this chapter (on page 134), the independent variable was whether participants took an antidepressant daily over six weeks and the dependent variable was the experience of depressive symptoms, measured using a rating scale that provided a depression score.
- Potential extraneous variables for this study included the participants' diet, consumption of alcohol and the amount of exercise they did. These are examples of participant variables.
- The time of day participants completed the pre and post rating scales was an environment variable, while the way in which instructions were given to participants was a possible researcher variable.
- The reason why the above-mentioned variables are extraneous variables is because they all have an impact on the dependent variable (the experience of depressive symptoms).
- From these extraneous variables, alcohol use is one that could become a confounding variable if not carefully controlled. This is because alcohol consumption can influence depressive symptoms (dependent variable) and additionally impact the effectiveness of antidepressants (independent variable).

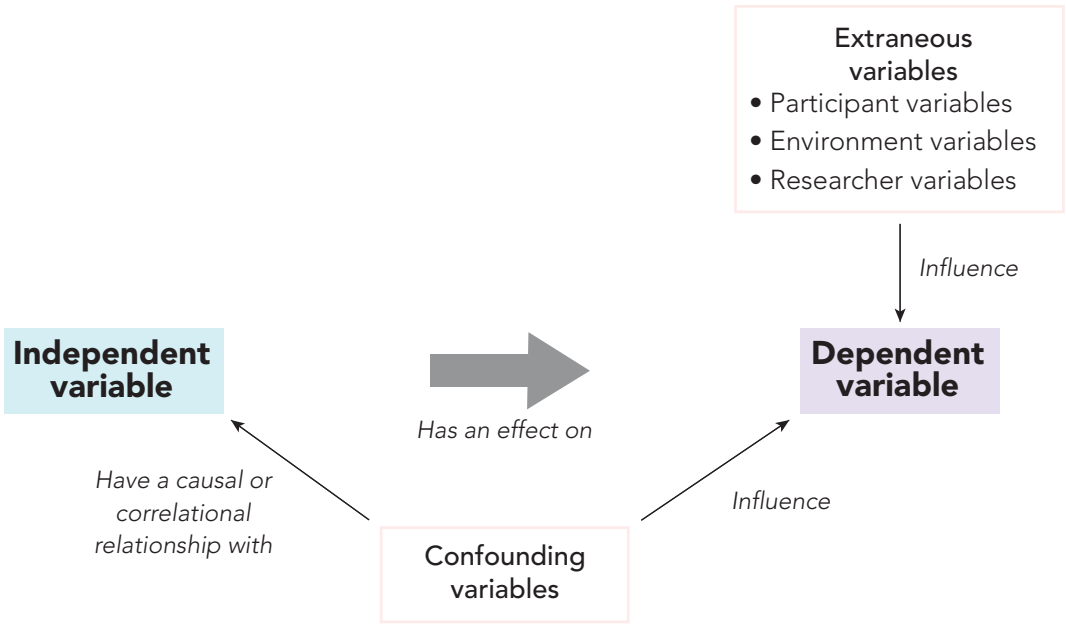


Figure 14.2 Diagram comparing extraneous and confounding variables.

SOURCES AND EFFECTS OF EXTRANEOUS VARIABLES AND CONFOUNDING VARIABLES

Experimenter effect: the expectations and behaviours of the researcher that may bias results.

- The researcher could consciously or unconsciously give away the desired outcome of the research, or unconsciously influence participants.
- When a researcher has expectations for the results a study should produce, they may unintentionally behave in a way that participants interpret as clues as to how they should behave.
- The researcher may also unconsciously influence participants by presenting instructions differently to different groups or participants, or they may inaccurately record or interpret data.
- Running a **double-blind procedure**, where the researcher, as well as the participants are unaware of the experimental conditions, can help to reduce experimenter effects.

Demand characteristics: cues participants perceive during a study that lead them to believe they have discovered the aim of the study or expectations of the researcher.

- Demand characteristics can cause participants to behave (oftentimes unconsciously) in ways that support the hypothesis or help achieve what they believe to be the desired results.
- These cues may not come from the methodology or the researcher's behaviour, but from a rumour they heard about the study, or even the location of the laboratory.
- While demand characteristics can occur because the participant wants to please the researcher and be viewed positively by them, they may alternatively occur because participants want to purposefully disprove the hypothesis and ruin the credibility of the study.
- Even if the researcher standardised the procedure and instructions, used a single-blind procedure, controlled research variables, and there was no experimenter effect, participants could still change their behaviour to meet what they perceive to be the aim of the study or expectations of the researcher.

Experimenter effect is the researcher consciously or unconsciously sharing their expected outcome, or inaccurately carrying out the procedure or recording data	*Whereas ...*	**Demand characteristics** are when participants discover, or believe they have discovered, the aim of the study and change their behaviour

- The experimenter effect can at times allow for demand characteristics; the researcher unintentionally sharing their expectations of the study may lead some participants to believe they now know the researchers' desired outcomes and change their behaviour to help create them.

MINIMISE THE EFFECTS OF EXTRANEOUS AND CONFOUNDING VARIABLES

Random allocation of participants

- Random allocation of participants to an experimental group or control group is commonly used in psychological research.
- The main purpose of random allocation of participants is to ensure each participant in the sample has an equal chance of being chosen for the control group as for the experimental group.
- Participant variables can be minimised through random allocation of participants because it ensures participants with personal characteristics are spread between experimental and control groups.
- The researcher wants to ensure that the dependent variable is caused by the independent variable and not due to personal characteristics.
- Random allocation of participants also minimises researcher effects whereby the researcher could distribute participants into groups and personally decide who is going to be in the experimental group.

Single-blind procedure

Single-blind procedure: the experimenter is aware of the experimental conditions (which participants are in the control and experimental group) while the participants are unaware of them.

- The researcher is aware of the aim and the conditions being conducted but the participants are not told which condition of the experiment they are in, and at times, not even the aim of the research.
- Knowing the aim of the research may affect the behaviour of the participants and result in extraneous variables such as demand characteristics. In such cases, deception would be used and participants would have the true purpose of the study and reason for deception explained to them during debriefing.
- In relation to the example experiment on page 123, the participants would not be aware of whether they are receiving the hemp capsule, or the hemp-flavoured water capsule (placebo). The participants are 'blind' to whether they are receiving the active treatment or not. The experimenter does know which group the participants belong to.
- While demand characteristics cannot be completely eliminated from research, single-blind procedures can help control their effects as participants do not know what condition of the experiment they are in (whether they are in a control group receiving a placebo, or in an experimental group being given an active substance).

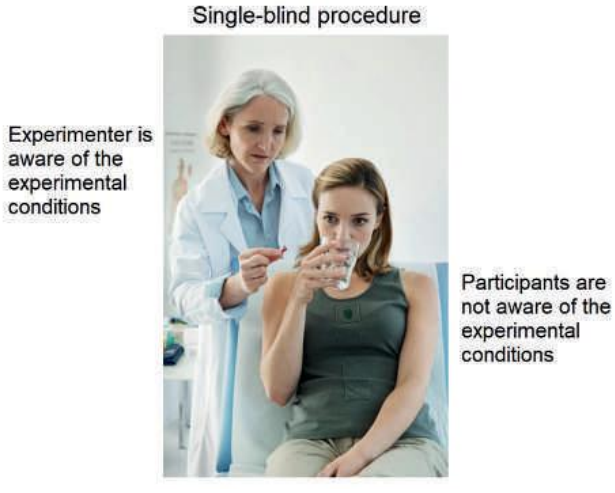


Figure 14.3 The experimenter in a single-blind procedure

Beyond the syllabus

If a participant diagnosed with major depressive disorder is given medication and told it will reduce depressive symptoms, they may report a decrease in depressive symptoms due to the placebo effect.

The **placebo effect** is a positive result that occurs due to the participant's belief that a treatment will be effective.

To be sure that the medication (independent variable) influences depressive symptoms (dependent variable), a placebo can be used.

A **placebo** is a neutral treatment that looks the same as the real treatment being evaluated and is delivered in the same way.

The graph in Figure 14.4 shows results from a third phase trial of an antidepressant with the active drugs dextromethorphan and bupropion (commercial name Auvelity). Rather than a single-blind study where the experimenter would be aware of which participants were given the active treatment and which were given the placebo, a **double-blind study** for this research was used.

In a double-blind study, neither the participants nor the experimenter knows which condition of the independent variable the participants are allocated to.

Double-blind studies reduce experimenter effect as the experimenter is less able to unconsciously treat participants differently based on the group they are in.

Participants were randomly allocated into an experimental and control group, and those in the experimental group received Auvelity orally, twice daily, for six weeks. Participants in the control group received sugar tablets (placebo) that looked identical to Auvelity tablets.

All participants completed the Montgomery-Asberg Depression Rating Scale (MADRS) at the start of the experiment, and again at the end of the six weeks. The difference in results between the control and experimental group demonstrates Auvelity had an effect on depressive symptoms, in this case, the antidepressant was found to significantly decrease depressive symptoms over a six-week period.

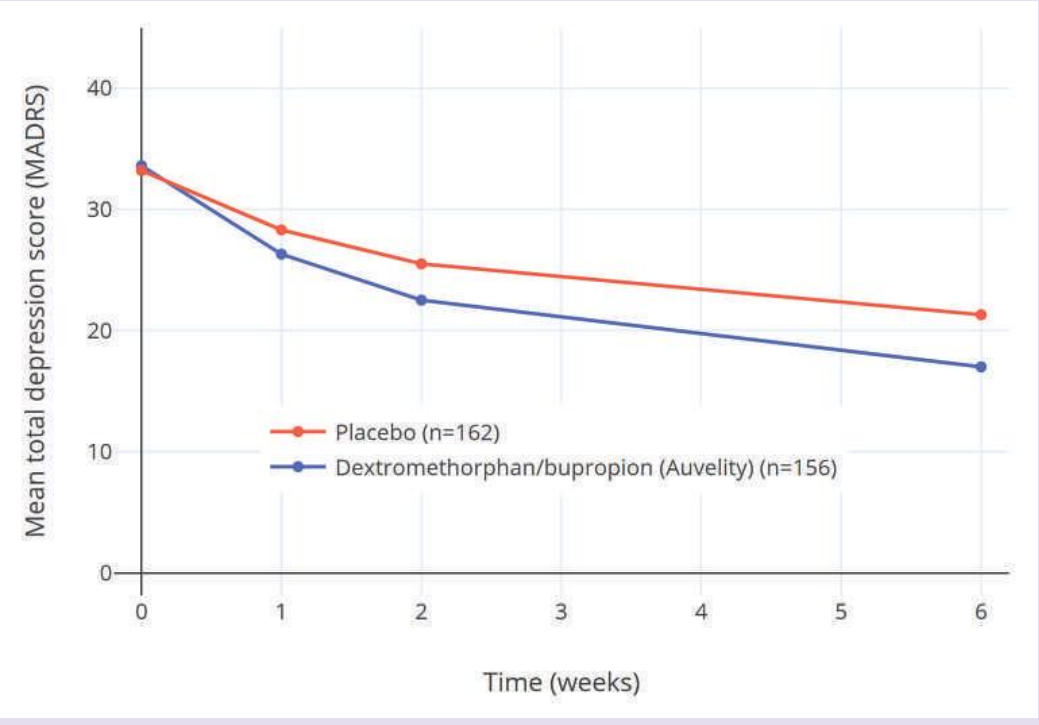


Figure 14.4

administering treatment to a participant.

STANDARDISATION OF PROCEDURES AND INSTRUCTIONS

- Environment variables can be minimised by providing the same location and conditions for all participants, for example, conducting an experiment in a laboratory setting.
- Providing the same instructions to each group of participants can minimise researcher variables and experimenter effects.

Referring to the example experiment at the start of this chapter, participants were split into an experimental and a control group, with those in the experimental group ingesting hemp seed oil capsules before bed every night for two weeks and those in the control group ingesting hemp-flavoured water capsules (placebo).

The researcher would know which participants were in the control or experimental group, but the participants would not know, thus being a single-blind procedure. Ideally, the environment in which participants took the capsules and slept would be controlled, but as it was not, this would be an uncontrolled extraneous variable (specifically, an environment variable).

It would be preferable if the procedure was standardised for all participants, for example, participants being instructed to not consume any alcohol or caffeine after 3pm. If there were participants in the experimental group who happened to meditate to help them fall asleep, then meditating would be confounded with the independent variable.

Whether participants took hemp seed oil before bed, as well as whether they meditated before bed, would covary in a way that it would not be possible to know which caused the change in sleepiness (dependent variable). Confounding variables can be avoided by keeping all conditions identical except for the independent variable.

Figure 14.5 Practising meditation before bed is a potential confounding variable affecting sleepiness and covarying with hemp seed oil consumption.

Question 1

(a) It is usually not possible to study every individual in a population of research interest, so, a sample is selected using a number of techniques. Complete the table below showing how representative the sample can be to the population, the level of the researcher bias involved in the sampling process, and amount of time and effort required for the sampling technique (low or high). (7 marks)

Type of sampling	Ability to be representative of the population	Bias	Time and effort required
Convenience			
Stratified			
Snowball			
Random	High		High

(b) Outline the difference between an experimental group and the control group in an experiment. (2 marks)

(c) Contrast between participant selection and participant allocation. (2 marks)

(d) Define the psychological terms 'experiment effect' and 'demand characteristics' and explain how the experimenter effect may cause demand characteristics to prevail in a research study. (4 marks)

Question 2

Observational studies may occur where participants in public places are not aware that they are being observed for research reasons.

(a) Outline **two** ethical issues that should be considered during such studies. (2 marks)

One: _____

Two: _____

(b) Outline **two** practical problems that may occur during the observation of participants in public areas. (2 marks)

One: _____

Two: _____

DATA COLLECTION

Key teaching points	Learn	Revise	Demonstrate
Data collection			
• Types of data			
○ Qualitative data			
○ Quantitative data			
• Methods of data collection – application, strengths and limitations			
○ Qualitative			
• Interviews – focus group and individual; structured, semi-structured			
• Open-ended survey			
○ Quantitative			
• Objective physiological measures – heart rate, breathing rate, galvanic skin response (GSR)			
• Subjective measures – checklists and rating scales, such as Likert scales			
○ Mixed methods – data collection may be a combination of qualitative and quantitative data			
• Differences between subjective and objective data			

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TYPES OF DATA

Qualitative data: descriptive information in the form of words.

Quantitative data: information in the form of numbers that can be counted.

	Qualitative data	Quantitative data
Data format	• Written words	• Numerical
Data display	• Flow charts, taxonomy (showing classification or organisation of information), modified Venn diagrams (displaying shared concepts) and summary tables.	• Graphs and summary tables (e.g., frequency tables).
Question format used to obtain data	• Open-ended questions that allow free-form answers to be provided.	• Closed-ended questions that limit answers to set responses.
Method of collection	• Interviews (structured or semi-structured), focus groups, open-ended surveys and observation (naturalistic).	• Checklists, rating scales (e.g., Likert scales), observation (controlled) and using equipment in physiological measures (e.g., thermometer to measure body temperature).
Analysis	• The large amount of descriptive data is assessed for patterns and organised into categories. • Categories of data are created by grouping collated descriptive information.	• Data is quantifiable (able to be counted) so can be statistically analysed. • Data can determine a cause-and-effect relationship or correlation.
Strengths	• In-depth information can be collected as participants may have the opportunity to explain their responses. • There is flexibility in aspects of the methods used to collect the data, e.g., the inclusion or exclusion of interview questions, or the wording of interview questions.	• Generalisability of results can be assessed. • Numerical data is easier to replicate through repetition of the research allowing for reliability to be assessed.
Limitations	• There is a reduced generalisability of results due to information being gathered from a smaller sample size (compared to larger sample sizes typical of quantitative research). • To interpret the data, researchers require a deep understanding of the studied concept.	• There is a requirement for researchers to have a strong knowledge of statistical analysis. • For results to have high generalisability, large sample sizes are required.
Example	• Family of Henry Molaison were interviewed by Scoville and Milner to help assess whether his personality changed after brain surgery.	• The number of aggressive behaviours counted in children in Bandura, Ross and Ross' Bobo doll experiment.

METHODS OF DATA COLLECTION

QUALITATIVE

- Interviews can be administered to an individual or to a group of people at one time (focus group).

	Application	Strengths	Limitations
Structured interview	• Set of pre-established questions is asked in real time face-to-face or over the phone.	• Many individuals or focus groups can be asked the same set of standardised questions reducing differences between interviewers. • Participants do not need to rely on their reading ability in order to participate.	• Interviewers are not able to ask participants to further explain their responses thus limiting the richness of collected data. • Analysing data collected from interviews is complicated so drawing general conclusions is difficult.
Semi-structured interview	• A set of pre-established questions that can be asked but participants can also be asked follow-up questions based on earlier responses. This sort of interview is suitable for a job interview.	• Extensive data can be collected and the option for interviewers to ask participants to further explain their reasons leads to deeper understanding. • Participants do not need to rely on their reading ability in order to participate.	• Due to the face-to-face or over the phone format, participants may feel less comfortable revealing sensitive information to the interviewer, thus limiting data that can be collected. • Analysing data collected from interviews is complicated so drawing general conclusions is difficult.
Open-ended survey	• Participants are provided with questions on paper or online with space to respond in open-text format with as much detail as they like. • Open-ended surveys are often used in exploratory studies of issues requiring deep insight.	• Detailed information (including attitudes and emotions) can be collected on complicated topics. • Participants are not restricted by limited options.	• Participants must rely on their reading and writing ability to participate. • Differences in the amount of detail provided by participants makes analysing the collected data difficult.

How to run a focus group

1. Develop a set of questions for participants to answer based on the aim of the research.
2. Gather a sample from the population of research interest using an appropriate sampling technique.
3. Provide an information letter and consent form for participants to complete. Participants under the age of eighteen require a legal guardian to provide informed consent on their behalf.
4. Facilitate a focus group with a manageable number of participants from the sample (numerous focus groups using different participants can be run). Ask follow-up questions based on participant responses to pre-established questions and record verbal discussions between participants and comments made to the facilitators using a recording device.
5. After participants have been debriefed, collate, then analyse the written and recorded data.

Dr Boston, Professor Devine and their research team at Edith Cowan University were interested in using technology to advance learning and engage children and adults in regards to bone health literacy. Their recent project involved developing and producing an immersive educational video game for secondary school students, educating them on the importance of bone and joint health.

Figure 15.1 A focus group comprising twenty-eight year 11 secondary students.

The research proposal was approved by Edith Cowan University's Human Research Ethics Committee, and as this study involves individuals under the age of eighteen, permission was required from Catholic Education Western Australia and the Association of Independent Schools of Western Australia. Principals of schools in both organisations were contacted by the research team and principals who gave permission for their students to be involved in the study passed details onto their parents and students for their consent to participate in this research project. The project was then coordinated by relevant teaching staff and the research team.

A critical step in producing a serious game was learning what young people currently know about bone and skeletal health, the types of games they like to play and to provide feedback on existing digital software (in the form of a game) with a sample of teenagers.

The research team visited several science classes at a secondary school to gather feedback for an online video game they were developing. Each small group of students was considered a **focus group** and students were required to complete pre- and post- game question sheets, additionally Dr Boston asked them impromptu questions. This form of qualitative data collection is known as a **semi-structured interview**.

After obtaining a preliminary sample of students from the schools, Dr Boston asked teachers to share her contact information with any other teachers who might be interested in having their students participate in the study. At this point in the study, **stratified sampling** was used.

Ethical considerations were maintained throughout all steps of the study.

1. Design of the research study: scientific rigour and merit, identified risks and ways to mitigate the risks.
2. Participant recruitment: the process of informed consent and right to privacy.
3. During the intervention or measurement procedure to which participants are subjected: the management of risks.
4. In the release of results obtained: the protection of confidentiality and anonymity.
5. After the release of results: ensured that participants and communities involved in the research will benefit.

QUANTITATIVE

	Application	Strengths	Limitations
Objective physiological measures Heart rate Breathing rate	• Changes in emotional stress, physical effort and consciousness can be recorded.	• Participants are less likely to be able to affect data collected (risk of participant bias is limited). • Measures can be recorded in real-time.	• Exercise can easily cause changes to the measurement, which is a disadvantage if the state of consciousness, for example, is being identified. • Factors such as exercise or heat can affect the measurement. • Participants may feel anxious when having the measure taken and this can alter results.
Galvanic skin response (GSR)	• Measures changes in the electrical conductivity of the skin and can detect anxiety, guilt, fear or excitement. It can be used to help determine state of consciousness and to measure and reduce stress using biofeedback training.		
Subjective measures Checklist	• Collects yes/no information on statements. *Yes* ❑ *No* ❑ • Checklists can be used to measure attitudes.	• Data can be statistically analysed. • Data collected from a large sample size can occur in a relatively short time (compared with conducting an interview). • Can be conducted remotely such as online or via mail.	• Responses are limited to the options provided. • It does not allow participants to give reasons for their responses. • Participants must rely on their reading ability to participate. • Phrasing and order of statements can affect people's responses.
Rating scale (e.g., Likert scale) Rating scales require participants to rate concepts	• The Likert scale is a type of rating scale where participants indicate their strength of agreement to statements. • Rating scales can be used to measure attitudes.		

- Rating scales can be used to quantify abstract concepts, such as the level of pain someone is experiencing. Figure 15.2 shows an example of a pain measurement scale that can be used for children and adults alike. The patient can either provide a number to represent their pain intensity, or they can point to the picture of the face that best visually matches how they are feeling.

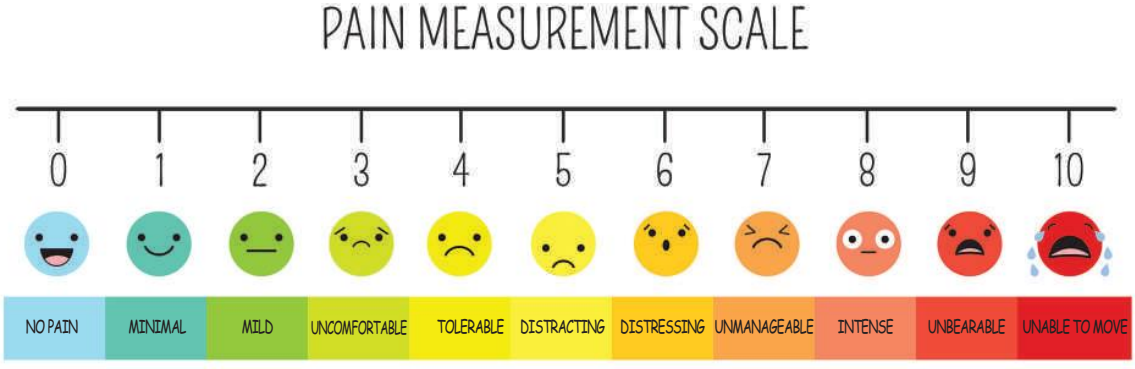


Figure 15.2

- A Likert scale, named after social scientist Rensis Likert, is a type of rating scale often used to measure attitudes. Each question uses a five or seven-point scale, usually including a neutral option.
- Each point on the scale is allocated a numerical score used for determining whether an overall attitude is positive or negative, or to provide a score on a diagnostic test.
- Likert scales can be used to measure levels of agreement, importance or frequency, just to name a few (Figure 15.3).

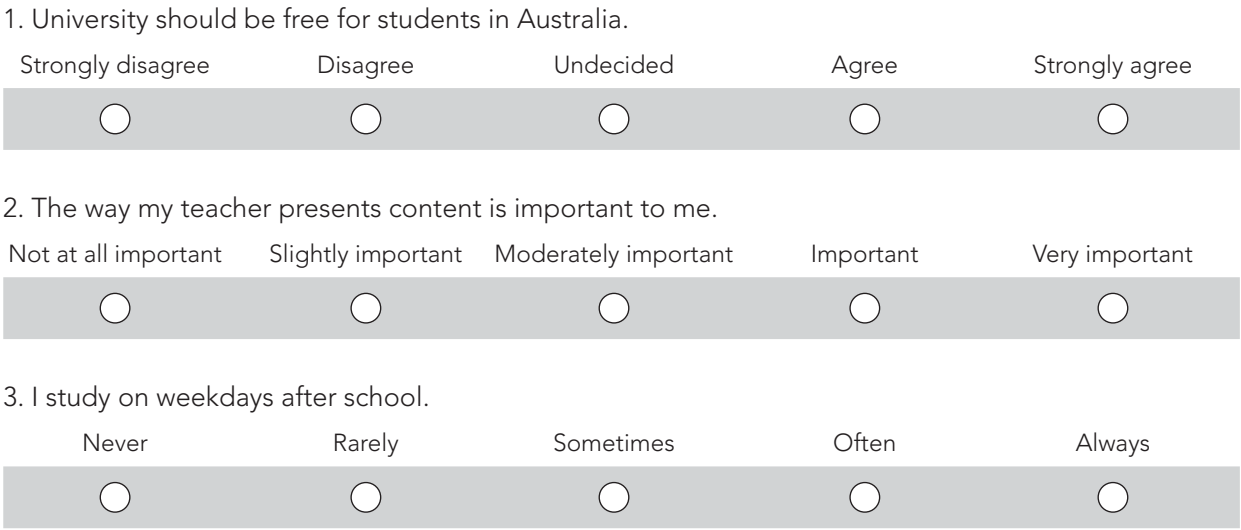


Figure 15.3

MIXED METHODS

Mixed methods: where qualitative and quantitative data are collected from participants in the same study.

- Utilising both interviews and rating scales in a study is an example using a mixed method design.

	Application	Strengths	Limitations
Mixed methods	• Qualitative and quantitative data are collected from participants in the same study. • Both interviews and rating scales are used in a study.	• A greater understanding of the research problem can be provided than using either a qualitative or quantitative method alone. • Both qualitative and quantitative methods can be used to complement each other, e.g., an interview can lead to the development of a checklist.	• Greater expertise from researchers is required to collect and analyse data. • The time required to collect and analyse data is greater than in just qualitative or just quantitative methods.

DIFFERENCES BETWEEN SUBJECTIVE AND OBJECTIVE DATA

Subjective data: data based on personal opinions and judgement.

- E.g., self-reported measures such as a checklist or Likert scale.

Objective data: data based on facts that can be supported through observation and measurements.

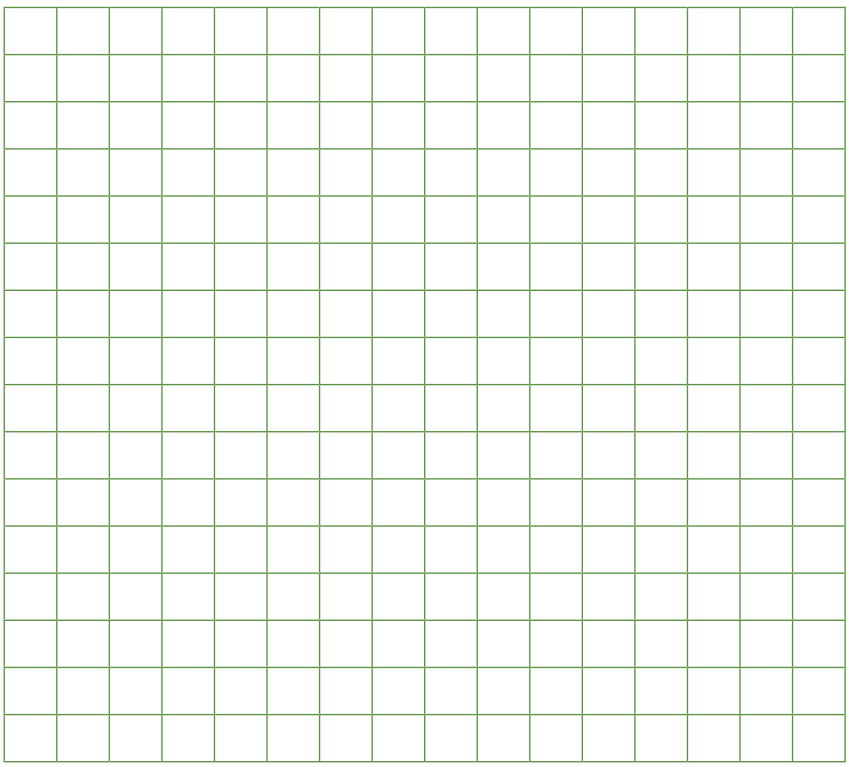
- E.g., physiological measures such as heart rate and breathing rate. Physiological measures are usually taken with a piece of equipment that measures physical activity in the body.

Question 1

Researchers are working on inserting a tiny spinal implant into patients with severe spinal injuries with the goal of restoring lower-body functioning. At the end of the journal article explaining the current research published on a popular website, readers were invited to click on one of two choices: whether they support the research continuing or whether they do not support the research continuing.

	Supportive of continued research	Not supportive of continued research
Number of participants	185	46

(a) Graph the results from the information above in the grid below. (5 marks)



(b) Explain **one** limitation of the sampling technique used in this experiment. (3 marks)

(c) Explain the reason why the data collected is quantitative rather than qualitative. (2 marks)

(d) (i) Participants clicked on one of the two options as shown below. Name the type of subjective measure used. (1 mark)

Supportive of continued research ❑ Not supportive of continued research ❑

(ii) Outline **two** limitations of using subjective measures in research. (2 marks)

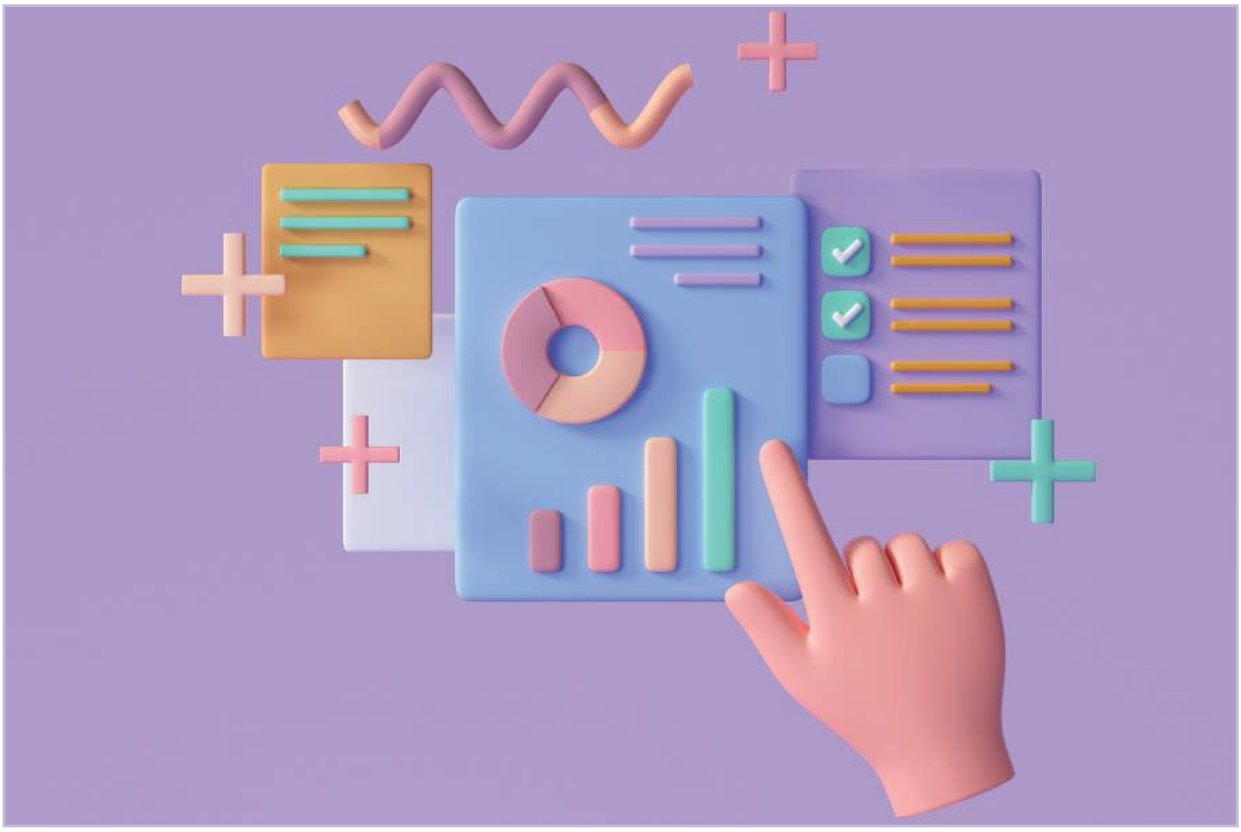
One:

Two:

Question 2

(a) Contrast sample data and population data. (2 marks)

PROCESSING AND ANALYSING DATA

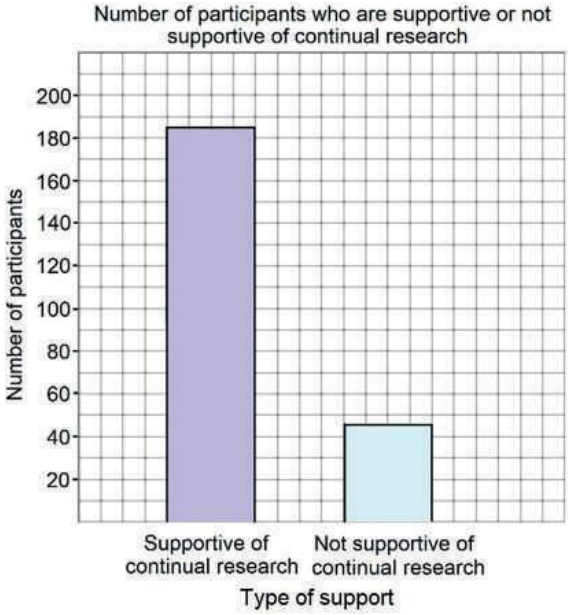


Key teaching points	Learn	Revise	Demonstrate
Processing and analysing data			
• Construct and interpret data displays			
○ Graphs – column, bar, line, histogram, scatterplot			
○ Tables – summary, frequency			
• Calculate and interpret the mean and median as measures of central tendency			
• Interpret Pearson's correlation coefficient as a measure of strength and direction of linear relationships			

CONSTRUCT AND INTERPRET DATA DISPLAYS

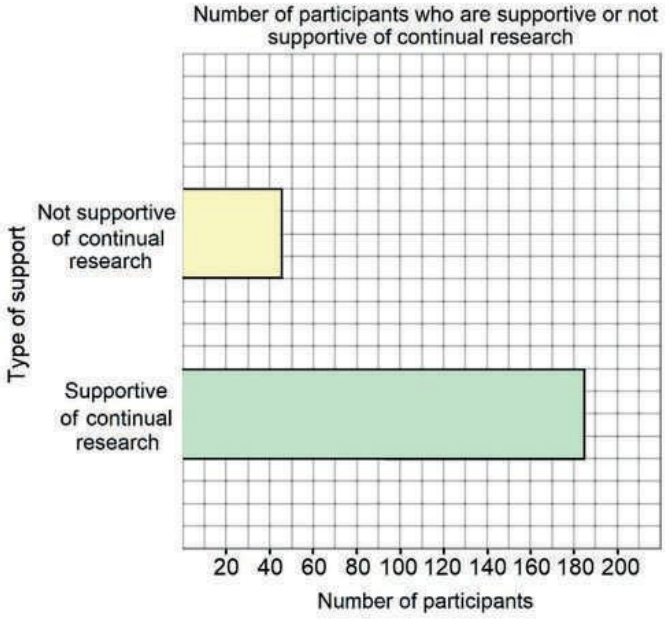
COLUMN GRAPH

- Column graphs are commonly used to display results from experimental research (the independent variable and dependent variables are plotted).
- Bars are oriented vertically.
- There are gaps between each bar.
- Bars used to compare different categories of data.
- Data is discrete.



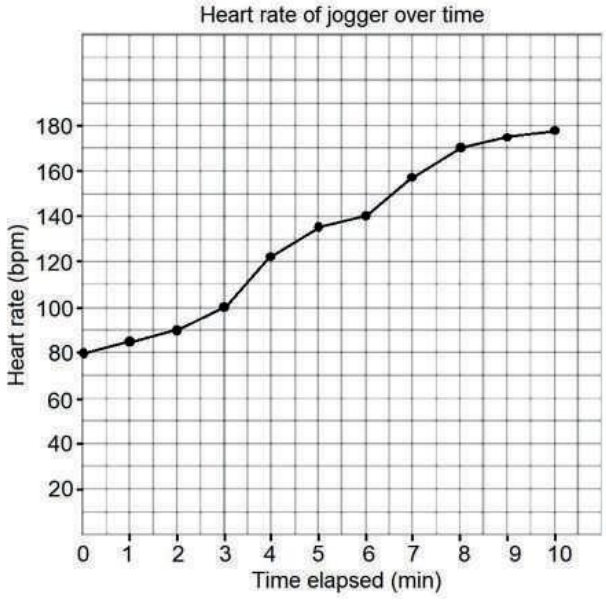
BAR GRAPH

- Bar graphs are commonly used to display results from experimental research (the independent variable and dependent variables are plotted).
- Bars are oriented horizontally.
- There are gaps between each bar.
- Bars used to compare different categories of data.
- Data is discrete.



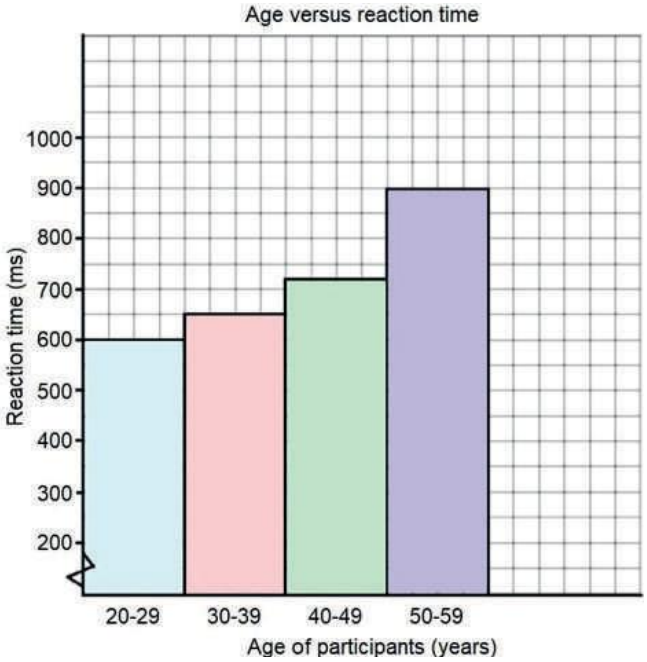
LINE GRAPH

- Line graphs are commonly used to display results from experimental research (the independent variable and dependent variables are plotted).
- Both variables are either increasing or decreasing at regular increments.
- Almost always used to show change over time with time being plotted on the x-axis.
- Data is continuous for both variables.



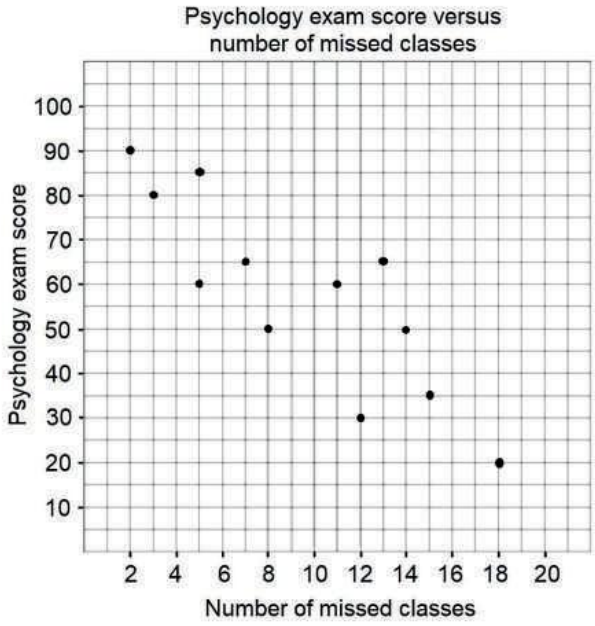
HISTOGRAM

- Histograms are typically used to display frequency distributions.
- Class intervals are on the horizontal axis, frequency is on the vertical axis.
- The bars touch each other.
- Data is continuous.



SCATTERPLOT

- Scatterplots are used to display results from correlational research.
- There are no independent or dependent variables, only pre-existing variables.
- Can plot variables on either axis.
- Shows the degree of correlation between two variables.



Continuous data
Data that can be measured, has an infinite number of possible values, and values can be broken down into smaller parts.
E.g., temperature, weight, time.

Discrete data
Data that can be counted, has a finite number of possible values, and values are unable to be broken down into smaller parts.
E.g., number of participants or items.

TABLES

Summary table: a table that visually summarises the key findings of a study.

- Table 16.1 is a summary table showing the level of sleepiness for a group of participants who spend less than ten hours per week playing games and a group who spend more than ten hours per week playing games. The table includes statistical comparisons between them (mean and standard deviation). The level of sleepiness was measured using a short questionnaire (rating scale) called the Epworth Sleepiness Scale (ESS).

	Hours spent playing games (per week)	Sleepiness (measured using the ESS)	
		Mean	Standard deviation
Group A	Less than 10 hours	10	5
Group B	More than 10 hours	16	2

Table 16.1

Frequency table: a table listing values and the number of times each value occurs in a data set.

- Frequency tables are a type of summary table.
- The frequency of a value is the number of times it occurs in a data set.
- The number of aggressive acts observed by male and female children is collated in Table 16.2.

	Number of aggressive acts
Males	22
Females	14

Table 16.2

Assumed prior mathematical skills developed through year 7–10

Percentage: the amount of a number shown in parts per hundred.

To calculate the percentage of a number, divide the number by the whole value and then multiply the result by 100.

Example: a research study included a sample of 72 adults who napped once a day and 108 who did not nap. Calculate the percentage of adults who did not nap.

Total sample size: 72 + 108 = 180 $\quad$ 108 ÷ 180 = 0.6 $\quad$ 0.6 × 100 = **60**%

Frequency distribution table: a tabulated representation of the number of times values occur within a data set, grouped in sections called class intervals.

Example: the numbers below shows raw test scores for a year 10 science class. Place the data within a frequency distribution table.

45, 24, 34, 19, 24, 37, 49, 11, 26, 46, 23, 14, 8, 33, 24, 36, 45, 33, 18, 46, 23, 27, 38, 18

Data from a frequency distribution table would be graphically displayed in the form of a histogram.

Class interval (raw test scores)	Frequency (number of students in class interval)
0 – 9	1
10 – 19	5
20 – 29	7
30 – 39	6
40 – 49	5

CALCULATE AND INTERPRET THE MEAN AND MEDIAN AS MEASURES OF CENTRAL TENDENCY

Measures of central tendency: descriptive statistics that produce the average value of a set of scores.

Mean: the measure of central tendency calculated by adding together values in a set of scores, then dividing by the number of values in the data set.

45, 76, 34, 8, 13, 54, 67

45+76+34+8+13+54+67 = 297

297 ÷ 7 = 42.4

Advantage

- All values in raw data are accounted for.

Disadvantage

- The mean is sensitive to outliers (extreme scores).

Median: the measure of central tendency calculated by listing the values in a set of scores in numerical order and selecting the value that is located in the middle of the list.

- If there are two numbers in the middle, add them together then divide by two.

45, 76, 34, 8, 13, 54, 67

8, 13, 34, **45**, 54, 67, 76

Median = 45

Advantage

- The median is not affected by outliers.

Disadvantage

- The median calculated may not be a number in the original data set if an average of two middle numbers was produced.

INTERPRET PEARSON'S CORRELATION COEFFICIENT AS A MEASURE OF STRENGTH AND DIRECTION OF LINEAR RELATIONSHIPS

Correlation: a statistical technique used to measure the linear relationship between two pre existing variables.

- There are two possible directions in a correlation.
- **Positive:**
  - Both variables either increase or decrease (↓↓ or ↑↑).
  - For example, the amount of school work and stress.
  - Data points plotted on a scatterplot slope upwards.
- **Negative:**
  - One variable increases as the other decreases (↓↑).
  - For example, the amount of sleep and level of fatigue.
  - Data points plotted on a scatterplot slope downwards.

There can also be zero or no correlation. This means there is no relationship between the two variables.

Pearson's correlation coefficient: the strength and direction of a linear relationship showed in numerical form (also known as Pearson's r).

- Pearson's correlation coefficient can fall between -1.0 and +1.0 with -1.0 being a perfect negative relationship, +1.0 being a perfect positive relationship and 0 having no relationship (Figure 16.1).
- The closer the coefficient is to either -1.00 or +1.00, the stronger the relationship is between the two variables. The closer the coefficient is to 0, the weaker the relationship between the variables.
- The strength of relationship can be classified as weak, moderate or strong, as shown in Figure 16.1 and Table 16.3.

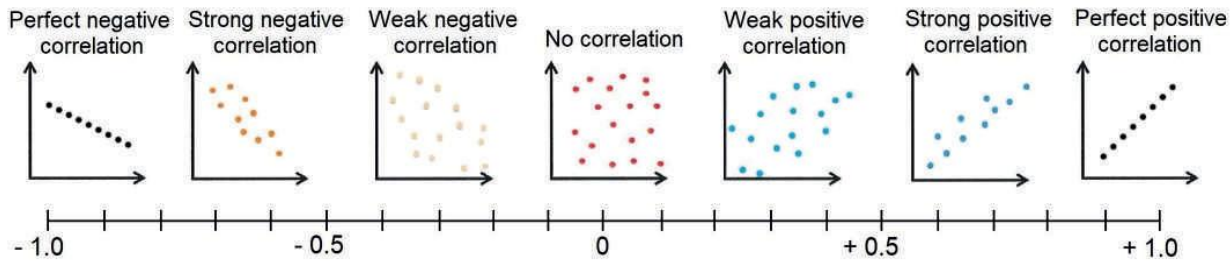
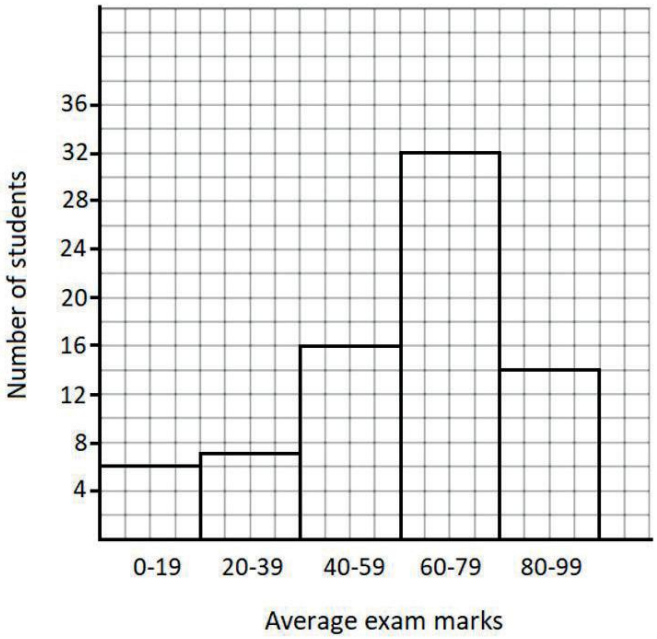


Figure 16.1

Correlation coefficient (r)	Strength of relationship
± 0.00 – 0.29	None (0.00) to weak
± 0.30 – 0.69	Moderate
± 0.70 – 1.00	Strong to perfect (1.00)

Table 16.3

Question 1



(a) Name the type of graph above. (1 mark)

(b) Suggest a title for the graph. (1 mark)

(c) Outline why the bars touch in this type of graph. (1 mark)

(d) Calculate the total number of students used in the research. (1 mark)

Question 2

A group of participants were used in research and their ages are as follows:

24, 35, 30, 19, 22, 36, 21, 30, 25, 35 and 31.

(a) Calculate the mean age of the participants. (1 mark)

(b) Calculate the median age of participants. (1 mark)

Question 3

A researcher explored the relationship between life events and illness. He produced a questionnaire made up of a list of twenty major life events such as moving house and getting a divorce. The researcher had 200 participants indicate the number of major life events they had experienced over the past three years by ticking a yes or no box next to each event in the list of twenty. Additionally, participants provided the number of days they missed work due to illness during the same time period.

(a) Explain how the researcher assuring the participants that their submitted data will remain anonymous may potentially improve the validity of the questionnaire. (1 mark)

(b) Name the type of self-report measure utilised when participants selected whether or not they had experienced major life events from a list. (1 mark)

(c) Outline **two** reasons why the research is correlational research. (2 marks)

One:

Two:

(d) List the **three** possible relationships for any two variables assessed in correlational research. (3 marks)

One: _____

Two: _____

Three: _____

(e) 'Results from the research showed that a greater number of life events was associated with higher levels of illness.' Is this a fair conclusion to make? Provide a justification for your response. (2 marks)

_____

_____

_____

_____

(f) A line of best fit can be drawn through data points on a scatterplot to show the trend of the data. If a line of best fit is unable to be drawn onto a scatterplot, outline what this means for the direction of correlation. (1 mark)

_____

_____

17 DRAWING CONCLUSIONS AND EVALUATION OF RESEARCH

Key teaching points	Learn	Revise	Demonstrate
Drawing conclusions			
• Evidence-based conclusions consistent with psychological evidence and relevance to the research question			
Evaluation of research			
• Application and use of the concept of validity as a measure of evaluating research			
• Application and use of the concept of reliability as a measure of evaluating research			
• Generalisability of sample to the population			
• Suggest relevant improvements to address limitations of research			
• Ethical implications			
• Critical evaluation of information from a range of scientific sources			

DRAWING EVIDENCE BASED CONCLUSIONS

Evidence-based conclusion: a conclusion derived from objective evidence, such as research from credible sources.

- When drawing an evidence-based conclusion, it needs to be supported with evidence aligning to the theory it relates to in the syllabus. In addition to this, both the conclusion and evidence must also align with the research question that has been asked.
- For the research question, 'Do children behave aggressively after observing adults behaving in an aggressive manner?' the 1961 Bobo doll study by Bandura, Ross and Ross can be used as psychological evidence. The key findings of the study can be discussed, as well as limitations of the study that should be taken into consideration when drawing a conclusion.

EVALUATION OF RESEARCH

VALIDITY AND RELIABILITY

Validity: the degree to which a measurement tool evaluates what it is designed to measure.

- If a mood rating scale included statements that allowed for mood to be measured, then the mood rating scale would have high validity.
- If the statements in the mood rating scale did not allow for mood to be measured, then the mood rating scale would have low validity.

Reliability: the degree to which a measurement tool produces consistent results.

- If an individual completes a mood rating scale once a month for three months and the results are similar each time, then the mood rating scale would have high reliability.
- If the results were very different each time, then the mood rating scale would have low reliability.

Beyond the syllabus

The validity of a study can be examined in terms of its internal and external validity. **Internal validity** examines whether a study was designed, conducted, and analysed without bias and whether researchers can be sure changes in the dependent variable were due to the independent variable and not confounding variables.

External validity assesses whether produced results can be generalised to the population the sample is taken from. The higher the generalisability of results, the greater the external validity of the study. Conducting a study in an environment similar to that of the population the sample was taken from increases external validity.

Validity can also be analysed in terms of the measurement tool used in a study. **Construct validity**, for example, involves checking whether the questions within a measurement tool assess the underlying theoretical construct it is claiming to measure. E.g., a mood rating scale consists of questions pertaining to emotions.

The **internal reliability** of a study can be used to gauge the extent to which a test is consistent within itself. The **split-half method** can be used to measure the internal consistency of a test by comparing one half of the test with the other. The test would have high internal reliability if both halves of the test produced similar results.

External reliability enables researchers to assess the degree to which a measurement tool produces consistent results each time it is administered. An easy way to assess external reliability is by repeating a test a second time and comparing the results produced. If results are similar, then there is high **test-retest reliability**.

GENERALISABILITY OF SAMPLE TO THE POPULATION

- A study with good generalisability means that the results collected from the sample can be applied to the population. Hypothetically, a new sample should be able to be selected from the population, the research be replicated, and the results be similar to those found in the original sample.

Generalisability: the extent to which results gathered from a sample in research can be applied to other situations.

- For a study to have good generalisability, the sample needs to be representative of the population. Choosing a suitable sampling method that allows for the sample to be representative of the population is therefore critical, however it is important to note that obtaining a perfectly representative sample is rare.
- While convenience and random sampling does not tend to allow for the sample to be representative, stratified sampling does because participants are selected from groups in the same proportions that they appear in the population.

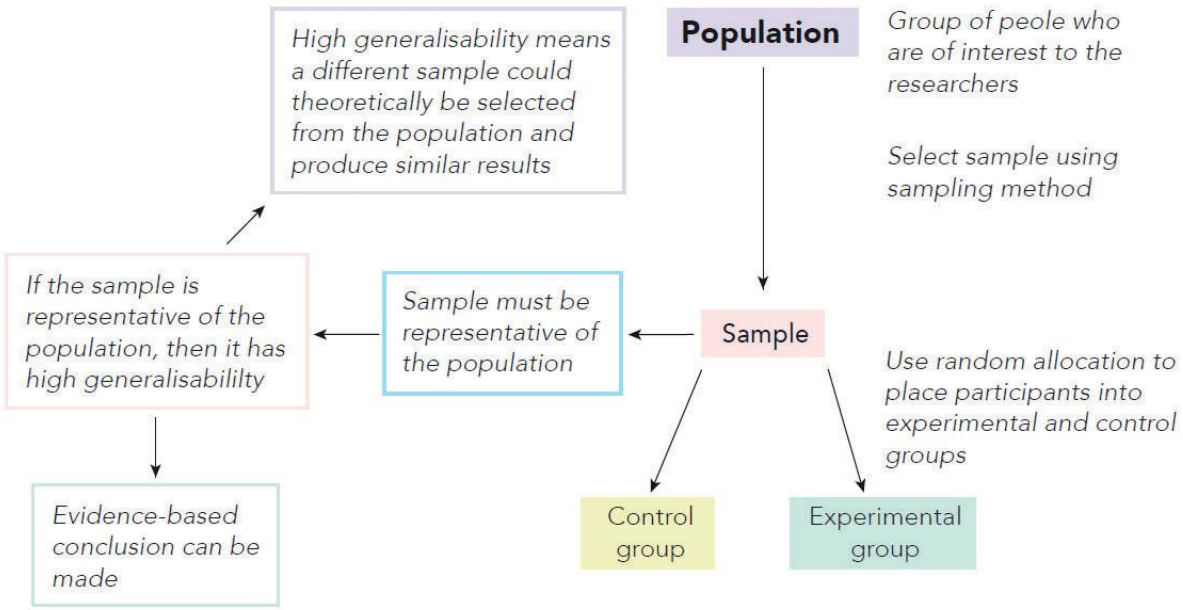


Figure 17.1 The development of a study with high generalisability.

ADDRESSING LIMITATIONS OF RESEARCH

Limitation	How to address limitation
Not knowing if the independent variable influenced the dependent variable	• Use a control group to act as a comparison for the experimental group. A control group indicates whether it is the independent variable affecting the dependent variable, or another variable.
Extraneous variables	• Use random allocation when placing participants into control and experimental groups. • Be sure participants are not aware of which group they have been allocated to. • Eliminate the experimenter effect. • Monitor variables to ensure they are controlled. • Use standardised instructions and procedures. • Conduct the experiment in a controlled environment (such as a laboratory).
Confounding variables	• Control extraneous variables so they do not develop into confounding variables.
Demand characteristics	• Use a placebo (fake treatment with no active effect). • Eliminate the experimenter effect. • Use a single-blind procedure so participants are unaware of what group they are in. • Use deception to prevent participants from knowing the aim of the study.
Experimenter effects	• Instead of using a single-blind procedure, use a double-blind procedure where neither experimenter nor participants are aware of which conditions participants are in, or the hypothesis. • Use a sampling technique involving the least amount of researcher bias, such as stratified sampling.
Low reliability	• Use measurement tools that have been empirically measured to show they collect reliable results. • Replicate the study and carefully analyse it to detect and reduce random errors.
Low validity	• Control extraneous variables. • Improve measurement techniques. • Use a single or double-blind procedure. • Include a control group. • Use random allocation when placing participants into control and experimental groups.
Sample is not able to be generalised to the population	• Use a stratified sampling method rather than convenience or random to create a sample representative of the population. • Use the same number of participants in each group. • Use random allocation when placing participants into control and experimental groups. • Be sure participants are not aware of which group they have been allocated to. • Extraneous variables need to be controlled.

ADDRESSING ETHICAL IMPLICATIONS

Ethical implication	How to address ethical implication
Participants not being fully aware of the purpose of the study, what they are required to do, or potential risks associated with participating	Participants must give informed consent.
Participants feeling pressured to be part of a study	Uphold the ethical guideline of voluntary participation.
Participants feeling distressed during a study	Remind participants of their withdrawal rights.
Participants changing their behaviour due to knowing the aim of the study	Use deception so participants are unaware of the aim of the study.
Extensive and unrequired personal information being collected from participants	Maintain privacy whereby only required information relevant to the study is collected from participants.
Participant information accessible to individuals other than the researcher	Maintain confidentiality where participant information is securely stored then disposed of when no longer needed.
Participants having mistaken ideas about themselves, the purpose of the study or other participants in the study	Provide debriefing at the conclusion of the study.

CRITICAL EVALUATION OF INFORMATION FROM A RANGE OF SCIENTIFIC SOURCES

- When looking at scientific sources such as published journal articles, be sure to check if they have been peer-reviewed. Peer-reviewed articles have been published in a scholarly journal and reviewed by experts on the topic. These articles will have high validity.
- Check for the credibility of the source by looking at the qualifications of the author and, whether the author has an affiliation with a government agency, university, non-for-profit organisation or corporation.
- Evaluate the accuracy and the reliability of the source by making sure there are references that support the information provided. Make sure that included statistical data or facts can be confirmed by other sources.
- Assess whether the information is subjective (based on opinion) or objective (based on fact). Consider that subjective information may be biased.

Question 1

Kaye and Rebecca received approval from the ethics committee at the university they attend to run an observational study to compare aggression seen in male and female children. Both Kaye and Rebecca watched a pre-primary class during their 20-minute recess time and individually recorded the number of times they heard and saw/witnessed male and female children display aggressive behaviour. The female children displayed 14 aggressive acts (verbal abuse, pushing and kicking) while male children displayed 22 acts of aggression.

(a) Draw a frequency table with the data collected during the study. (3 marks)

(b) If Kaye and Rebecca were to display their collected data in graph form, which type of graph would be the most suitable? (1 mark)

(c) Provide a justification for the response given for part (b). (1 mark)

(d) Write a directional hypothesis Kaye and Rebecca could have developed. (4 marks)

(e) Explain how the reliability of data collection by Kaye and Rebecca can be measured. (2 marks)

(f) The final step in scientific method is to share findings. Explain why this is an important step in relation to reliability. (2 marks)

Question 2

(a) Contrast between reliability and validity. (2 marks)

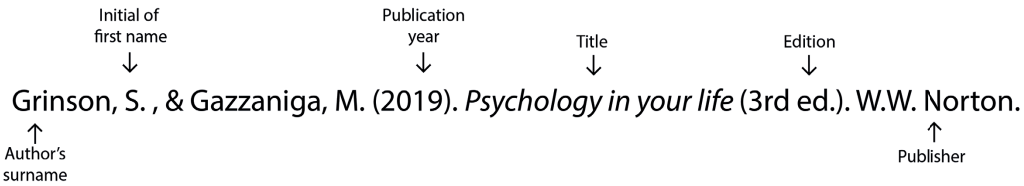
(b) Explain the association between the representativeness of a sample used and the generalisability of the same sample to the population. (2 marks)

BOOK

In text citation: Alzheimer's and Parkinson's have similarities (Doidge, 2017).

Doidge (2017) states that Alzheimer's and Parkinson's have similarities.

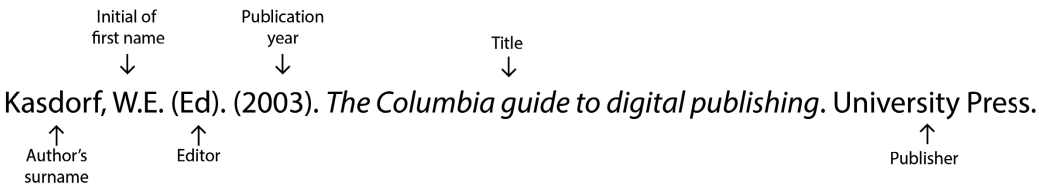
BOOK WITH MORE THAN ONE AUTHOR AND A DIFFERENT EDITION



In text citation: Classical conditioning involves reflexive responses (Grinson & Gazzaniga, 2019).

Grinson and Gazzaniga (2019) explained how classical conditioning involves reflexive responses.

BOOK WITH EDITOR



In text citation: Digital publishing has improved in the last ten years (Kasdorf, 2003).

WEBSITE

In text citation: The whole family can help train the dog (Bender, 2019).

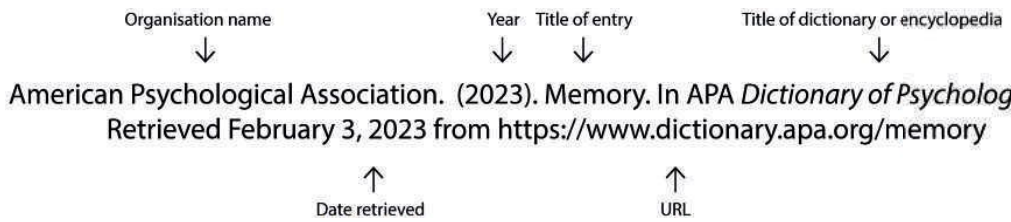
WEBSITE WITH NO AUTHOR OR DATE

In text citation: One role of the department is to preserve collections for future research (Western Australian Museum, n.d.).

VIDEO FILE

If there is an author, start with their surname, initial of their first name. [Screen name].

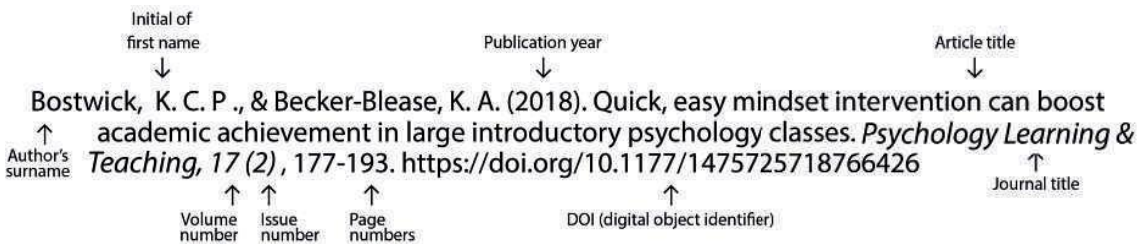
ONLINE DICTIONARY OR ENCYCLOPEDIA



NEWSPAPER ARTICLE: PRINT AND ONLINE

For a printed article, write the newspaper or magazine title, comma, and then the page number..

JOURNAL ARTICLE WITH LESS THAN THREE AUTHORS



In text citation: Having a growth mindset produces greater academic performance (Bostwick & Becker-Blease, 2018).

As Bostwick and Becker-Blease (2018) states, having a growth mindset produces greater academic performance.

JOURNAL ARTICLE WITH THREE OR MORE AUTHORS

In text citation: Hoyek et al. (2012) explained how further investigations should focus on gender differences.

Further investigations should focus on gender differences (Hoyek et al., 2012).

If quoting: 'We further concluded that the VMRT and 2D MR tests may not be well-designed for elementary-school children.' (Hoyek et al., 2012, p. 1).

GUIDE TO WRITING AN EXTENDED RESPONSE

Psychology WACE exam structure

- The Psychology WACE exam requires students to answer two extended response questions.
- The first question (part A) is weighted at 10% and is compulsory, while the second question (part B) is weighted at 20% with an option of two questions.
- Science inquiry content may be incorporated into either question and more than one topic from the syllabus can be covered in either, or both questions.

Recommendations for a well-written response

- Writing English-style essays is not a necessity of the ATAR Psychology course. This means an introduction and conclusion is not required, nor are introductory and concluding sentences in each paragraph.
- Group information into paragraphs and write them in a logical order.
- Starting each paragraph at the top of a new page provides space at the bottom to add information remembered later. It also creates space for your teacher to provide feedback.
- Starting each paragraph with the definition of a key term mentioned in the question provides opportunities to utilise psychological terminology.
- Marks are not allocated for dates of research.
- Marks are not allocated for the first name of researchers and theorists; last names are enough.
- Write the full term and include the acronym in brackets immediately after. For the rest of the extended response, write the acronym only. E.g., general adaptation syndrome (GAS)
- You are not required to include research or content not explicitly included in the syllabus. Extended response questions in WACE exams are designed to enable full marks to be achieved from syllabus content alone.
- Relevant diagrams, flowcharts, tables and graphs can be included, however, they require labels and must be explained within the relevant paragraphs.
- Four marks are typically allocated for the use of psychological language.

The following is a sample extended response question, a written response that would achieve full marks, and the sample marking key.

Question 11 **(23 marks)**

Nicotine is a psychoactive substance found in cigarettes that stimulates receptors in the brain causing the release of dopamine. Logan started smoking cigarettes after watching a group of teenagers similar to his age using them at a beach party. Logan attended parties at the beach most weekends and smoked cigarettes each time. After a few months Logan began experiencing a rush of pleasure and cigarette cravings whenever he went to the beach whether or not it was for a social event. Eventually, Logan decides he needs help to quit smoking and sees a therapist who suggests the use of classical conditioning to end the addiction.

Referring directly to the scenario, write an extended response.

In your answer you must:

- explain how operant conditioning can explain the early stages of a smoking addiction. (3 marks)
- describe how the continuing dependence on nicotine, or the difficulty in stopping smoking, can be explained by negative reinforcement. (3 marks)
- explain how classical conditioning has led to Logan feeling a rush of pleasure, or cravings each time he is at the beach. (8 marks)
- outline how classical conditioning can be utilised to end Logan's addition. (5 marks)
- correctly use psychological language to clearly demonstrate psychological understandings. (4 marks)

Operant conditioning is a type of learning whereby the consequence of behaviour determines whether they will be repeated or not. In the early stages of a smoking addiction, positive reinforcement occurs (✓) as smoking produces a pleasurable feeling – this is the addition of a stimulus (✓), that increases the likelihood of smoking again – this is the reinforcement of the behaviour (✓). At this point it would be difficult to stop smoking as doing so would cause unpleasant withdrawal symptoms (✓). Taking up smoking again would stop the withdrawal symptoms; thus the behaviour of smoking is reinforced (✓) as the unpleasant symptoms are removed (negative) (✓).

When Logan smokes cigarettes, he experiences pleasure and cravings that make him want to continue smoking (✓). Classical conditioning demonstrates how smoking each time he was at a beach party (✓) eventually led to Logan craving cigarettes and experiencing pleasure by just being at the beach.

Beach (NS) → no response

Smoking cigarette (UCS) → pleasurable feeling / craving (UCR)

Beach (NS) + smoking cigarette (UCS) → pleasurable feeling / craving (UCR)

Beach (CS) → pleasurable feeling / craving (CR)

The diagram above shows how the beach produces no initial response in Logan and is the neutral stimulus (NS) (✓). Smoking cigarettes is the unconditioned stimulus (UCS) (✓) that automatically produces the unconditioned response (UCR) of pleasure and cravings (✓).

After Logan smokes at the beach multiple times, eventually just being at the beach, without smoking, is enough to for him to experience cravings and pleasure (✓). Going to the beach becomes the conditioned stimulus (CS) (✓) that causes the conditioned response (CR) of pleasurable feelings and cravings (✓).

Classical conditioning can be used to help Logan break his smoking habit with the introduction of an unpleasant stimulus. For example, each time Logan smokes a cigarette (NS) (✓), he is exposed to the smell of vomit (UCS) (✓) which causes him to feel nauseous (UCR) (✓). After a few pairings of the NS and UCS, smoking a cigarette (CS) (✓) causes him to feel nauseous (CR) (✓).

Use of psychological language to demonstrate psychological knowledge (4)

Description	Marks
Operant conditioning	
Positive reinforcement can explain early stages of a smoking addiction	1
The stimulus of a pleasurable feeling (positive)	1
Reinforces the behaviour of smoking (reinforcement)	1
Stopping smoking causes withdrawal symptoms / unpleasant symptoms	1
In order to remove the unpleasant symptoms (negative)	1
Smoking another cigarette must occur (reinforcement)	1
Subtotal	**6**
Classical conditioning	
Smoking a cigarette leads to a craving / feeling of pleasure	1
Logan smoked cigarettes each time he was at a beach party	1
After numerous parties, just being at the beach was enough to cause Logan to crave a cigarette / experience pleasure	1
Neutral stimulus: beach	1
Unconditioned stimulus: smoking a cigarette	1
Unconditioned response: experiencing cravings / feelings of pleasure	1
Conditioned stimulus: beach	1
Conditioned response: experiencing cravings / feelings of pleasure	1
Subtotal	**8**
Classical conditioning to stop the addiction	
E.g., Each time Logan smokes a cigarette (NS), he is exposed to the smell of vomit (UCS) which causes nausea (UCR). After a few pairings, smoking a cigarette (CS) causes nausea (CR).	
Neutral stimulus: smoking a cigarette / imagining smoking / looking at an image of a cigarette	1
Unconditioned stimulus: any relevant unpleasant stimulus	1
Unconditioned response: any relevant unpleasant response	1
Conditioned stimulus: smoking a cigarette / imaging smoking / looking at an image of a cigarette	1
Conditioned response; any relevant unpleasant response	1
Subtotal	**5**
Use of psychological language	
Coherent paragraphs that are in logical order. Consistent, extensive, and correct use of relevant psychological terminology. Meaning of content is not hindered by grammar and punctuation.	4
Coherent paragraphs that are in logical order. Range of mostly correct psychological terminology used. Meaning of content is not hindered by grammar and punctuation, although there may be some errors.	3
Paragraphs are used. Simple psychological terminology used. Meaning of content is not hindered by grammar and punctuation, however there may be some errors.	2
Paragraphs are not used. Some psychological terminology is correct. Limited correct spelling, grammar and punction that may hinder meaning of content.	1
Subtotal	**4**
Overall total	**23**

ANSWERS TO REVIEW QUESTIONS

CHAPTER ONE

Question 1

(a)

Description	Marks
The brain is unable to process stimulus energy.	1
Stimulus energy is converted into electrochemical energy which can be processed by the brain.	1
Total	**2**

(b)

Description	Marks
Sensation and perception occur so quickly one after the other.	1
They are experienced as one seamless event.	1
Total	**2**

Question 2

(a)

	Encoding	Storage	Retrieval
Reading an article in a magazine	✓		
Telling your friend the ending to a movie you watched last month			✓
Walking past a shop and realising you have been to the shop before			✓
Keeping in mind the artist of a song the radio host announced		✓	

(b)

Description	Marks
Short-term memory	1
Total	**1**

(c)

Description	Marks
The duration of information able to be held in the sensory store is up to 4 seconds.	1
The duration of information able to be held in the long-term store is relatively permanent.	1
Total	**2**
Accept any other relevant answer.	

(d) (i)

Description	Marks
Procedural memory	1
Total	**1**

(ii)

Description	Marks
Episodic memory	1
Total	**1**

(iii)

Description	Marks
Semantic memory	1
Total	**1**

(e)

	Procedural memory	Declarative memory
Whether or not conscious thought is required	Conscious thought is not required	Conscious thought is required
Type of information recalled	Recall of how to do things	Recall of factual information

(f)

Description	Marks
Procedural	1
Total	**1**

(g)

Description	Marks
The information is lost / information fades rapidly	1
Total	**1**

(h)

Description	Marks
We do not pay attention to all the information.	1
Any **one** of: • Because we do not have conscious control over sensory memory. • Because a large amount of information is lost or unattended to.	1
Total	**2**

Question 3

(a)

Description	Marks
Iconic memory	1
Total	**1**

(b)

Description	Marks
Phonological loop	1
Total	**1**

(c)

Description	Marks
Sensory memory store / echoic memory	1
Long-term memory store	1
Total	**2**

(d)

Description	Marks
Any **two** of: • Controls which information enters or exists short-term memory • Decides which information arriving from sensory-memory will be attended to • Switches attention between tasks • Integrates information from the visuospatial sketchpad and phonological loop • Plays a major role in planning behaviour • Plays a major role in controlling behaviour • Controls which information will arrive from long-term memory • Selects strategies to use when problem solving	1–2
Total	**2**
Accept other relevant answer	

CHAPTER TWO

Question 1

(a) (i)

Description	Marks
Hippocampus	1
Total	**1**

(ii)

Description	Marks
Stores episodic memories temporarily	1
Before they are moved to the pre-frontal cortex	1
Total	**2**

(iii)

Description	Marks
The amygdala strengthens	1
Episodic memories stored in other areas of the brain	1
Total	**2**

(iv)

Description	Marks
Henry Molaison was no longer able to transfer information from short-term store into the long-term store	1
He would forget each time he sat cognitive tests	1
He was unable to provide informed consent as he could not remember each day that passed	1
Total	**3**

Question 2

(a)

Description	Marks
Proactive interference	1
The old information (old postcode)	1
Interferes with the ability to remember the new information (new postcode)	1
Total	**3**

(b) (i)

Description	Marks
Psychological repression	1
Thought suppression	1
Total	**2**

(ii)

Description	Marks
To reduce anxiety	1
Total	**1**

Question 3

(a)

Description	Marks
The correct alternative in a multiple-choice question gives a direct retrieval cue / more cues than a short-answer question.	1
Any **two** of: • This provides a direct retrieval point to access the information in long-term memory • By presenting the correct answer among a set of alternatives multiple-choice questions test recognition memory, not recall memory • Recognition is a more sensitive measure of long-term memory than recall	2
Total	**3**

(b)

Description	Marks
The colleagues who stayed in the meeting room had access to cues as they were in the room where the presentation was given	1
Colleagues in the staff room did not have access to the same cues as they were tested in a different room to where the presentation was given	1
Material is better recalled in the context in which it was encoded than in a context in which it was not encoded	1
Total	**3**

Question 4

(a)

Description	Marks
Giovanni asks students to select the correct road rule from a list of alternatives (such as a multiple-choice test)	1
Total	**1**
Accept other relevant answer	

(b)

Description	Marks
Giovanni teaches his students how to parallel park and a week later reteaches the skill to see what was remembered.	1
Total	**1**
Accept other relevant answer	

(c)

Description	Marks
Giovanni asks his students to list five road rules.	1
Total	**1**
Accept other relevant answer	

CHAPTER THREE

Question 1

(a)

Description	Marks
Maintenance rehearsal / rehearsal Prolonging information in the short-term memory So that it is able to be encoded and moved to long-term memory	1 1 1
Total	**3**

(b) (i)

Description	Marks
Maintenance rehearsal	1
Total	**1**

(ii)

Description	Marks
Elaborative rehearsal	1
Total	**1**

Question 2

(a)

Description	Marks
There is a steep decline in memory retention over the first day	1
Then a more gradual decrease in memory retention over the following 5 days	1
Total	**2**

(b)

Description	Marks
The spacing effect refers to the increased ability to retain information	1
When learning is spread over a period of time instead of amassed at one point in time	1
Total	**2**

(c)

Description	Marks
Using non-existent words prevented semantic encoding as these words had no meaning	1
This allowed for the focus of the experiment to be solely on the retention of information *(accept other relevant reason)*	1
Instead, structural and phonemic encoding (seeing the words and repeating them) occurred	1
Non-existent words only allow for shallow processing	1
Total	**4**

(d)

Description	Marks
Participant variables	1
Prior experiences of and memories attached to existing words is eliminated	1
Total	**2**

Question 3

(a)

Description	Marks
Neurofibrillary tangles	1
That breakdown the microtubule structures supporting the axon of neurons	1
Total	**2**

(b)

Description	Marks
They start to waste away / they atrophy	1
Total	**1**

CHAPTER FOUR

Question 1

(a) (i)

Description	Marks
Magpie	1
Total	**1**

(ii)

Description	Marks
Fear/crying	1
Total	**1**

(iii)

Description	Marks
Mother screaming	1
Total	**1**

(iv)

Description	Marks
Magpie	1
Total	**1**

(v)

Description	Marks
Fear/crying	1
Total	**1**

(b)

Description	Marks
The conditioned stimulus – magpies (1) should be presented to Bianca without the unconditioned stimulus her mother screaming (1)	1–2
This should be repeated numerous times	1
Total	**3**

(c)

Description	Marks
An organism responds in the same way to a stimulus that is similar to the original conditioned stimulus	1
Bianca becomes fearful when she sees any type of bird	1
Total	**2**

Question 2

(a)

Description	Marks
Extinction	1
Total	**1**

(b)

Description	Marks
Spontaneous recovery	1
Total	**1**

Question 3

(a)

Description	Marks
The loud noise (unconditioned stimulus) caused intense fear / was highly traumatising	1
Total	**1**

(b)

Description	Marks
Albert was conditioned to experience a fear response	1
He was subjected to psychological harm	1
Total	**2**

CHAPTER FIVE

Question 1

(a)

Description	Marks
Observational learning	1
Total	**1**

(b) (i)

Description	Marks
The addition of confinement	1
To deter a person from murdering others	1
Total	**2**
Accept other relevant added stimulus	

(ii)

Description	Marks
Removal of freedom	1
To deter a person from murdering others	1
Total	**2**
Accept other relevant removed stimulus	

(c) (i)

Description	Marks
Drug	1
Total	**1**

(ii)

Description	Marks
Nausea	1
Total	**1**

(iii)

Description	Marks
Violent films	1
Total	**1**

(iv)

Description	Marks
Violent films	1
Total	**1**

(v)

Description	Marks
Nausea	1
Total	**1**

(d)

Description	Marks
Exposure to the violent films without being simultaneously injected with drugs will eventually stop nausea from occurring Exposure to the conditioned stimulus in the absence of the unconditioned stimulus will eventually stop the conditioned response	1 1 1 1 1 1
Total	**6**

Question 2

(a)

Description	Marks
Initially the cat managed to get out of the puzzle box and receive the food through trial and error.	1
The cat accidentally pushed the lever causing the door to open and food to be made accessible.	1
The cat then chose to push the lever each time it was placed in the box, this is operant conditioning.	1
Total	**3**

(b)

Description	Marks
Antecedent: the hungry cat was placed in a puzzle box	1
Behaviour: the cat managed to press the lever in the box after moving around	1
Consequence: the door of the puzzle box opened allowing the cat to exit and eat the food	1
Total	**3**

(c)

Description	Marks
Fixed interval schedule	1
Food was made available to the pigeon at set time intervals	1
Total	**2**

CHAPTER SIX

Question 1

(a)

Description	Marks
Model	1
Total	**1**

(b)

Description	Marks
One mark for identifying factor, one mark for relating the factor to the scenario.	
Attention Relate factor to scenario: Chelsea pays attention to the girl pushing the boy off the swing	1–2
Retention Relate factor to scenario: Chelsea has the ability to retain the information in her long-term memory	1–2
Reproduction Relate factor to scenario: Chelsea has the physical ability to push a young child off the swing also	1–2
Motivation Relate factor to scenario: Chelsea will be able to use the swing if she pushes a child off it	1–2
Reinforcement Relate factor to scenario: Chelsea sees that the girl that pushed the boy off the swing was then able to play on the swing	1–2
Total	**10**

Question 2

(a)

Description	Marks
Positive reinforcement is used The addition of a token Encourages the continuation of desired behaviours	1 1 1
Total	**3**

(b) (i)

Description	Marks
Any **two** of: • Token economies only address the effects of schizophrenia • Token economies do not address the cause of schizophrenia • The use of token economies in the treatment of schizophrenia is not long lasting	1–2
Total	**2**

(ii)

Description	Marks
Participants who do not wish to be part of the program miss out on certain privileges	1
All participants should have access to positive experiences while receiving treatment otherwise their time there would be more difficult for them	1
Total	**2**
Accept other relevant answer	

(c) (i)

Description	Marks
It may not affect long-term behaviour	1
Life inside the prison is not representative of life outside of prison	1
Total	**2**
Accept other relevant answer	

(ii)

Description	Marks
Any **one** of: • To prevent theft of tokens • As a means to monitor progress	1
Total	**1**

(iii)

Description	Marks
Any **one** of: • Participants may become frustrated / angry / withdrawn • Participants may opt out of the program • Participants may lose trust in prison staff	1
Total	**1**
Accept other relevant answer	

CHAPTER SEVEN

Question 1

(a) (i)

Description	Marks
Source of motivation: social	1
Stephen wants to fit in with his friends so agrees to drink alcohol	
Total	**1**

(ii)

Description	Marks
Source of motivation: emotional	1
Aaliyah is trying to avoid failure by studying	
Total	**1**

(iii)

Description	Marks
Source of motivation: cognitions	1
Cooper challenges himself intellectually by learning Spanish	
Total	**1**

Question 2

Description	Marks
Relatedness: the need people have to form social connections with others	1
Sumaya makes friends with other people who like art	1
Autonomy: the desire people have to feel in control of their own behaviour	1
Sumaya can try the art style she chooses	1
Competence: the need to experience achievement from mastering new skills	1
Sumaya feels that she is improving in her art skills	1
Total	**6**

CHAPTER EIGHT

Question 1

(a)

Description	Marks
Cognitive needs The mental process of gaining knowledge and understanding	1 1
Aesthetic needs The desire for the beauty in the world that contributes to a sense of fulfillment	1 1
Transcendence needs The need for transcendent experiences	1 1
Total	**6**

(b)

Description	Marks
Gabe will place more importance on being able to pay the mortgage	1
Being able to pay the mortgage to keep their home is a deficiency need (it is a cognitive need)	1
Educational growth is a growth need (it is a safety need)	1
People are not motivated by growth needs until their deficiency needs are met	1
Total	**4**

(c)

Level of hierarchy	Name of level	One piece of evidence that level has been satisfied
First level	Physiological needs (1)	Any **one** of: • she has meals available to her • she has accommodation to stay in • she has somewhere to sleep (1)
Second level	Safety needs (1)	Any **one** of: • she has curfews • she has set times to do homework • she has somewhere to stay for the rest of her time in high school (1)
Third level	Love and belonging needs (1)	Any **one** of: • she has made a friend • she feels cared for by her house mother (1)

CHAPTER NINE

Question 1

(a)

Description	Marks
Life satisfaction	1
Affective balance	1
Total	**2**

(b)

Description	Marks
Cognitive: life satisfaction is the cognitive evaluation one makes of their life	1
Affective: the positive and negative emotions experienced	1
Total	**2**

Question 2

(a)

Description	Marks
An individual's acknowledgement of their personal strengths, weaknesses and past decisions and behaviours	1
Total	**1**

(b) (i)

Description	Marks
Purpose in life	1
High	1
Total	**2**

(ii)

Description	Marks
Self-acceptance	1
Low	1
Total	**2**

(iii)

Description	Marks
Autonomy	1
High	1
Total	**2**

(c)

Characteristic	Diener's model of subjective wellbeing	Ryff's six factor model of wellbeing	Marks
Emphasis on positive aspects of wellbeing		✓	1
Acknowledges that wellbeing is a multi-dimensional concept involving different parts of an individual's life	✓	✓	1
Strongly focuses on psychological wellbeing		✓	1
Describes wellbeing as subjective in nature	✓	✓	1
Emphasis on life satisfaction and affect	✓		1
Has three components that make up wellbeing	✓		1
External factors, such as social, economic, and cultural influences on wellbeing are not considered	✓	✓	1
Has six components that make up wellbeing		✓	1
		Total	**8**

CHAPTER TEN

Question 1

(a) (i)

Description	Marks
Alarm stage	1
Total	**1**

(ii)

Description	Marks
Adrenal glands	1
Total	**1**

(iii)

Description	Marks
Allows for a continual supply of blood sugar	1
Increases pain tolerance	1
Total	**2**

(iv)

Description	Marks
Decreases the performance of the immune system	1
Impairs cognitive ability	1
Total	**2**

(b)

Description	Marks
Resistance stage	1
Total	**1**

Question 2

(a)

Description	Marks
Checklist	1
Total	**1**

Question 3

(a) (i)

Description	Marks
Any two strategies, e.g., speaking with a counsellor, boxing at the gym, mindful colouring in.	1–2
Total	**2**
Accept other relevant responses	

(ii)

Description	Marks
Any two strategies, e.g., putting off working on the projects, telling herself she has no hope of meeting the deadlines, drinking three bottles of wine over a week.	1–2
Total	**2**
Accept other relevant responses	

CHAPTER ELEVEN

Question 1

(a)

Description	Marks
To increase the chances of survival	1
To restore energy levels in the body	1
Total	**1**

(b)

Description	Marks
The sleep cycle usually starts with NREM 1, progresses to NREM 2, NREM 3 and then enters REM sleep.	1
Total	**1**

(c)

Description	Marks
Four to six sleep cycles	1
Each lasts around 90 minutes	1
Total	**1**

(d)

Description	Marks
Muscles of the body (specifically the core muscles) would be completely relaxed	1
Physical movement, including getting out of bed and walking, would not be possible	1
Total	**2**

CHAPTER TWELVE

Question 1

(a)

Description	Marks
Partial sleep deprivation lasts for a few days.	1
Whereas chronic sleep deprivation lasts for at least three months.	1
Effects of partial sleep deprivation may only be temporary / may be reversed following sufficient sleep.	1
Whereas effects of chronic sleep deprivation may lead to severe ongoing psychological and physiological problems.	1
Total	**4**

(b)

Description	Marks
Any **two** of: • It aids in regulating the circadian rhythm. • It increases the amount of sleep. • It increases the duration of sleep. • It helps to prevent sleep deprivation.	1–2
Total	**2**

(c)

Description			Marks
Measurement tool	**Subjective or objective data collected**	**Data collected is qualitative, quantitative or both**	
PANAS	Subjective	Quantitative	1–2
n-back task	Objective	Quantitative	1–2
PSAS	Subjective	Quantitative	1–2
PSQI	Subjective	Quantitative	1–2
Online sleep diary	Subjective	Both	1–2
		Total	**10**

Question 2

(a)

Description	Marks
Sleep quality increased In participants who did not use their mobile phone 30 minutes before bed	1 1
Total	**2**

(b) (i)

Description	Marks
PANAS	1
Total	**1**

(ii)

Description	Marks
Mood improved in the participants	1
Who did not use their mobile phone 30 minutes before bed	1
Total	**2**

(d)

Description	Marks
Longitudinal study design	1
Data was collected twice / pre-test data was collected and then data was collected again four weeks later	1
Total	**2**

CHAPTER THIRTEEN

Question 1

(a)

Description	Marks
Aoife would provide participants with an information letter covering details of the study.	1
Participants would be required to sign a consent form.	1
Total	**2**

(b)

Description	Marks
Voluntary participation was upheld.	1
Participants emailed Aoife using the details written on the flyers put up in the gymnasium.	1
Total	**2**

(c)

Description	Marks
Confidentiality refers to the way that information is safeguarded.	1
Privacy refers to the actual information collected from the participants.	1
Total	**2**

(d) (i)

Description	Marks
Any **two** of: • Aoife could secure collected information and data in a locked cupboard. • Aoife could destroy collected information when no longer needed for the study. • A number or code could be allocated to each participant rather than using their name.	1–2
Total	**2**

(ii)

Description	Marks
Completed consent forms	1
Completed questionnaires	1
Raw data, collated data or analysed data	1
Total	**3**

(e)

Description	Marks
Aoife would only collect information relevant to the study from participants.	1
Total	**1**

(f)

Description	Marks
Allowing participants to remove their results from her research	1
Correct any mistaken ideas participants have about the study / answer any questions the participants have	1
Provide the contact details of counselling services	1
Total	**3**

(g)

Description	Marks
Hospital	1
Total	**1**
Accept other relevant answer	

CHAPTER FOURTEEN

Question 1

(a)

Description				Marks
Type of sampling	**Ability to be representative of the population**	**Bias**	**Time and effort required**	
Convenience	Low	High	Low	1–3
Stratified	High	Low	High	1–3
Snowball	Low	High	Low	1–3
Random	High	Low	High	1
			Total	10

(b)

Description	Marks
The experimental group is subjected to the independent variable.	1
The control group is not subjected to the independent variable.	1
Total	**2**

(c)

Description	Marks
Participant selection refers to the process of selecting participants from a population to be part of the sample.	1
Participant allocation refers to the process of assigning participants to the experimental and control groups.	1
Total	**2**

(d)

Description	Marks
The experimenter effect are the expectations or behaviours of the researcher that may bias results	1
Demand characteristics are cues participants perceive during a study that lead them to believe they have discovered the aim of the study or expectations of the researcher	1
If the researcher unintentionally leads participants to believe they now know their expectations or desired outcomes for the study	1
Participants may change their behaviour to help create these desired outcomes	1
Total	**4**

Question 2

(a)

Description	Marks
• Participants are unable to give informed consent. • The privacy of the participants is invaded as where they are and what they are doing may be recorded.	1 1
Total	**2**
Accept other relevant answer	

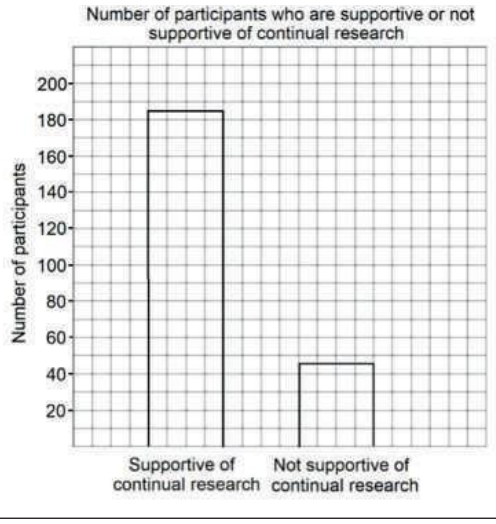
(b)

Description	Marks
Any **two** of: • It may be difficult for researchers to remain hidden while observing participants. • The recording of particular behaviours is subjective for researchers. • It may be difficult to place observed behaviours into categories.	1–2
Total	**2**
Accept other relevant answer	

CHAPTER FIFTEEN

Question 1

(a)

Description	Marks
Must be a bar graph (due to discrete data being provided)	1
Title includes both independent and dependent variable	1
Appropriate scales on both axes (includes compression symbol if scale is compressed)	1
Y-axis has correct label and unit of measurement	1
X-axis has correct label and unit of measurement	1
Total	**5**
	

(b)

Description	Marks
Only people who happen to read the journal article online are able to participate.	1
The sample will not be representative of the population it is taken from.	1
This means results will lack validity / will not be able to be generalised.	1
Total	**3**

(c)

Description	Marks
The researcher has counted the number of people who support the continuation of the research and the number of people who do not support the continuation of the research.	1
The information collected is numerical rather than descriptive.	1
Total	**2**

(d) (i)

Description	Marks
Checklist	1
Total	**1**

(ii)

Description	Marks
Any **two** of: • Responses are limited to the options provided. • It does not allow participants to give reasons for their responses. • Participants must rely on reading ability to participate. • Phrasing and order of statements can affect people's responses.	1–2
Total	**2**
Accept other relevant limitation	

Question 2

(a)

Description	Marks
Sample data is data collected from a specific sample.	1
Whereas population data is data collected from an entire population.	1
Total	**2**

CHAPTER SIXTEEN

Question 1

(a)

Description	Marks
Histogram	1
Total	**1**

(b)

Description	Marks
Must include both independent and dependent variable	1
E.g., Number of students versus average exam marks	
Total	**1**

(c)

Description	Marks
The data is continuous	1
Total	**1**

(d)

Description	Marks
75	1
Total	**1**

Question 2

(a)

Description	Marks
28	1
Total	**1**

(b)

Description	Marks
30	1
Total	**1**

Question 3

(a)

Description	Marks
Participants will be less likely to try to make themselves seem more socially desirable through their responses / reduces desirability bias	1
Total	**1**

(b)

Description	Marks
Checklist	1
Total	**1**

(c)

Description	Marks
A relationship between two variables is being investigated. There is no cause-and-effect relationship.	1 1
Total	**2**
Accept other relevant answer	

(d)

Description	Marks
Positive	1
Negative	1
No relationship	1
Total	**3**

(e)

Description	Marks
Yes	1
Only an association has been made, not causation.	1
Total	**2**

(f)

Description	Marks
No direction / no correlation	1
Total	**1**

CHAPTER SEVENTEEN

Question 1

(a)

Description	Marks
Title: must include both independent and dependent variable	1
Table includes headings for male and female	1
Correct data included	1
Number of aggressive acts displayed by male and female children Number of aggressive acts Males: 22 Females: 14	
Total	**3**

(b)

Description	Marks
Column or bar graph	1
Total	**1**

(c)

Description	Marks
The data is discrete / the data is not continuous / there are pieces of information being compared to each other.	1
Total	**1**

(d)

Description	Marks
Population (children)	1
Operational independent variable	1
Operational dependent variable	1
Predicted direction	1
E.g., It is hypothesised that children who are male will display more aggression, measured by counting the number of aggressive acts observed in 20 minutes, compared to females	
Total	**4**

(e)

Description	Marks
Compare Kaye's tally with Rebecca's tally	1
If their data is the same, then there is high reliability / if their data is not the same, then there is low reliability.	1
Total	**2**

(f)

Description	Marks
Other people are able to use the shared findings to reproduce the experiment.	1
Having the experiment completed multiple times allows for the possibility of improved reliability.	1
Total	**2**

Question 2

(a)

Description	Marks
Reliability is the degree to which a measurement tool produces consistent results	1
Whereas validity is the degree to which a measurement tool evaluates what it is designed to measure.	1
Total	**2**

(b)

Description	Marks
A sample that is representative of a population	1
May lead to the sample having high generalisability	1
Total	**2**

GLOSSARY

Extended content – *not explicitly written in the syllabus*

Adaptive coping strategies: beneficial and productive methods for managing stress that can decrease the adverse impacts of stress.

Adrenaline: a hormone secreted from the adrenal glands that increases heart rate and supports the conversion of glycogen into glucose in the liver.

Aesthetic: beauty as well as the appreciation of anything beautiful.

Affect: the experience and outward expression of emotions.

Alzheimer's disease: a brain disease that involves the degeneration of neurons in regions of the brain that are involved in cognitive skills and memory formation and retrieval.

Amotivation: the lack of intrinsic or extrinsic motivation.

Amygdala: a collection of nuclei deep within each temporal lobe that play a role in emotional responses and modulates the fear response.

Amyloid plaques: accumulations of scar tissue formed by deteriorating neurons and clusters of beta-amyloid protein.

Antecedent: internal and external conditions present immediately prior to a particular response.

Anterograde amnesia: the inability to form new memories after developing amnesia.

Articulatory process: repeats heard words in a loop allowing for maintenance rehearsal to occur (inner voice).

Atrophy: a decrease in size of a tissue or organ.

Attention: the mental capacity to concentrate on a specific stimulus while ignoring other stimuli

Axon: the long projection of a neuron that conducts electrical nerve impulses.

Axon terminals: the enlarged end points of axon branches that store neurotransmitters and release them into the synapse.

Bar graph: a graph with horizontal bars used to display different categories of data.

Capacity: the maximum amount of information able to be stored at a given time.

Case study: an in-depth investigation of an individual person, group of people or a single event.

Cell body: contains a nucleus that controls the activities of the neuron.

Central executive: a component of the working memory model responsible for coordinating the slave systems as well as controlling attention given to information and decision making.

Cerebellum: the structure underneath the cerebrum involved in balance, judging distance, and coordination of fine motor movement.

Cerebral cortex: the outermost layer of the brain made up of nerve cell tissue that is responsible for higher order processes.

Cerebrum: the largest part of the brain consisting of white matter on the inside, and the cerebral cortex on the outside.

Checklist: a collection of yes/no information on statements.

Chronic sleep deprivation: the persistent reduction of sleep over a long period of time.

Chronic traumatic encephalopathy (CTE): a progressive brain disease associated with repeated traumatic brain injuries that causes problems with cognition and memory.

Circadian rhythm: the bodily cycle that last around 24 hours and controls the nocturnal release of hormones including melatonin.

Classical conditioning: a form of learning where an existing reflex response is elicited by the repeated pairing of two unrelated stimuli.

Cognition: the mental process of gaining knowledge and understanding through the senses, personal experiences, and mental activity.

Column graph: a graph with vertical bars used to display different categories of data.

Conditioned response: a reflex response elicited by a previously neutral stimulus as a consequence of learning.

Conditioned stimulus: a stimulus that elicits a particular response due to learning.

Confederate: an individual who plays a rehearsed role as a participant in an experiment.

Confidentiality: the need for information collected from participants to be stored in a secure manner and then disposed of when no longer required.

Confounding variable: a type of extraneous variable that impacts the dependent variable and systematically changes as the independent variable changes.

Construct validity: the degree to which a measurement tool measures the concept it was designed to assess.

Continuous data: data that can be measured and has an infinite number of possible values that can be broken down into smaller parts.

Continuous reinforcement: type of reinforcement where a reinforcer is provided after each desired response.

Control group: a group of participants exposed to all conditions except the independent variable.

Controlled observation: researchers observe participants in an environment that is structured, such as a laboratory.

Controlled variables: where variables that stay consistent throughout an experiment.

Convenience sampling: participants that are easy to access are selected.

Coping: the process by which an individual manages the challenges they perceive as stressful along with the emotions associated with them.

Correlation: a statistical technique used to measure the linear relationship between two pre-existing variables.

Correlational research: research that measures the linear relationship between two co-variables.

Cortisol: a steroid hormone secreted from the adrenal glands when the body experiences stress.

Cross-sectional study: a study where data is collected once from participants.

Debriefing: an explanation given to participants at the conclusion of a study.

Decay: the fading of memory over time.

Decay theory: theory that suggests memories fade over time.

Deception: lying to participants about the true nature of a study or their role in it; this is used when the participants knowing the true purpose of the study would affect the results.

Declarative memory: a type of long-term memory for factual information that can be expressed in words.

Deficiency needs: basic needs people are motivated to fulfil due to their absence.

Demand characteristics: cues participants perceive during a study that lead them to believe they have discovered the aim of the study or expectations of the researcher.

Dementia: a general term for a group of symptoms including a decline in memory, cognitive skills and reasoning.

Dendrites: extensions of the cell body that receive neurotransmitters from pre-synaptic neurons and convert them into electrical nerve impulses that are conducted toward the cell body.

Dependent variable: the variable that is being measured by the experimenter.

Directional hypothesis: a statement that compares the predicted outcome of each condition.

Discrete data: data that can be counted and has a finite number of possible values that are unable to be broken down into smaller parts.

Distress: a negative stress response typically accompanied by physiological reactivity and negative emotions.

Divided attention: the ability to concentrate on two or more stimuli simultaneously.

Double-blind procedure: the researcher, as well as the participants are unaware of the experimental conditions.

Duration: the length of time information can be stored for.

Elaborative rehearsal: rehearsal technique allowing information to be encoded into long term memory by attaching meaning to it.

Empirical evidence: evidence that uses observations rather than being based on theories and hypotheses (theoretical).

Encephalopathy: a general term describing brain diseases that modify the function or physical structure of the brain.

Encoding: the form in which information is stored.

Environment variables: variables relating to the environment the study takes place in and how this effects participant responses.

Episodic buffer: a component of the working memory model that temporarily stores consolidated information from the central executive, visuo-spatial sketchpad, phonological loop, and long-term memory.

Episodic memory: a type of declarative memory for personally significant events.

Ethical guidelines: codes of practice that are designed to be followed as a guide by people involved in psychological research.

Eustress: a positive stress response that motivates and enhances functioning.

Evidence-based conclusion: a conclusion derived from objective evidence, such as research from credible sources.

Experimental group: a group of participants exposed to the independent variable.

Experimental research: research where the independent variable can be manipulated, a cause-and-effect relationship can be found and participants can be randomly allocated.

Experimenter effect: the expectations and behaviours of the researcher that may bias results.

External reliability: the degree to which a test produces consistent results each time it is used.

External validity: the extent to which results from a study can be generalised to other contexts.

Extinction: when repeated presentation of the conditioned stimulus on its own ceases to elicit a response as there is no longer an association between the conditioned stimulus and the unconditioned stimulus.

Extraneous variables: unwanted variables that may impact the dependent variable.

Extrinsic motivation: motivation that stems from a desire for external rewards.

Fixed interval: reinforcement takes place at fixed time intervals.

Fixed ratio: reinforcement takes place following a set number of responses.

Fixed schedule: a predictable schedule where the length of time or number of responses between reinforcements is set.

Forgetting: the inability to retrieve memories.

Frequency distribution table: a tabulated representation of the number of times values occur within a data set, grouped in sections called class intervals.

Frequency table: a table listing values and the number of times each value occurs in a data set.

Galvanic skin response (GSR): the measure of electrical conductivity of the skin.

Generalisability: the extent to which results gathered from a sample in research can be applied to other situations.

Growth needs: needs that once met, act as the motivation for people to continue fulfilling them.

Hippocampus: the region located deep within each temporal lobe that plays a major role in memory and learning.

Histogram: the frequency of class intervals displayed in graph format.

Hormones: chemical substances secreted into the blood by endocrine glands to stimulate the function of organs.

Hypothalamus: the structure sitting below the thalamus that regulates sleep, eating, body temperature and sex drive.

Independent variable: the variable that is being manipulated by the experimenter.

Infantile amnesia: the inability of adults to retrieve accurate episodic memories from before two or three years of age.

Informed consent: the necessity for researchers to obtain written consent from participants (using a consent form).

Interference: when information in the long-term store cannot be retrieved due to it being disrupted by similar information.

Internal reliability: the degree to which a test produces consistent results within itself.

Internal validity: the extent to which results from a study are due to the independent variable affecting the dependent variable, rather than confounding variables.

Interpretation: meanings assigned to groups of patterns.

Interval schedule: a schedule reliant on the length of time between reinforcements.

Intrinsic motivation: motivation driven by an inner desire for self-satisfaction arising from achieving a specific goal.

Inquiry question: an open-ended question that the research is aiming to answer.

Learner: the person who is observing the model.

Likert scale: a type of rating scale where a numerical score is allocated to each point on a scale determining an overall attitude or providing a score on a diagnostic test.

Line graph: a graph displaying continuous data of two variables increasing or decreasing at regular increments.

Longitudinal study: a study where data is collected more than once, using the same participants.

Long-term memory: a relatively permanent memory store for a limitless amount of information that sends and receives information from the short-term store.

Maintenance rehearsal: a rehearsal technique where the repetition of information allows it to be held in the short-term store of memory for a longer period of time.

Maladaptive coping strategies: coping strategies involving harmful and unhealthy stress management that exacerbates its adverse effects.

Mammillary bodies: the pair of structures located on the side of the hypothalamus that play a role in memory.

Mean: the measure of central tendency calculated by adding together values in a set of scores, then dividing by the number of values that were added.

Measures of central tendency: descriptive statistics that produce the average value of a set of scores.

Median: the measure of central tendency calculated by listing the values in a set of scores in numerical order and selecting the value that is located in the middle of the list.

Medulla: the lowest part of the brainstem that relays information between the spinal cord and brain and regulates the respiratory and cardiovascular systems.

Melatonin: the hormone that regulates the sleep-wake cycle.

Memory: the cognitive function through which information and past experiences are actively processed, stored and retrieved.

Mixed methods: where qualitative and quantitative data are collected from participants in the same study.

Model: the person who sets an example for others to imitate through their actions.

Motivated forgetting: the intentional or unintentional suppression of memories or thoughts from conscious awareness to minimise emotional distress.

Motivation: the conscious or unconscious drive leading the behaviours that individuals initiate, direct and maintain.

Motive: the desires behind goal-directed behaviour.

Myelin sheath: the fatty covering of the axon that acts as an insulator protecting the axon from stimuli that could interfere with electrical nerve impulse transmission.

Naturalistic observation: researchers observe participants in their natural setting in an unobtrusive manner.

Negative affect: distressing emotions.

Negative correlation: a linear relationship where one variable increases and the other decreases.

Negative punishment: the removal of stimuli that decrease the likelihood of the behaviour being repeated.

Negative reinforcement: the removal of stimuli that increase the likelihood of the behaviour being repeated.

Nervous system: the system that produces and relays messages between the brain, spinal cord and the network of neurons.

Neurofibrillary tangles: abnormal accumulations of tau protein within neurons of the brain.

Neurological disorder: a disorder of the nervous system affecting the brain, spinal cord and neurons of the body.

Neurons: cells of the nervous system that communicate with each other, as well as muscle and gland cells.

Neurotransmitters: molecules that act as chemical messengers.

Neutral stimulus: a stimulus that on its own does not elicit a particular response.

Non-directional hypothesis: a statement that there is a difference between conditions but does not specify the type of difference.

Non-experimental research: research where the independent variable cannot be manipulated, a cause-and-effect relationship cannot be found and participants cannot be randomly allocated.

Noradrenaline: a hormone secreted from the adrenal glands that causes blood vessels to constrict and blood pressure to increase.

Objective data: data based on facts that can be supported through observation and measurements.

Observational learning (observational conditioning): where the learner watches a model, notices the consequences of their behaviour and then decides whether they will imitate their behaviour.

Observational research: a technique used to study behaviour.

Open-ended survey: a pen and paper questions or online questions with space to respond in open-text format.

Operant conditioning: a type of learning whereby the consequence of behaviour determines whether they will be repeated or not.

Organisation: selected information is categorised, allowing for the arrangement of meaningful patterns.

Partial reinforcement: type of reinforcement where a reinforcer is not provided after each desired response.

Partial sleep deprivation: the severe reduction or complete lack of sleep over a short period of time.

Participant variables: variables relating to the individual characteristics of participants.

Parasympathetic nervous system: the branch of the autonomic nervous system that reverses bodily functioning produced by the sympathetic nervous system and maintains an energy level suitable for normal body functioning.

Pearson's correlation coefficient (Pearson's r): the strength and direction of a linear relationship showed in numerical form.

Percentage: the amount of a number shown in parts per hundred.

Perception: the mental representation that the brain creates using information detected by the senses.

Phobia: intense and irrational fear to an object or situation that continues over time.

Phonemic encoding: the encoding of auditory information.

Phonological loop: a component of the working memory model that temporarily stores and processes auditory information.

Phonological store: storage for words that are heard.

Placebo: a neutral treatment that looks the same as the real treatment being evaluated and is delivered in the same way.

Placebo effect: change in a participants' behaviour due to being exposed to a treatment that they believe will affect them.

Pons: the part of the brainstem that plays a role in the rhythm of breathing and is thought to be involved in REM sleep.

Population: the entire group of people that is of interest to a researcher.

Positive affect: pleasant emotions.

Positive correlation: both variables increasing or decreasing in a linear relationship.

Positive punishment: the addition of stimuli that decrease the likelihood of the behaviour being repeated.

Positive reinforcement: the addition of stimuli that increase the likelihood of the behaviour being repeated.

Pre-frontal cortex: the front layer of the frontal lobes that coordinates executive functions, such as the ability to predict the consequences of behaviours, as well as the ability to recognise and regulate emotions.

Primary auditory cortex: an area within both temporal lobes that registers and processes auditory information.

Primary motor cortex: a strip of cerebral cortex running through the frontal lobes that controls voluntary movement of the body.

Primary reinforcer: the tangible reward.

Primary sensory cortex: a strip of cerebral cortex running through the parietal lobes that registers and processes sensory information.

Primary visual cortex: an area within both occipital lobes that registers and processes visual information.

Privacy: the principle that only information relevant to the study should be collected from participants.

Proactive interference: where previously stored information interferes with retrieval of new learning.

Procedural memory: a type of long-term memory for skills or actions that are usually difficult to explain in words.

Punishment: a consequence that decreases the likelihood of a behaviour repeating.

Qualitative data: data collected that is descriptive and in the form of words.

Quantitative data: data produced that is numerical.

Random allocation: the random distribution of participants into groups.

Random sampling: the process by which the names of members in a population are collated then randomly selected.

Rating scale: a tool that uses the quantification of abstract concepts through participant rating.

Ratio schedule: a schedule dependent on the quantity of responses needed before reinforcement is provided.

Recall: the process of retrieving information from long-term memory without the provision of cues to aid in retrieving the information.

Reception: the detection of sensory information in the sense organs of the body by sensory receptors.

Recognition: the ability to identify previously stored information by matching stimuli to stored memories.

Reduction: the principle in animal research ethics of obtaining more information from the number of animals planned for research or using alternative methods to gather similar information by using fewer animals.

Refinement: the principle in animal research ethics of utilising methods that will minimise potential distress or pain in animals in research.

Reflex response: an automatic, involuntary and almost instantaneous response to a stimulus.

Reinforcement: a consequence that increases the likelihood of a behaviour repeating.

Relearning: reacquiring knowledge or skills that were previously learned but may have begun to decay over time.

Reliability: the degree to which an assessment tool produces consistent results.

Replacement: the principle in animal research ethics of the use of alternative methods that eliminate the need for animals in research.

Researcher variables: variables relating to the personality characteristics, appearance and conduct of the researcher that unintentionally impact participant response.

Response: behaviour that emerges as a result of a stimulus.

Reticular formation: the network of nuclei located within the length of the brainstem that helps maintain wakefulness and alertness.

Retrieval: the movement of information from the long-term store of memory to conscious awareness.

Retrieval cue: stimuli aiding in the retrieval of memories.

Retrieval failure: the inability to consciously recall information stored in the long-term store due to the absence of retrieval cues that could trigger memory retrieval.

Retroactive interference: where new learning interferes with retrieval of previously stored information.

Retrograde amnesia: the inability to recall past memories prior to the onset of amnesia.

Sample: a subsection of the population.

Sampling: the process of selecting participants from a population of research interest that will be used in a study.

Scatterplot: the correlation between two existing variables plotted in graph form.

Secondary reinforcer: the symbolic tokens used to motivate desired behaviour.

Selection: crucial features of information are selected for further processing and insignificant content is disregarded.

Selective attention: the process of concentrating on chosen stimuli while disregarding others.

Self-acceptance: an individual's acknowledgment of their personal strengths, weaknesses and past decisions and behaviours.

Self-actualisation: the ultimate state of being that all individuals are striving to attain.

Semantic encoding: attaching meaning to information and/or linking information to knowledge currently in the long-term store.

Semantic memory: a type of declarative memory for impersonal factual knowledge.

Semi-structured interview: a set of pre-established questions that can be asked in addition to the participant being asked follow-up questions based on earlier responses.

Sensation: the detection of environmental stimuli by the sense organs and the conversion of sensory information to electrochemical energy.

Sensory organs: specialised organs in the body containing sensory neurons functioning as sensory receptors.

Sensory receptors: specialised cells in the body that detect sensory information.

Sensory register: the memory store where sensory information is briefly held before decaying or transferring to the short-term store.

Short-term memory: a temporary memory store for limited information received from the sensory register and long-term store.

Single-blind procedure: an experiement where the experimenter is aware of the experimental conditions while the participants are unaware of them.

Sleep deprivation: the condition of not getting sufficient sleep.

Sleep hygiene: the behaviour and sleep environment that result in healthy sleep.

Sleep latency: the time it takes to fall asleep.

Sleep-wake cycle: the recurring pattern of wakefulness and sleep individuals undergo on a daily basis.

Snowball sampling: initial participants recruit additional subjects.

Spontaneous recovery: the sudden reappearance of a previously extinct conditioned response after the unconditioned stimulus has been absent for some time.

Split-half method: assessing the internal consistency of a test by comparing results produced by each half of the test.

Still pictures: single static images that are two-dimensional.

Stimulus: anything that influences an organism.

Stimulus discrimination: when a stimulus does not elicit the conditioned response because it differs significantly from the original stimulus

Stimulus generalisation: when a stimulus similar to a conditioned stimulus elicits the same response as the conditioned stimulus.

Stratified sampling: a sampling process whereby participants are selected from subgroups of the population in the same proportions they appear in the population.

Stress: the nonspecific response of the body to any demand.

Stressors: sources of stress from internal or external factors.

Storage: the retention of information within the stores of memory.

Structural encoding: a form of processing where physical information based on appearance is encoded.

Structured interview: a set of pre-established questions asked in real time face-to-face or over the phone.

Subjective data: data based on personal opinions and judgement.

Subjective wellbeing: the mixture of negative and positive measures and overall emotional and cognitive assessment of life that is personal to the individual.

Summary table: a table that visually summarises the key findings of a study.

Sympathetic nervous system: the branch of the autonomic nervous system that controls the 'fight or flight' response by regulating the glands and internal organ function.

Systematic desensitisation: type of therapy that combines relaxation techniques with gradual exposure to overcome a phobia.

Test-retest reliability: administering a test twice to a group of participants to assess external reliability.

Thalamus: the double-lobed structure located just above the brainstem that receives sensory information, except smell, and transmits information to the cerebral cortex.

Token economy: behaviour modification technique based on operant conditioning principles whereby a symbolic reinforcer is used to encourage a particular behaviour.

Transcendence: the experience of going beyond the limitations of physical human experience.

Transduction: the changing of sensory information into electrochemical energy.

Transmission: the movement of electrochemical energy from sensory receptors to the brain for interpreting.

Unconditioned response: the reflexive reaction to a specific unconditioned stimulus.

Unconditioned stimulus: a stimulus with the inherent ability to elicit a reflex response.

Validity: the degree to which an assessment tool measures what it is designed to measure.

Variable interval: when reinforcement takes place at irregular time intervals.

Variable ratio: when reinforcement takes place after an unpredictable number of responses.

Variable schedule: an unpredictable schedule where the length of time or number or responses between reinforcements changes.

Vicarious reinforcement: a form of observational learning in which the observed consequences of a model's actions can modify the behaviour of the learner.

Visuospatial sketchpad: a component of the working memory that stores and manipulates visual and spatial information.

Voluntary participation: where participants partake in a study because it is their choice to do so.

Wernicke-Korsakoff Syndrome (WKS): a rare neurological disorder caused by thiamine (vitamin B1) deficiency leading to the degeneration of brain cells and characterised by difficulties forming new memories and retrieving stored memories.

Withdrawal rights: the principle of ethics whereby participants can end their participation in a study, or have their results removed during or at the completion of the study without pressure or penalty.

Working memory model: a view of short-term memory as a dynamic storage system capable of simultaneously holding multiple pieces of information.

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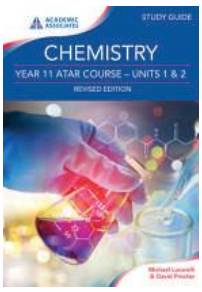

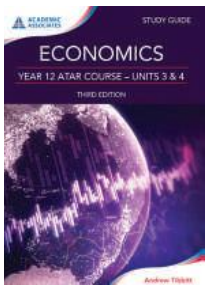

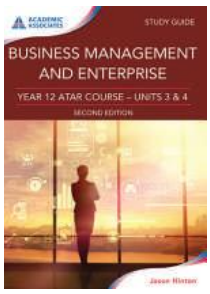

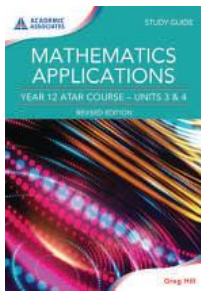

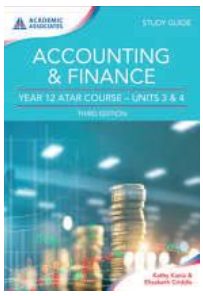

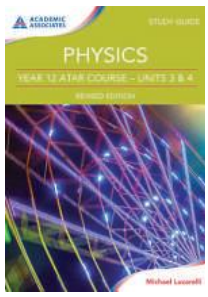

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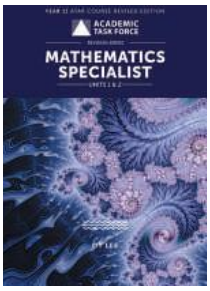

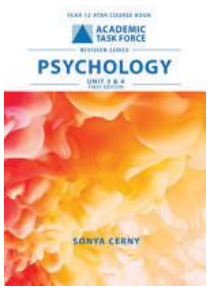

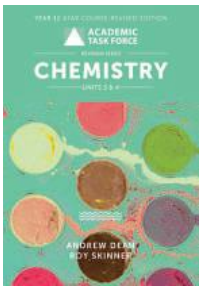

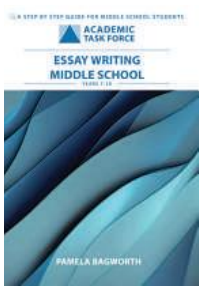

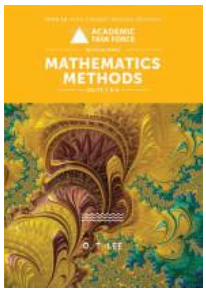

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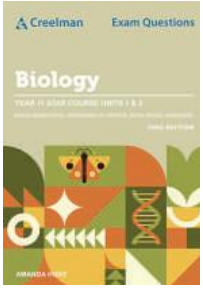

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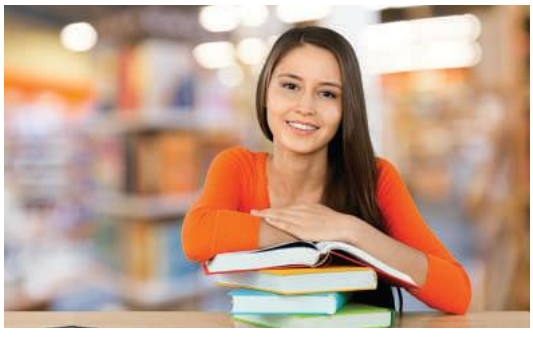

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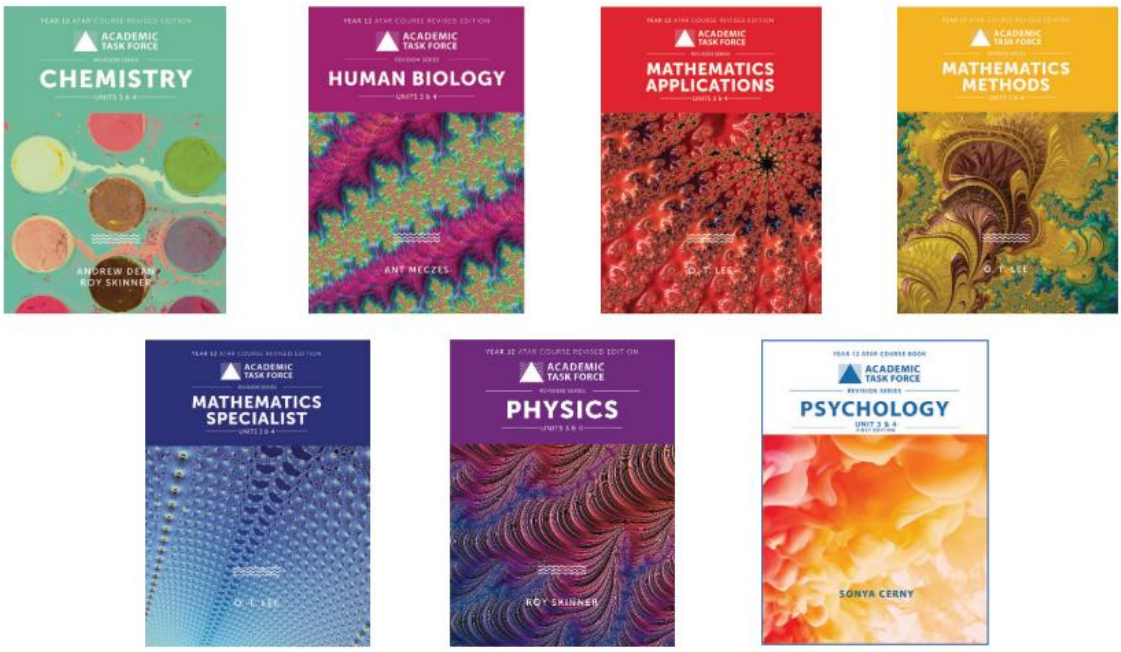

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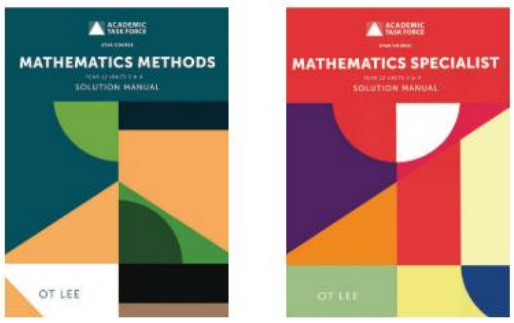

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