

GENERAL
SENIOR
SYLLABUS
2025

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PSYCHOLOGY

FOR QUEENSLAND

AMRITA MOSS

ALISKA BIERMAN

WENDY MACDONALD

WITH LORELLE BURTON

UNITS

3 & 4

SECOND EDITION

OXFORD



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Warning to First Nations Australians

Aboriginal and Torres Strait Islander peoples are advised that this publication may include images or names of people now deceased.

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Introducing Psychology for Queensland Units 3 & 4 (Second edition)

Congratulations on choosing Psychology for Queensland Units 3 & 4 as part of your studies this year!

Psychology for Queensland Units 3 & 4 has been purpose-written to meet the requirements of the QCAA Psychology 2025 General senior syllabus. It includes a range of flexible print and digital products to suit your school and incorporates a wide variety of features designed to make learning fun, purposeful and accessible for all students!

Key features of the Student Books

The Psychology toolkit module provides an overview of the syllabus, student-friendly guidance for every science inquiry skill and tips for success on assessment tasks.

Lesson 1.1
Studying QCE Psychology

Key Ideas

- Psychology is the scientific study of human behaviour and mental processes.
- Studying psychology can lead to a diverse range of career pathways.
- QCE Psychology is divided into units and topics.
- The science inquiry skills and their application are important for success in QCE Psychology.

Learning intentions and success criteria

psychology the systematic study of the mind (mental processes) and behaviour

Introducing psychology

Psychology is the systematic study of human behaviour and mental processes. Psychologists use the scientific method to describe, explain, understand and predict relationships between our physical body, non-physical mind and other observable behaviours.

Studying psychology provides a broad foundation that can lead to many different careers. Direct pathway examples include clinical, forensic, educational, cognitive, sports, and organisational psychology, neuropsychology, research and contributing to academic knowledge on human behaviour. Indirectly, a background in psychology can enhance careers in human resources, marketing and user experience design, where understanding human behaviour is crucial. It can also be beneficial in law enforcement, social work, and any field requiring nuanced communication and analytical skills. Each pathway utilises the core competencies of understanding, predicting and influencing human behaviour.

Structure of the QCE Psychology course

Studying QCE Psychology provides you with the opportunity to engage in a range of inquiry tasks and develop science inquiry skills. You will develop an understanding of how the mind works and what influences behaviour, and you'll be able to make links between theory, knowledge and practice.

The structure of the QCE Psychology course is laid out in the Psychology General Senior Syllabus. The course consists of four units. Units 1 and 2 are completed in the first year of the QCE Psychology course, and Units 3 and 4 in the second year. Each unit is divided into topics and each topic can include science

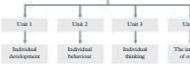


FIGURE 2 The structure of the QCE Psychology course

understanding, science as a human endeavour and science inquiry subject matter. You should be familiar with these categories of understanding from your studies in Years 7 to 10.

An overview of the QCE Psychology units is shown in Figure 2, and Units 3 and 4 are summarised in Table 1.

TABLE 1 Topics in Units 3 and 4 Psychology

| Unit 3 Individual thinking | |
|----------------------------|--|
| Topic | Description |
| 1 Brain function | In this topic you will learn about: <ul style="list-style-type: none"> specialised areas of the brain the structure and function of the human nervous system neurotransmission. |
| 2 Sensation and perception | In this topic you will learn about: <ul style="list-style-type: none"> the processes of seeing the processes of hearing psychological aspects of visual and auditory perception cultural influences on visual and auditory perception. |
| 3 Memory | In this topic you will learn about: <ul style="list-style-type: none"> memory processes models of memory formation and storage of explicit memories how we remember and forget. |
| 4 Learning | In this topic you will learn about: <ul style="list-style-type: none"> classical conditioning operant conditioning social learning theory. |

| Unit 4 The influence of others | |
|--------------------------------|---|
| Topic | Description |
| 1 Social psychology | In this topic you will learn about: <ul style="list-style-type: none"> socialisation theories of gender role formation groups, status and power obedience and compliance. |
| 2 Interpersonal processes | In this topic you will learn about: <ul style="list-style-type: none"> prosocial behaviour aggression attraction and relationships. |
| 3 Attitudes | In this topic you will learn about: <ul style="list-style-type: none"> attitudes cognitive dissonance social identity theory and attribution theory biases stereotypes prejudice and discrimination. |
| 4 Cross-cultural psychology | In this topic you will learn about: <ul style="list-style-type: none"> community and culture multiculturalism and pluralism psychological challenges of immigration the challenges of cultural diversity relating practices. |

Source: Adapted from Psychology 2021: 2 General Senior Syllabus © State of Queensland (QCAA) 2024

Each module begins with a module opener that includes:

- QCAA subject matter
- reference to a supporting prior knowledge quiz that assesses and informs student understanding of prerequisite concepts
- a list of practical lessons that support science inquiry.

MODULE 4

Processes of seeing and hearing

Introduction

What do cookies smell like? What about sunscreen? And what memories did thinking about those smells bring to mind? Perhaps cookies remind you of Christmas, while sunscreen reminds you of summer holidays at the beach. Smell is a powerful and primal sense, closely linked to memory and emotion. This is because unlike our other senses, the olfactory bulb, which is responsible for processing smell, bypasses the thalamus and connects directly to the hippocampus and amygdala, brain regions involved in memory and emotional processing (Heist, 2016; Wilson & Stevenson, 2006). This ancient system is vital for animals that rely on smell for survival, such as for tracking food, detecting predators and identifying mates. Humans, however, have evolved to depend far more on vision and hearing. Vision allows us to perceive a wide spectrum of colours, judge distances and process intricate details. Similarly, humans are one of the few species capable of creating, understanding and interpreting complex auditory patterns, such as language and music (Patel & Dronkers, 2013).

As you will learn in this and the next module, seeing and hearing are far more complex than simply receiving stimuli. Our experiences, emotions and motivations play a big role in how we see and hear things. In this module we will explore sensation and perception with a focus on vision and hearing.

Prior knowledge

Check your understanding of concepts related to the process of seeing and hearing before you start.

Subject matter

Science understanding

Describe the processes of seeing and hearing, with reference to:

- reception by accessory structures
- transduction by sensory receptors and receptive fields
- transmission to the CNS via the optic/cochlearic nerves
- preliminary processing in the thalamus
- organisation and interpretation by the primary visual/auditory cortex.

Science as a human endeavour

Consider that senses apart from seeing and hearing involve different modes of reception from the environment and different transmission pathways, e.g. the sense of smell is received chemically and is the only sense not transmitted by the thalamus.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify errors, and extraneous or confounding variables that are likely to influence results, and implement strategies to minimise systematic and random error, e.g.
 - type of participant selection and allocation
 - single-blind and double-blind procedures
 - counterbalancing
 - standardised instructions and procedures
- select, synthesise and use evidence to
 - explain findings
 - draw conclusions, using *p*-values to infer significance, allowing for the possibility of type I and II errors
- judge the reliability and validity of the experimental process
 - reliability of observers (selection, training)
 - reliability of psychological test/measures
 - internal validity and external validity
 - validity of psychological tests/measures

acknowledge sources of information with standard scientific referencing conventions.

Source: Psychology 2021: 2 General Senior Syllabus © State of Queensland (QCAA) 2024



Key features of Oxford Digital

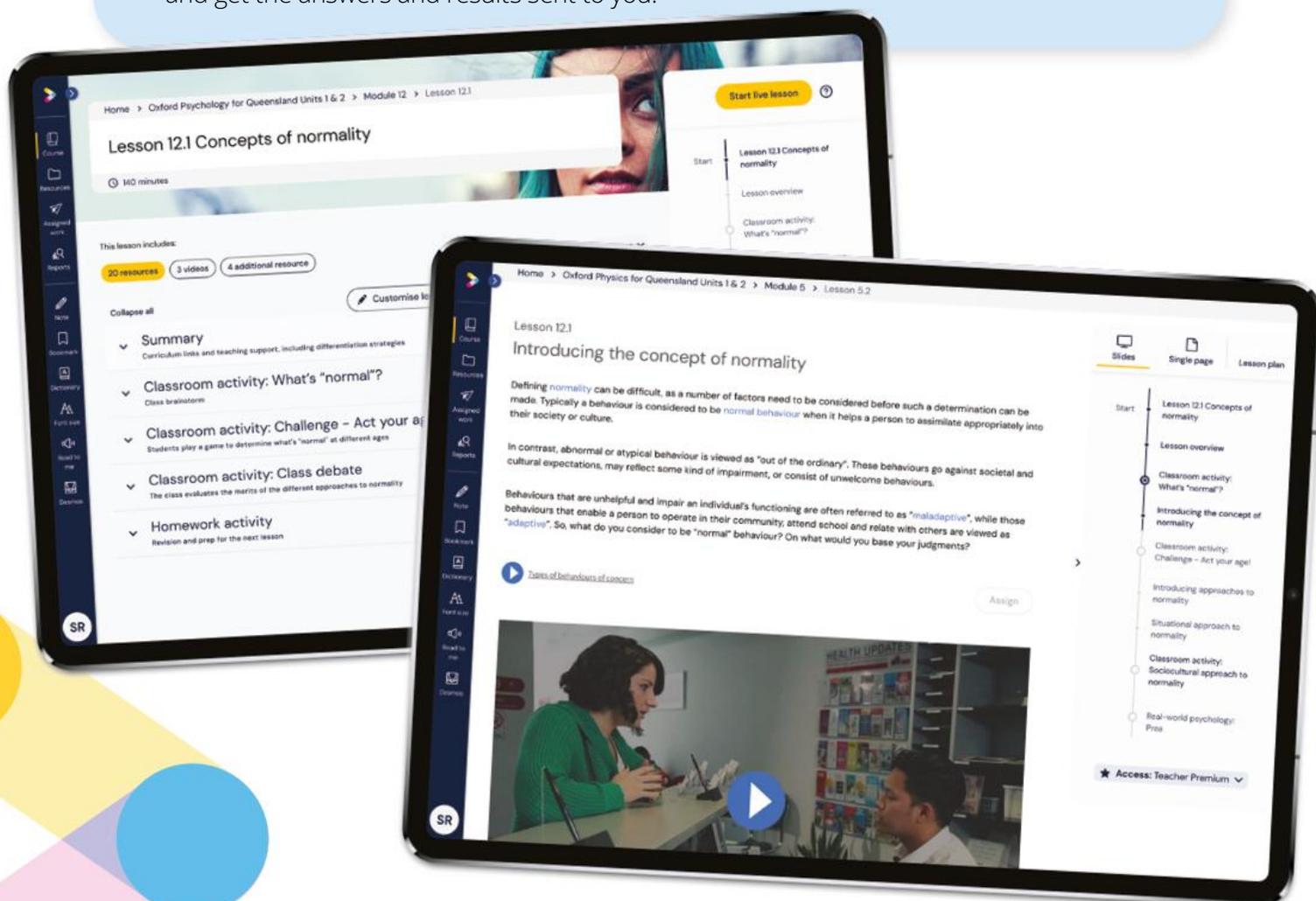
Oxford Digital has been designed in consultation with Australian teachers for Australian classrooms. The new platform delivers fully accessible, reflowable course content with videos, auto-marking activities, interactives and more embedded right where you need them.

There's also a range of unique features designed to improve learning outcomes.

Key features for students

As a student, you can:

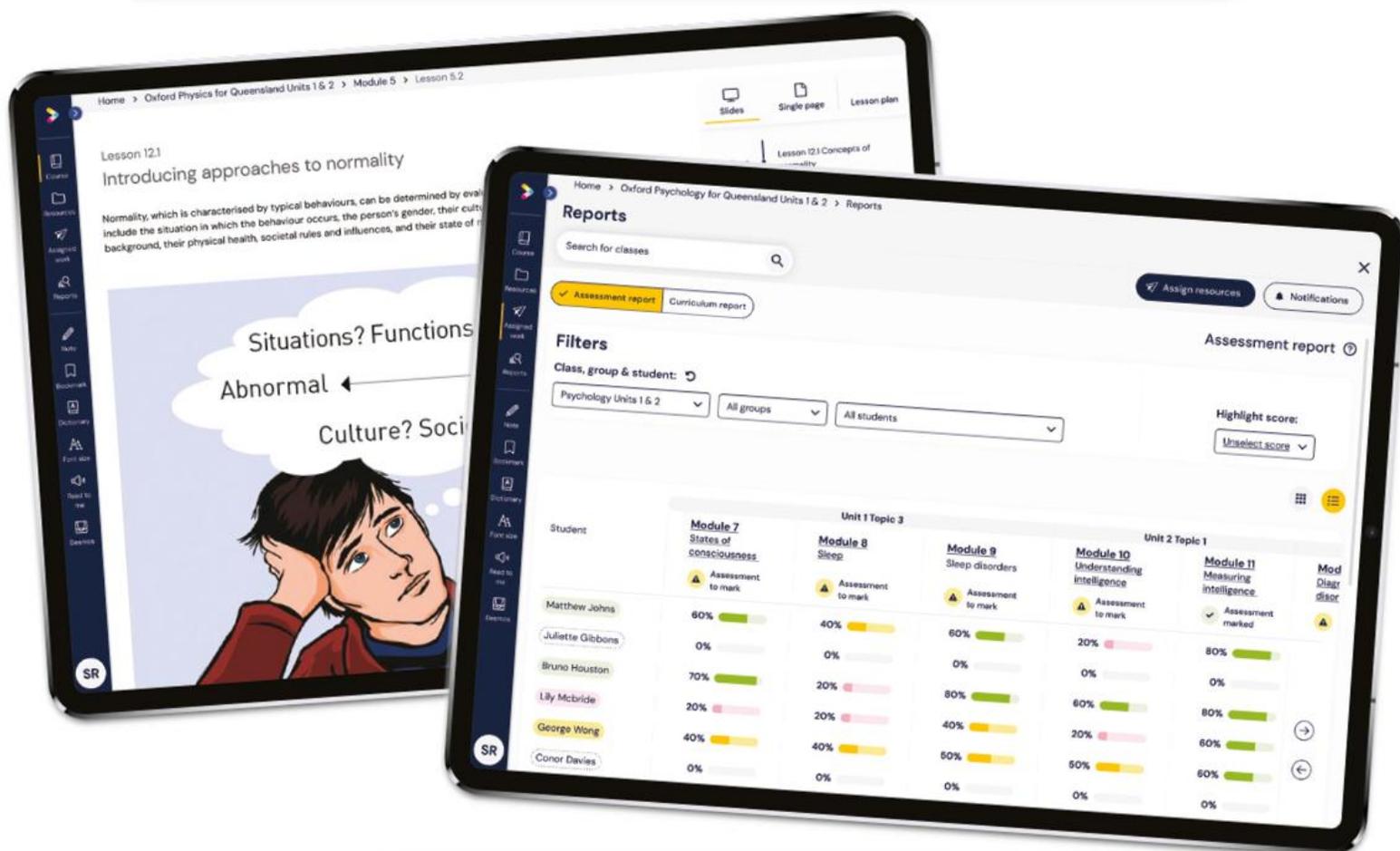
- > **view** all course content in a **fully accessible**, reflowable format that's delivered in bite-sized chunks so you can work at your own pace
- > use the "Read to me" button to have any part of the course read aloud to you
- > **highlight, take notes, bookmark pages**, or define words with the built-in **Australian Oxford Dictionary**
- > **watch** short **content videos, worked example videos** and **practical demonstration videos** to help you revise anything you don't understand, catch up on things you've missed, or help you with your homework
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Key features for teachers

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- > **personalise** learning for every student and **differentiate** content based on student strengths and weaknesses. Assign support or extension resources to any student using a range of differentiation resources
- > **revolutionise** your planning, marking and reporting with powerful analytics on student performance and progress.



Find out more

For a complete overview of all the features and benefits of Oxford Digital:

- > activate your digital access (using the instructions on the inside front cover of this book) and click on "Introducing *Psychology for Queensland Units 3 & 4*" in the "About this course" menu.

Meet the authors & reviewers



Amrita Moss

Lead author

Amrita Moss is a certified Highly Accomplished Teacher with a wealth of knowledge gained through many years of teaching. She currently holds leadership roles in endorsing and confirming assessment for the

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Aliska Bierman

Author

Aliska Bierman is a certified Highly Accomplished Teacher (AITSL), a QCAA Lead Marker and Exam Writer for Psychology, and a General Board Member of the Psychology Teachers' Association

of Queensland (PTAQ). She is a senior science teacher specialising in psychology and physics, and holds a Bachelor of Engineering (Aerospace Avionics) with Honours, a Graduate Diploma of Education (Secondary) and a Graduate Diploma of Psychology.

Aliska is active in the teaching community, regularly facilitating professional development workshops and presenting at statewide conferences to support and connect psychology teachers across Queensland. At Brisbane State High School, she has led the implementation of the QCE Psychology syllabus and played a key role in designing and implementing the school's Year 9–12 psychology program.

As an accomplished science author, she has contributed to Education Perfect and Oxford University Press, writing curriculum-aligned resources for both the Queensland and Victorian senior syllabuses. A committed leader in digital pedagogy, Aliska also supports the development of innovative, evidence-based teaching and learning practices within her school and the wider teaching community.



Wendy Macdonald

Author

Wendy Macdonald has taught science and biology in Queensland for over 25 years. She currently leads Marist College Ashgrove's Science and Engineering faculty and was responsible for the implementation

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A passionate educator, Wendy is deeply committed to inspiring young minds and fostering a love of learning. Her dedication to teaching goes beyond the classroom – she actively mentors early-career teachers, contributes to curriculum development, and engages in professional learning communities. Wendy has also been involved in various QCAA teams, including endorsement, confirmation and external exam marking, reflecting her ongoing commitment to educational excellence and innovation.



Lorelle Burton

Author

Professor Lorelle Burton is internationally recognised as an esteemed leader in psychology over almost 30 years in higher education. She is currently the Associate Provost at the University

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Caitlin Ramsay-Rickard

Reviewer

Caitlin Ramsay-Rickard is a nationally certified Highly Accomplished Teacher with eight years experience teaching Psychology in Queensland state

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Amanda Rockliff

Reviewer

Amanda Rockliff has taught Psychology in Queensland since its inception in 2019. As current President of the Psychology Teachers Association of Queensland, Amanda is passionate about supporting teachers in the

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Bernice Zaro

First Nations reviewer

Bernice Zaro is a proud Aboriginal and Torres Strait Islander Woman with a strong passion for educational greatness through culturally inclusive learning. Bernice identifies with parents who are

Traditionally connected to Aboriginal Communities of South East Queensland and Mer in the Torres Strait Islands (Murray Island) and she is inspired to share and learn continuously. Bernice, along with her husband Aicey Zaro, a recognised traditional Artist, has been educating schools and communities through Cultural Awareness art workshops for over 15 years during their time managing the Zaro Cultural Gallery in the Burdekin region. Bernice has a passion for learning through her ongoing studies in community development, child wellbeing and cultural diversity, and for sharing personal experiences through family, community and business, which inspire her to take on new opportunities.

Oxford University Press also thanks and acknowledges the following authors for their contributions: Karen Marangio, Roger Edwards, Vicki Moore, Elizabeth Blaher-Lucas and Fiona Ganino-Day.

Psychology toolkit

Introduction

Psychology is recognised as a science because researchers use the scientific method to establish knowledge, test hypotheses and make systematic observations about human behaviours.

Psychology stands distinct from the natural sciences due to the complexity and variability of its subjects: people. Unlike the other sciences, which allow researchers relatively high control over variables, psychological research must navigate the complexity of human behaviour, as attempting to control one variable can introduce other unwanted variables. Thus, research in this field demands careful balance and considered design while also upholding strict ethical and legal standards to protect participants.

This module lays the foundation for research in psychology and will serve as an invaluable resource throughout Units 3 and 4. The aim of this module is to extend your science inquiry skills for practical application in psychology. You will learn to generate relevant questions and use the scientific method to collect, process, analyse and interpret data so that you can answer your questions.

This module is set out in a way that makes each piece of information easy to access. Science inquiry skills are listed at the beginning of the lesson in which they are discussed. The module is not meant to be read from beginning to end. Rather, it is like a toolkit – you dip your hand into it, get the tool you need and then use it.

Prior knowledge



Prior knowledge quiz

Check your understanding of science inquiry skills before you start.

Online-only lessons

| | |
|--------------------|--|
| Lesson 1.2 | Considering First Nations perspectives in Psychology |
| Lesson 1.3 | Understanding the scientific method |
| Lesson 1.4 | Planning investigations |
| Lesson 1.5 | Considering safety and ethics |
| Lesson 1.9 | Communicating scientifically |
| Lesson 1.10 | Preparing for your data test |
| Lesson 1.11 | Conducting your student experiment |
| Lesson 1.12 | Conducting your research investigation |
| Lesson 1.13 | Preparing for your exams |



Lesson 1.1

Studying QCE Psychology



Learning intentions
and success criteria

Key ideas

- Psychology is the scientific study of human behaviour and mental processes.
- Studying psychology can lead to a diverse range of career pathways.
- QCE Psychology is divided into units and topics.
- The science inquiry skills and their application are important for success in QCE Psychology.

Introducing psychology

psychology
the systematic study
of the mind (mental
processes) and
behaviour

Psychology is the systematic study of human behaviour and mental processes. Psychologists use the scientific method to describe, explain, understand and predict relationships between our physical body, non-physical mind and other observable behaviours.

Studying psychology provides a broad foundation that can lead to many different careers. Direct pathway examples include clinical, forensic, educational, cognitive, sports, and organisational psychology, neuropsychology, research and contributing to academic knowledge on human behaviour. Indirectly, a background in psychology can enhance careers

in human resources, marketing and user experience design, where understanding human behaviour is crucial. It can also be beneficial in law enforcement, social work, and any field requiring nuanced communication and analytical skills. Each pathway utilises the core competencies of understanding, predicting and influencing human behaviour.



FIGURE 1 Psychology is the study of human behaviour and mental processes.

Structure of the QCE Psychology course

Studying QCE Psychology provides you with the opportunity to engage in a range of inquiry tasks and develop science inquiry skills. You will develop an understanding of how the mind works and what influences behaviour, and you'll be able to make links between theory, knowledge and practice.

The structure of the QCE Psychology course is laid out in the Psychology General Senior Syllabus. The course consists of four units. Units 1 and 2 are completed in the first year of the QCE Psychology course, and Units 3 and 4 in the second year. Each unit is divided into topics and each topic can include science

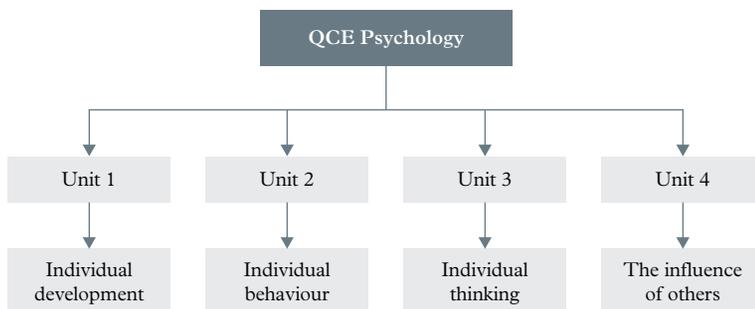


FIGURE 2 The structure of the QCE Psychology course

understanding, science as a human endeavour and science inquiry subject matter. You should be familiar with these categories of understanding from your studies in Years 7 to 10.

An overview of the QCE Psychology units is shown in Figure 2, and Units 3 and 4 are summarised in Table 1.

TABLE 1 Topics in Units 3 and 4 Psychology

| Unit 3 Individual thinking | |
|--------------------------------|--|
| Topic | Description |
| 1 Brain function | In this topic you will learn about: <ul style="list-style-type: none"> specialised areas of the brain the structure and function of the human nervous system neurotransmission. |
| 2 Sensation and perception | In this topic you will learn about: <ul style="list-style-type: none"> the processes of seeing the processes of hearing psychological aspects of visual and auditory perception cultural influences on visual and auditory perception. |
| 3 Memory | In this topic you will learn about: <ul style="list-style-type: none"> memory processes models of memory formation and storage of explicit memories how we remember and forget. |
| 4 Learning | In this topic you will learn about: <ul style="list-style-type: none"> classical conditioning operant conditioning social learning theory. |
| Unit 4 The influence of others | |
| Topic | Description |
| 1 Social psychology | In this topic you will learn about: <ul style="list-style-type: none"> socialisation theories of gender role formation groups, status and power obedience and compliance. |
| 2 Interpersonal processes | In this topic you will learn about: <ul style="list-style-type: none"> prosocial behaviour aggression attraction and relationships. |
| 3 Attitudes | In this topic you will learn about: <ul style="list-style-type: none"> attitudes cognitive dissonance social identity theory and attribution theory biases stereotypes prejudice and discrimination. |
| 4 Cross-cultural psychology | In this topic you will learn about: <ul style="list-style-type: none"> community and culture multiculturalism and pluralism psychological challenges of immigration the challenges of cultural diversity reducing prejudice. |

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Assessment in QCE Psychology

In Units 3 and 4, you will complete three assessment pieces and an end-of-year examination. The structure of your assessment is outlined in Table 2.

TABLE 2 Units 3 and 4 assessments

| Assessment type | Assessment description | Assessment objectives |
|------------------------|---|--|
| Data test | Students respond to items using qualitative data and/or quantitative data derived from practicals, activities or case studies relevant to Unit 3 subject matter. | <ol style="list-style-type: none"> 2 Apply understanding of brain function, sensation and perception, memory or learning to given algebraic, visual or graphical representations of scientific relationships and data to determine unknown scientific quantities or features. 3 Analyse data about brain function, sensation and perception, memory or learning to identify trends, patterns, relationships, limitations or uncertainty in datasets. 4 Interpret evidence about brain function, sensation and perception, memory or learning to draw conclusions based on analysis of datasets. |
| Student experiment | Students modify (i.e. refine, extend or redirect) an experiment relevant to Unit 3 subject matter to address their own related hypothesis or question. This assessment provides opportunities to assess science inquiry skills. | <ol style="list-style-type: none"> 1 Describe ideas and experimental findings. 2 Apply understanding to modify experimental methodologies and process data. 3 Analyse experimental data. 4 Interpret experimental evidence. 5 Evaluate experimental processes and conclusions. 6 Investigate phenomena through an experiment. |
| Research investigation | Students gather evidence related to a research question to evaluate a claim relevant to Unit 4 subject matter. This assessment provides opportunities to assess science inquiry skills and science as a human endeavour (SHE) subject matter. | <ol style="list-style-type: none"> 1 Describe ideas and findings. 2 Apply understanding to develop research questions. 3 Analyse research data. 4 Interpret research evidence. 5 Evaluate research processes, claims and conclusions. 6 Investigate phenomena through research. |
| External examination | Includes two papers that assess content related to Units 3 and 4 and asks students to respond using multiple choice, single words, or sentences or paragraphs. The examination may ask students to calculate using algorithms or interpret unseen stimulus. | <ol style="list-style-type: none"> 1 Describe ideas and findings about subject matter. 2 Apply understanding about subject matter. 3 Analyse data about subject matter to identify trends, patterns, relationships, limitations or uncertainty. 4 Interpret evidence about subject matter to draw conclusions based on analysis. |

Source: Adapted from *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

You can use Lesson 1.10 Preparing for your data test, Lesson 1.11 Conducting your student experiment, Lesson 1.12 Conducting your research investigation and Lesson 1.13 Preparing for your exams to guide you through these assessments. Note that science as a human endeavour content will not be directly assessed in your examinations.

Science inquiry skills

In addition to developing your science understanding in Psychology (which we will cover in Modules 2 to 18), the QCE course requires you to develop and apply a range of science inquiry skills. These skills are specified in the QCE Psychology General Senior Syllabus, and skills relevant to each lesson in this module are listed at the beginning of the lessons. The lessons will help you develop the skills.

The science inquiry skills are applicable to all areas of study in Units 1 to 4 of the QCE Psychology course. They are especially important for preparing and planning for your data test, student experiment and research investigation assessment tasks.

Check your learning 1.1



Check your learning 1.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Define** the term “psychology”. (1 mark)
- 2 **Recall** the structure of the QCE Psychology course. (1 mark)
- 3 **Describe** how your knowledge and skills will be assessed in Units 3 and 4. (1 mark)

Analytical processes

- 4 **Compare** the assessment objectives of the data test and student experiment, by
 - a identifying similarities (1 mark)
 - b identifying differences. (1 mark)

Knowledge utilisation

- 5 Visit the Australian Psychological Society website and review types of psychologists. Choose the one that interests you the most and conduct further research. **Create** an infographic summarising
 - a role description (1 mark)
 - b career opportunities (1 mark)
 - c qualifications needed (1 mark)
 - d how your chosen field positively impacts the world. (1 mark)

Lesson 1.2

Considering First Nations perspectives in Psychology

Key ideas

- First Nations peoples are the traditional custodians of the land we know now as Australia.
- First Nations cultures are the oldest living cultures in the world.
- Correctly acknowledging cultural and/or language groups, rejecting deficit discourse, avoiding Eurocentrism and critically evaluating sources of information can help you to respectfully engage with First Nations perspectives in QCE Psychology.



Learning intentions and success criteria

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify strategies to manage risks and environmental impact such as
 - cultural guidelines, e.g. protocols for working with the knowledge of First Nations peoples

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 oxforddigital

This lesson is available on Oxford Digital.

Lesson 1.3

Understanding the scientific method

Key ideas

- The scientific method is a framework that helps to eliminate bias in research so that valid, evidence-based conclusions can be drawn.
- A research question is a clearly formulated question that defines the focus of an investigation.
- A hypothesis is a scientific prediction about the outcome of a study; there are different types of hypotheses: alternative (either directional or non-directional, and either experimental or correlational) and null.
- In psychology, we statistically test the probability of the null hypothesis being true.



Learning intentions
and success criteria

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify, research and construct questions for investigation
- identify and operationalise variables to be manipulated, measured and controlled
- predict possible outcomes from investigations, e.g. identify null and alternative hypotheses

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Worked examples

This lesson is supported by the following worked examples:

- **Worked example 1.3A** Creating a research question

 oxforddigital

This lesson is available on Oxford Digital.

Lesson 1.4

Planning investigations

Key ideas

- Each different type of scientific investigation and research design has strengths and weaknesses that need to be considered.
- Participants in a study can be selected through convenience, random or stratified sampling methods.
- Errors and confounds can influence the quality of the results, but they can be minimised through careful design.



Learning intentions
and success criteria

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- distinguish between types of investigations, e.g.
 - experiments (independent and dependent variables)
 - » independent groups
 - » matched participants
 - » repeated measures
 - correlational research (related variables)
 - quasi-experiments
 - observational research
- identify and use appropriate sampling procedures for selection and allocation of participants, e.g.
 - convenience sampling
 - random sampling
 - stratified sampling
 - random allocation
- identify errors, and extraneous or confounding variables that are likely to influence results; and implement strategies to minimise systematic and random error, e.g.
 - type of participant selection and allocation
 - single-blind and double-blind procedures
 - counterbalancing
 - standardised instructions and procedures

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Lesson 1.5

Considering safety and ethics



Learning intentions
and success criteria

Key ideas

- Ethical principles should be applied in psychological research to ensure the safety and wellbeing of participants.
- Ethical understanding should be applied when conducting research by acknowledging sources and referencing.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and apply ethical principles, e.g.
 - acknowledgment of sources and referencing
 - consideration of the role and bias of the experimenter
 - protection and security of participants' information
 - confidentiality
 - voluntary participation
 - withdrawal rights
 - informed consent procedures
 - use of deception in research
 - debriefing
- identify strategies to manage risks and environmental impact such as
 - risk assessment, e.g. workplace health and safety (WH&S) guidelines
 - disposal methods

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Lesson 1.6

Collecting data

Key ideas

- Data can be classified as qualitative (descriptive), quantitative (numerical), subjective (personal) or objective (non-personal), continuous or discrete (categorical).
- Levels of measurement include nominal, ordinal, interval or ratio in order of increasing precision and usability for statistical analysis.
- Psychologists use case studies, observations, self-reports, interviews and computerised instruments to systematically and safely collect information for research.
- Researchers use logbooks to systematically record information, observations and data.



Learning intentions
and success criteria

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- use appropriate equipment, techniques, procedures and sources to systematically and safely collect primary and secondary data
- distinguish between levels of measurement, i.e.
 - nominal
 - ordinal
 - interval
 - ratio
- design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data required to obtain valid and reliable evidence

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Introducing types of data

The aim of scientific investigations is to collect and use data to construct evidence-based arguments. The use of systematically gathered evidence distinguishes scientific ideas from opinions and anecdotes. In QCE Psychology you will need to practise collecting, processing, analysing and interpreting data. The two types of data you will work with are:

- **primary data** – data that is original and has been gathered firsthand through your own research, such as surveys or experiments
- **secondary data** – existing data gathered from second-hand sources such as scientific journals, reputable and authoritative websites, and databases.

Data can be further classified as:

- qualitative or quantitative
- subjective or objective
- continuous or discrete.

primary data

data collected
firsthand

secondary data

data collected from
second-hand sources

Assessment tip

You need to collect primary data for the student experiment and secondary data for the research investigation.

Qualitative and quantitative data

Primary and secondary data can be further classified as either qualitative or quantitative.

qualitative data

descriptions of the characteristics of what is being studied

Qualitative data comes from descriptions of the qualities or characteristics of what is being studied. Qualitative data is commonly obtained from open-ended questions on surveys or interviews, focus groups or observations. Qualitative data offers in-depth information that is particularly useful for exploring context or gaining deep insight into a particular case or condition. Analysis of qualitative data can be very time-consuming as it involves identifying, examining and interpreting patterns or themes. More commonly, qualitative data is collected through surveys using a Likert-type scale, which allows for much faster analysis. For example:

- emotional state – happy/sad/angry
- difficulty of task – easy/moderate/difficult/very difficult.

quantitative data

measurements (numerical information) about the variables being studied

Quantitative data is information that can be expressed numerically, allowing for statistical analysis and mathematical computation. As the name suggests, the information is “quantified”, meaning that the number represents an actual value. This type of data is typically collected using instruments, and can include counts, scores, times, measurements and scales of judgment. Most psychological research aims to gather quantitative data because we can perform statistical procedures on these and, provided the data are accurate and precise, we can determine whether our results are significant and our hypotheses supported.

Subjective and objective data

subjective data

information about the variables being studied based on opinion, with no external criterion by which they are measured

Subjective data are based on personal experience or opinion. If you asked all the people in your class how they feel about maths, you would collect a wide range of responses – all of which are correct because they are based on the individual’s own feelings.

objective data

data that is measured according to an identifiable external criterion

Objective data are measured according to an identifiable external criterion. Each person using an objective measure correctly will obtain the same result. In simplest terms, if each person in the class measured the length and breadth of a desk, they would all obtain the same result.

Many standardised measures are used to gain psychological information in an objective way. This includes different IQ tests, and any psychologist who administers one of these would obtain the same result for the same person under the same conditions.

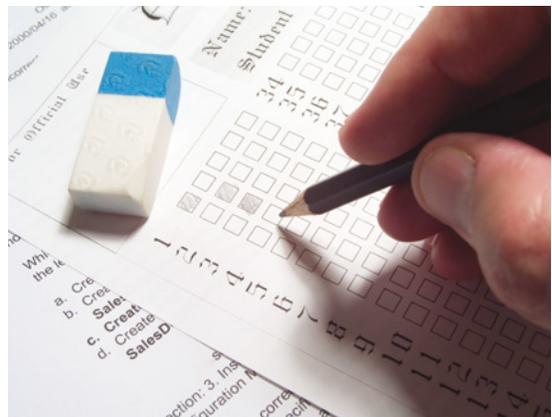


FIGURE 1 Self-report surveys collect subjective data.

Continuous and discrete data

continuous data

data that can take on any value within a range

Continuous data can take on any value within a range. This type of data is measurable and often involves quantities that can be measured to any degree of precision. Examples of continuous data include height, weight, temperature and time. For instance, a person’s height can be measured as 1.8 metres or 1.862 metres, and so on, indicating the precision with which this data type can be expressed.

Discrete data consists of countable values that can only take specific values within a range. These are separate, distinct values determined by counting. Examples of discrete data include the number of students in a classroom, the number of cars in a parking lot, or the number of books on a shelf. For example, you can have 20 students in a class but not 20.5 students.

discrete data
data that can only take specific values within a range

Introducing levels of measurement

In order of increasing precision, the levels of measurement used are:

- nominal
- ordinal
- interval
- ratio.

Nominal data

Nominal data represents names or labels that cannot be quantified or ranked. Nominal data represents discrete categories that are mutually exclusive, meaning that a person can only belong to one category. Examples include:

- sex (male/female/nonbinary)
- first language (English/Mandarin/Arabic/Vietnamese/Punjabi/other)
- religion (Islam/Christianity/Hinduism/Buddhism/Sikhism/Judaism/other).

nominal data
data is organised into qualitative categories that cannot be quantified or ranked



FIGURE 2 Hair colour is an example of nominal data that allows us to allocate individuals to groups.

Ordinal data

ordinal data

data that has a definite sequence, but the gap between one level and the next is not constant

Ordinal data can be ordered or ranked in a sequence, but the intervals between the data points are unknown or variable. Data is typically sequenced according to a “more” or “less” dimension such as small to large, or best to worst. Examples include:

- placement (first, second, third): there is no question about the order of achievements but it is not known how much better or faster the person in first place performed than the person in second place. Additionally, the difference in performance between first and second is not necessarily the same as the difference between second and third place
- reviews such as number of stars given to movies or hotels: five stars is better than four stars, but how much better?
- ratings as measured on a Likert-type scale, e.g. strongly disagree/disagree/neutral/agree/strongly agree
- size: small/medium/large
- grades: A/B/C/D/E.

Interval data

interval data

numerical data where the intervals between numbers are equal, but there is no true zero point

Interval data is numerical data where the intervals between numbers are equal, but there is no true zero point. Examples include:

- temperature in degrees Celsius: this is because 0°C does not indicate the absence of heat but rather the temperature at which water freezes. For instance, if today is 30°C, does that mean that it is twice as hot as yesterday when it was 15°C? No, because without a true zero, ratios cannot be used
- time on a clock, e.g. one o'clock, two o'clock: the exact interval between the two times is known (1 hour or 60 minutes) but there is no true zero
- psychological measures such as IQ measured on an intelligence scale.

Ratio data

ratio data

measurements that represent quantities in terms of equal intervals and an absolute zero

Ratio data has all the properties of interval data, with the addition of a meaningful zero point, which allows for the calculation of ratios. In ratio data, zero means the absence of a property. Ratio measurement allows for the most powerful statistical tests to be conducted. Examples include:

- temperature in degrees Kelvin: this is because 0°K indicates the absence of heat and is therefore a true zero
- time, e.g. reaction time
- length or height
- grades measured as a score out of a total: a score of 0 would indicate the absence of correct responses.

Study tip

Both nominal and ordinal levels of measurement are discrete or categorical, meaning that the scales do not allow for fractional amounts. In contrast, both interval and ratio levels of measurement are examples of continuous data that allow for fractional amounts.

Introducing data collection methods

Designing a research method includes choosing the most appropriate type of investigation (Lesson 1.4) as well as choosing a data collection method. We will now learn about techniques and procedures used by psychologists to systematically and safely collect data:

- case studies
- observations
- self-reports
- interviews.

Case studies

A **case study** involves a deep, comprehensive examination of a person, group, organisation or event. This research method stems from clinical medicine where physicians collect patient history. In psychology, case studies often involve individuals, and they have led to advancements in our understanding of the mind–body interaction. For example, Phineas Gage helped us understand the relationship between the brain and personality, Henry Molaison helped us discover different types of memory, and “Tan” helped us learn about areas of the brain related to speech.

Case studies involve collecting both qualitative and quantitative data through various means like interviews, observations and psychometric tests.

Case studies provide rich, detailed data, which can be used to generate hypotheses for future studies. Limitations include the lack of replicability due to the uniqueness of a case, and lack of generalisability due to the small sample size.

Observations

Observation involves recording the behavioural patterns of people, animals or events in a systematic manner. It can be naturalistic (in natural environments) or controlled (in labs or set environments). It may also include participant observation (where the observer is part of the group being studied).

- Observational studies typically collect qualitative data that can be analysed for patterns or themes.
- Naturalistic observations have high ecological validity due to limited control over the environment.
- Controlled observations have fewer confounds due to higher control over the environment, but the higher control lowers ecological validity.



FIGURE 3 Children’s behaviour can be observed in a natural environment, such as a playground.

Study tip

Students sometimes struggle to distinguish between interval and ratio scales because they ask themselves whether it is possible to have a zero measurement. It is important to remember that the zero on the scale represents the absence of something. For example, height is ratio because on the scale, 0 cm indicates the absence of height.

case study

in-depth examination of a person, group, organisation or event using various methods

Self-reports

self-report

participants' written or verbal responses to questions, statements or instructions about themselves

One of the most used data collection methods in psychology are **self-reports**. A self-report, as the name suggests, is participants' written or verbal responses to questions, statements or instructions about themselves. Self-reports allow researchers to collect information about participants that cannot be overtly measured, such as their thoughts, beliefs, emotions or behaviours.

A limitation of self-reports is their subjective nature. They rely on participants correctly understanding the questions, and answering honestly and accurately.

Self-reports use questionnaires, a research tool consisting of questions designed to collect information. Questionnaires come in several forms:

- **Surveys:** May be question-and-answer, or responses to Likert-type scales (rating scales). Surveys are easy to replicate and allow researchers to quickly gather a large amount of qualitative data. Likert-type scales can provide a means of quantifying qualitative data by coding responses using numerical values (Figure 4).

| I complete my Psychology homework on time. | Never | Sometimes | Often | Always |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| | 1 | 2 | 3 | 4 |
| | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

FIGURE 4 A Likert-type scale is a rating scale used to measure behaviours, attitudes or opinions. It can also help turn qualitative data into quantitative data by assigning numerical values to responses.

- **Psychological tests:** Personality and multiple-choice IQ tests are types of psychological tests. Strengths of psychological tests include being standardised, easy to replicate and easy to score. Limitations include being difficult to construct and validate.

Interviews

Interviews involve face-to-face interaction between the researcher and the participant.

Interviews can be structured or clinical. In a structured interview, participants are asked a set of pre-determined, often closed, questions. Clinical interviews include pre-determined questions and make allowance for additional open questions to gain clarification or more information.

Structured interviews are easier to replicate and enable researchers to compare participant responses. However, data may be missed through limited choices in responses. Strengths of clinical interviews are their flexibility and that they are usually high in validity. However, they rely on the objectivity of the interviewer. Interviews are also more susceptible to **social desirability bias**, where respondents answer questions in a manner they believe will be viewed favourably by others.

social desirability bias

the tendency to answer questions in a way that one believes will be viewed favourably by others

Technology in data collection

Technology can make some forms of data collection easier and quicker.

Computerised or automated data collection

Sometimes, a participant will respond to stimuli presented in a computer program or enter data into a spreadsheet. In animal studies, responses such as pressing a button can be recorded. A strength of this data collection method is efficiency, as the researcher does not

need to be present. Other strengths include accuracy, as response rates can be timed to the millisecond, and ease of analysis – once the computer program has been written, data analysis can be instantaneous. A limitation of this method is the need for computer programming or specially constructed measuring devices.

Video/audio taping

For clinical interviews and certain case studies (such as sleep studies), these recordings are very useful. A strength of this approach is that large amounts of data can be collected and analysed in detail. A limitation is that the data analysis is time-consuming.

Recording data

In practice, researchers use logbooks to systematically record information, observations, data, ideas and discoveries. This increases the integrity and reproducibility of their investigations.

Key features of a logbook:

- **Date:** Each entry is dated, and entries are organised in chronological order.
- **Objectivity:** Records are factual, and free from personal opinions or bias.
- **Completeness:** All details are included, such as planning notes, list of equipment used and settings, description and sequence of activities, all measurements, samples, calculations, tables and figures, qualitative observations and personal reflections, and acknowledgment of secondary resources.
- **Readability:** A detailed logbook is of no use if you or others can't understand and use what is written!

Study tip

Keeping a logbook is a great way to collect, organise and store the information you have collected, and you can also use it to demonstrate the authenticity of your work.

Study tip

For the student experiment, you will likely be collecting data from a group of participants. The best way to organise your raw data is in a table and, most likely, you will transcribe the information directly into a program like Excel. However, you can still use your logbook to plan your table with column and row headings that describe the variables and identify the units.

Check your learning 1.6



Check your learning 1.6: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** the following types of data and provide an example of each
 - a nominal (2 marks)
 - b ordinal (2 marks)
 - c interval (2 marks)
 - d ratio. (2 marks)
- 2 **Summarise** the different methods of data collection by copying and completing the table. (3 marks per method)

| Data collection method | Description | Strength | Limitations |
|------------------------|-------------|----------|-------------|
| Case studies | | | |
| Observations | | | |
| Self-reports | | | |
| Interviews | | | |

Analytical processes

- 3 **Compare** qualitative and quantitative data. (2 marks)
- 4 **Distinguish** between continuous and discrete data. (1 mark)
- 5 **Contrast** interval and ratio data. (1 mark)

Knowledge utilisation

- 6 A researcher wants to investigate student stress levels during exam periods. They design a questionnaire and distribute it among a group of students, asking them to rate their stress levels during their most recent exam period on a five-point Likert-type scale, where 1 = Little or no stress and 5 = High stress.

Determine the type of data that will be collected. **Justify** your response with reference to the scenario. (2 marks)

Lesson 1.7

Processing and analysing data



Learning intentions
and success criteria

Key ideas

- Statistics are mathematical procedures that help us to make sense of data.
- Descriptive statistics are numerical or graphical methods used to summarise and organise data in a meaningful way.
- Inferential statistics allow us to interpret meaning from the data such as drawing conclusions and making inferences and predictions.
- Statistics, tables and figures should be represented scientifically.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- use scientific language and representations to systematically record information, observations and data, e.g.
 - measurements
 - sample calculations
 - statistics
 - tables
 - figures
- translate information between graphical, numerical and/or algebraic forms
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - measures of central tendency: mean and median
 - measures of uncertainty, including dispersion in a sample (range, interquartile range, standard deviation) and using a sample to make an inference about the population from which it was drawn (standard error, confidence intervals)
 - correlation, e.g. Pearson r correlation coefficient
 - parametric inferential statistics, e.g.
 - two-sample t -test (unpaired and paired)
 - p -value from Pearson r
- select and construct appropriate representations to present data and communicate findings, e.g. summary tables/statistics, p -values, sample calculations, column graphs (with error bars), scatterplots (with trendline and r -value)
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

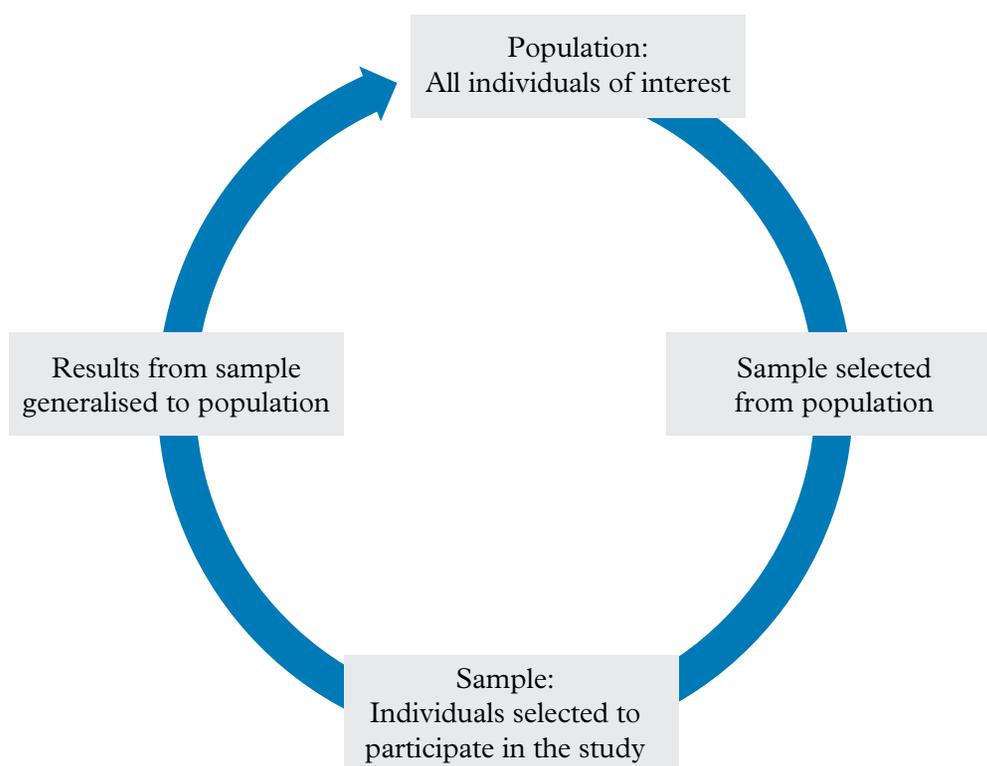
Introducing processing and analysing data

Research originally sets out to draw conclusions and find out something useful about the population of interest. However, researchers typically can't collect data from the entire population of interest. Instead, they sample a smaller subset of the population to participate in the research.

At the end of the investigation, the confidence and extent to which researchers can generalise findings from the sample back to the population of interest depends on:

- the representativeness of the sample
- methodological limitations
- reliability and validity of the procedures
- statistical significance of the results.

The good news is that, in psychology, although we use statistics, we never have to calculate more than the very simplest of them. Computer programs and calculators do it all for us! It is useful, however, to know how these statistics work and what they mean.



Source: Adapted from Gravetter and Wallnau (2014)

FIGURE 1 Researchers generalise findings from a population back to a sample, provided the results are reliable and valid.

Descriptive statistics

Raw data refers to the original, unprocessed information gathered directly from experiments and surveys. For example, Julie rolled a die 80 times and recorded the number shown on each throw. The raw data she collected: 1, 3, 6, 5, 2, 1, 6, 1, 5, 2, 1, 2, 5, 4, 3, 6, 5, 2, 3, 4, 1, 4, 3, 2, 5, 1, 6, 2, 3, 1, 5, 5, 2, 3, 5, 4, 1, 3, 5, 3, 6, 3, 1, 6, 6, 3, 3, 4, 3, 3, 6, 3, 1, 3, 4, 6, 2, 4, 6, 3, 4, 5, 4, 6, 2, 3, 4, 5, 5, 4, 2, 1, 5, 4, 5, 6, 1, 6, 2, 5.

raw data
original, unprocessed
information

As you can see, raw data can be unstructured and confusing, making it difficult to work out what it means and to spot errors. Descriptive statistics are the processes and mathematical procedures that we can use to organise and summarise the information.

Organising data

Tables

Tables are a helpful way to organise and present data. All tables should include the following:

- **Title:** The title for a table starts with “Table” followed by a number. Tables should be numbered sequentially, i.e. Table 1, Table 2 etc. The number is followed by a description that summarises what the table shows. For example, “Raw data”, “Demographic information” and “Processed data”. Include units of measurement for the dependent variable if they can’t be shown in the table.
- **Column headings:**
 - The independent variable (IV) is recorded in the first column. Each row of the first column corresponds to a different version of the independent variable.
 - While it is not required, it is good practice to record the number of participants in each level or condition of the independent variable. This is given a symbol of “n” for a sample or “N” for a population.
 - Raw and/or processed data for the dependent variable (DV) is recorded in subsequent column(s).
- **Row headings:** If you are summarising different types of information, e.g. demographic data, then the row headings need to clearly identify what is being shown.

Table X The description of the table sits above the table.

Replace with descriptive names rather than using “IV” and “DV”, and identify units where relevant.

| Dependent variable (units) | | | | |
|------------------------------|------------------------|------|-------------|------------------------|
| Independent variable (units) | Number of participants | Mean | Uncertainty | Inferential statistics |
| | | | | |
| | | | | |

Conditions are specified here.

The mean is the sum of participant or subject scores for that specific condition.

Uncertainty (in psychology) is usually quantified through standard deviation (SD), standard error of the mean (SEM) or confidence intervals (CI).

Inferential statistics help the researcher draw conclusions. Typically, this is a p -value.

FIGURE 2 Features of a scientific table

- **Units of measurement:** These should be specified in the row or column headings where applicable. Sometimes it is clearer to include this in the title description.
- **Footnotes:** Use footnotes to explain or provide additional context to the data within the table, such as any superscript letters or symbols.

| Mean employability rating of participants with and without facial tattoos | <i>n</i> | <i>M</i> | <i>SD</i> | <i>p-value</i> |
|---|----------|----------|-----------|----------------|
| With facial tattoo | 50 | 3.5 | 1.2 | 0.004 |
| Without facial tattoo | 50 | 7.8 | 0.9 | |

FIGURE 3 Mean employability rating of participants with and without facial tattoos. Employability was rated on a scale from 1 to 10; higher rating indicates greater perceived employability.

Frequency tables

A **frequency table** is a tool used in statistics to organise data by showing the frequencies (counts) of different values or categories of a variable. Placing the data into a frequency table helps to simplify the data and makes it easier to perform simple calculations on it. For example, the raw data from the dice rolls could be summarised in a frequency table (Table 1).



frequency table
table that displays the number of occurrences of each category of a variable

FIGURE 4 Placing data from rolling a die into a frequency table makes calculations easier.

TABLE 1 Frequency table

| Number on die | Frequency |
|---------------|-----------|
| 1 | 12 |
| 2 | 11 |
| 3 | 17 |
| 4 | 12 |
| 5 | 15 |
| 6 | 13 |

You can see that this is much clearer and therefore easier to work with than the raw data list of numbers presented earlier in this lesson.

The information in frequency tables can be converted to a graph called a histogram (discussed in the next section). Frequency tables also make it easier to perform certain calculations; for example, calculating the percentage of a dataset represented by a certain score. This can be calculated using the formula:

$$\text{percentage} = \frac{\text{number of times the score occurs}}{\text{total number of scores in dataset}} \times 100$$

For example, if we wanted to know what percentage of rolls scored 6, we would substitute the values from our dataset into the equation:

$$\begin{aligned} \text{percentage} &= \frac{\text{number of times the score occurs}}{\text{total number of scores in dataset}} \times 100 \\ &= \frac{13}{80} \times 100 \\ &= 16.25\% \end{aligned}$$

Worked example 1.7A**Constructing frequency tables**

A Psychology class was investigating the effect of emotional stimuli on physiological response. Participants watched an infomercial on toothpaste in one condition and a scary movie scene in another. Their heart rates were recorded (Table 2).

TABLE 2 Participants' heart rate (bpm) measured after 5-minute clip

| Participant | Heart rate (bpm): informative | Heart rate (bpm): horror |
|-------------|-------------------------------|--------------------------|
| 1 | 75 | 90 |
| 2 | 66 | 74 |
| 3 | 88 | 98 |
| 4 | 66 | 68 |
| 5 | 74 | 81 |
| 6 | 58 | 85 |
| 7 | 72 | 82 |
| 8 | 74 | 77 |
| 9 | 61 | 76 |
| 10 | 70 | 89 |

Construct a frequency table for the “informative” condition data.

| Think | Do | | | | | | | | | | | | |
|---|---|------------------|-------------------------|-------|---|-------|---|-------|---|-------|---|-------|---|
| <p>Step 1: Identify data categories (bins).</p> <ul style="list-style-type: none"> Consider the maximum and minimum values across the dataset. For nominal data, list each unique category. For numerical data, decide on sensible intervals or “bins” that cover the range of the data. Aim for an uneven number of bins. The data in this case is numerical. | <p>The data across both conditions ranges from 50 to 99. It makes sense to group these into intervals of 10:</p> <table border="1"> <thead> <tr> <th>Heart rate</th> <th>Informative</th> </tr> </thead> <tbody> <tr><td>50–59</td><td></td></tr> <tr><td>60–69</td><td></td></tr> <tr><td>70–79</td><td></td></tr> <tr><td>80–89</td><td></td></tr> <tr><td>90–99</td><td></td></tr> </tbody> </table> | Heart rate | Informative | 50–59 | | 60–69 | | 70–79 | | 80–89 | | 90–99 | |
| Heart rate | Informative | | | | | | | | | | | | |
| 50–59 | | | | | | | | | | | | | |
| 60–69 | | | | | | | | | | | | | |
| 70–79 | | | | | | | | | | | | | |
| 80–89 | | | | | | | | | | | | | |
| 90–99 | | | | | | | | | | | | | |
| <p>Step 2: Tally observation.</p> <ul style="list-style-type: none"> Go through the raw data and count the number of observations that match the category. Record the tally in the table. | <table border="1"> <thead> <tr> <th>Heart rate</th> <th>Informative</th> </tr> </thead> <tbody> <tr><td>50–59</td><td>1</td></tr> <tr><td>60–69</td><td>3</td></tr> <tr><td>70–79</td><td>5</td></tr> <tr><td>80–89</td><td>1</td></tr> <tr><td>90–99</td><td>0</td></tr> </tbody> </table> | Heart rate | Informative | 50–59 | 1 | 60–69 | 3 | 70–79 | 5 | 80–89 | 1 | 90–99 | 0 |
| Heart rate | Informative | | | | | | | | | | | | |
| 50–59 | 1 | | | | | | | | | | | | |
| 60–69 | 3 | | | | | | | | | | | | |
| 70–79 | 5 | | | | | | | | | | | | |
| 80–89 | 1 | | | | | | | | | | | | |
| 90–99 | 0 | | | | | | | | | | | | |
| <p>Step 3: Finalise your table.</p> <ul style="list-style-type: none"> Check the table to make sure all data points have been included and there are no errors in the tallying process. Check that you are communicating scientifically. Does your table have a title and appropriate headings, and include units of measurement and footnotes (if needed)? | <table border="1"> <thead> <tr> <th>Heart rate (bpm)</th> <th>Informative (frequency)</th> </tr> </thead> <tbody> <tr><td>50–59</td><td>1</td></tr> <tr><td>60–69</td><td>3</td></tr> <tr><td>70–79</td><td>5</td></tr> <tr><td>80–89</td><td>1</td></tr> <tr><td>90–99</td><td>0</td></tr> </tbody> </table> | Heart rate (bpm) | Informative (frequency) | 50–59 | 1 | 60–69 | 3 | 70–79 | 5 | 80–89 | 1 | 90–99 | 0 |
| Heart rate (bpm) | Informative (frequency) | | | | | | | | | | | | |
| 50–59 | 1 | | | | | | | | | | | | |
| 60–69 | 3 | | | | | | | | | | | | |
| 70–79 | 5 | | | | | | | | | | | | |
| 80–89 | 1 | | | | | | | | | | | | |
| 90–99 | 0 | | | | | | | | | | | | |

Your turn

Construct a frequency table for the “horror” condition data. (3 marks)

Presenting data

Tables help to organise the data, but they don't help us make meaning. Instead, we can visually present the data in an appropriate graph to help us make sense of the information and more easily identify trends, patterns and relationships.

All graphs should include DAILS:

- D = a **d**escription that succinctly describes what the graph is showing
- A = **a**xes: the IV goes on the *x*-axis, DV on the *y*-axis
- I = points on the axes are equally spaced **i**ntervals
- L = **l**abels on each axis; the DV and units of measure on the *y*-axis label and the IV and conditions on the *x*-axis
- S = **s**cale appropriate for the graph and the axes start at zero.

Figure 5 is an example of a column graph showing the average scores for each group with error bars.

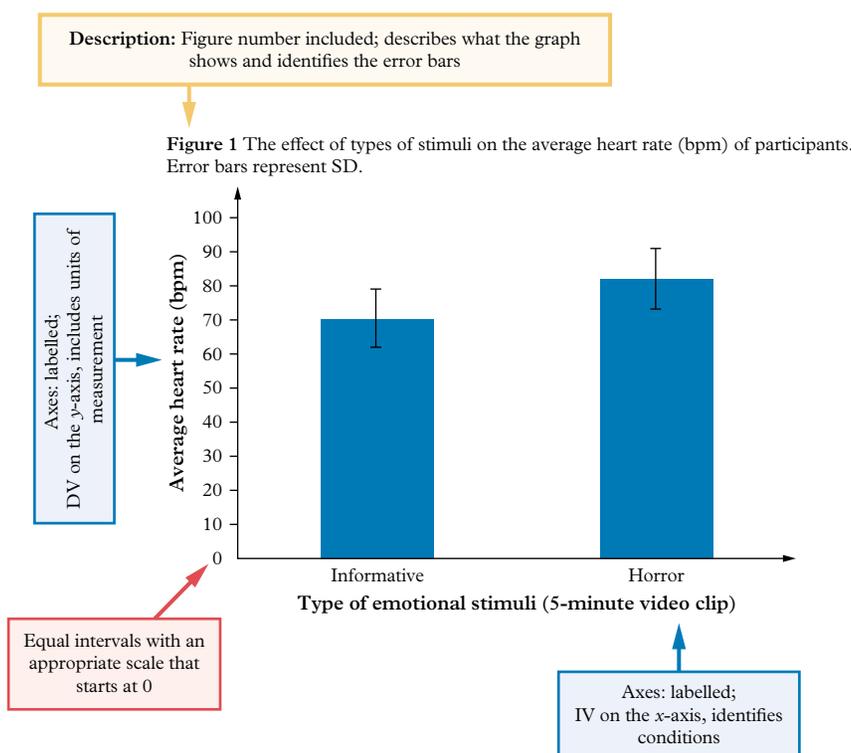


FIGURE 5 All graphs should include DAILS to make sure that the information is presented scientifically.

There are many different graphs that you can use to visually represent data. Let's look at the ones you will most likely need during your study.

Histograms

A **histogram** is a visual representation of a frequency table. It is a type of column graph where the columns touch. Histograms are useful for showing the shape of a data distribution such as whether it is normal or skewed.

histogram
visual representation of a frequency table in the form of a column graph

Study tip

You can create a histogram for each variable to test whether the assumption of normality is met (see inferential tests in Lesson 1.8).

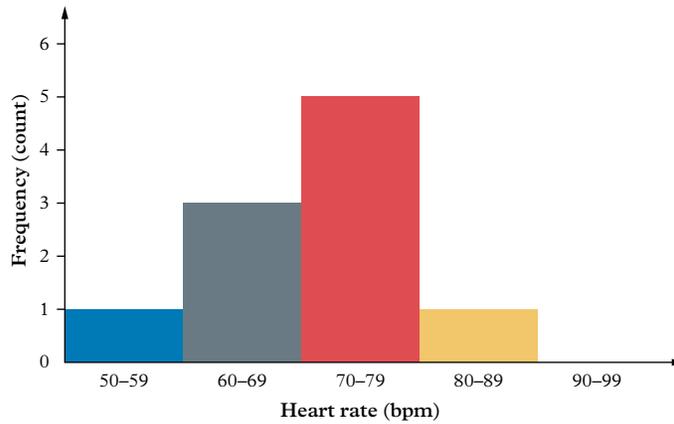


FIGURE 6 The histogram shows the number of participants whose heart rates were in the corresponding range.

Pie charts

pie chart

a circular graph divided into sections that are proportional to the data they represent

A **pie chart** displays data in a circular graph where each slice represents a category's proportion of the whole. Pie charts are helpful for showing the relative proportions or percentages of a whole. While these are not commonly used in published research, you can use them to summarise demographic data (data that describes the characteristics of populations).

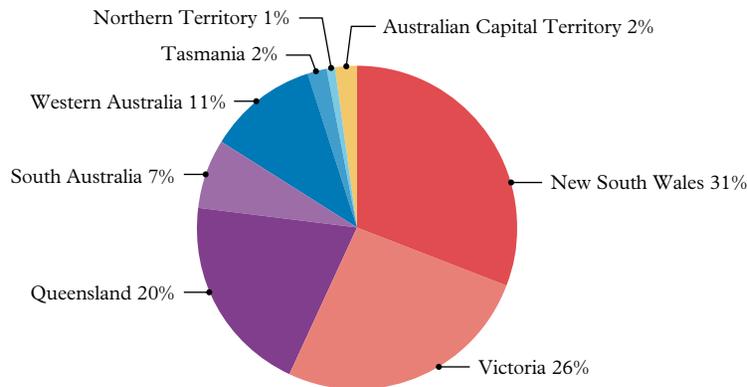


FIGURE 7 The pie chart makes it easier to see relative proportions. This example shows the percentage of the population living in each Australian state and territory, as at 30 September 2023.

column graph

graph typically used for experimental designs where the height of the vertical bar corresponds to the mean and each column represents a condition of the independent variable

error bar

graphical representation of the variability of uncertainty in data, usually either the standard deviation, standard error or confidence interval

Column graphs

A **column graph** uses vertical bars to represent data. Each bar's height corresponds to the value it represents (usually the average of participants in a group), and each bar is separated to distinguish between categories. **Error bars** are shown by markers drawn over the graph. Error bars can represent standard deviation (SD), standard error (SE) or confidence intervals (CI), therefore it is important that the figure description identifies the type of error bars shown. Figure 8 shows the key features of a column graph.

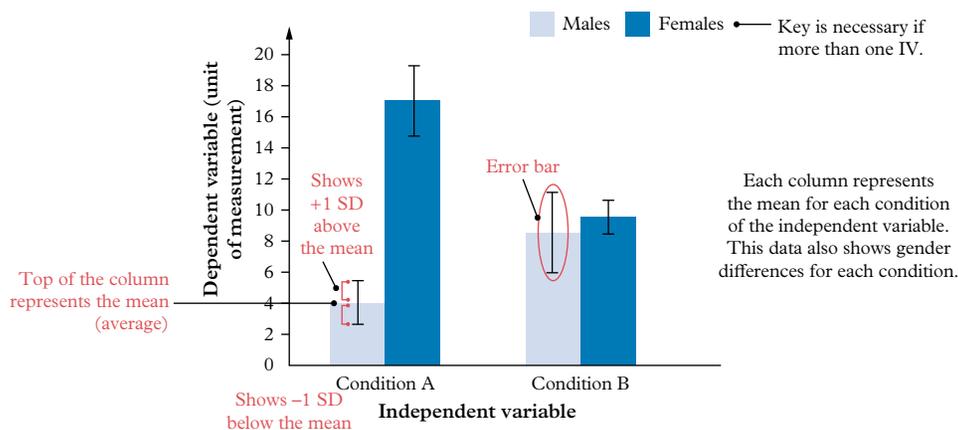


FIGURE 8 Key features of a column graph. In this example, the error bars represent standard deviation.

It is difficult to see error bars on dark-filled columns. To avoid this, columns are often not filled (coloured in) and may only include the error bars (Figure 9).

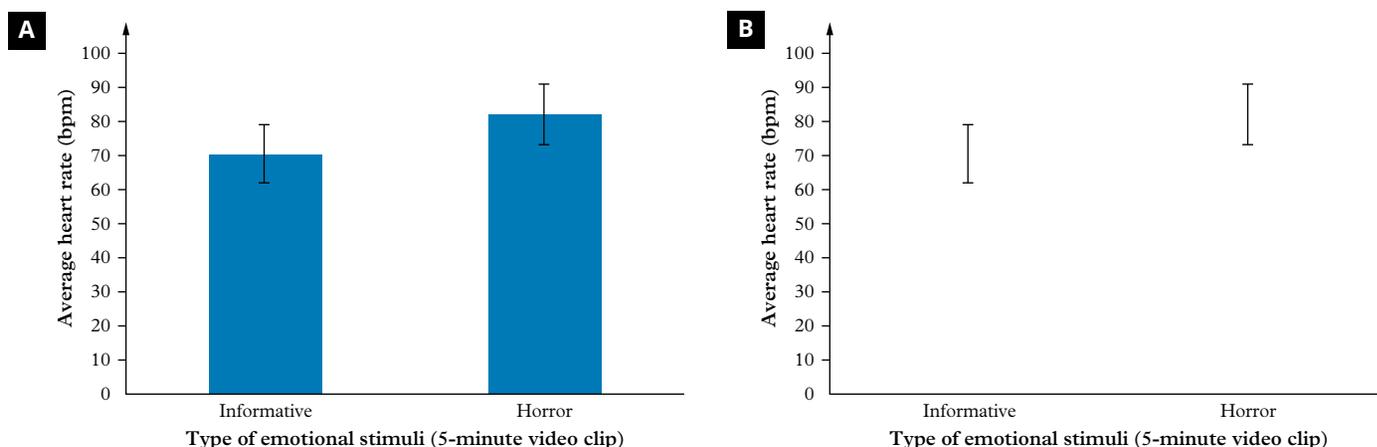


FIGURE 9 Both graphs show the average heart rate (bpm) for participants when they watched the informative and horror clips. (A) The graph has filled-in columns that make it difficult to see the error bars clearly. (B) Sometimes, the columns are removed and only the error bars are shown. They are still interpreted in the same way.

Column graphs are used for experimental research designs where the IV is categorical or discrete (can only take set values), and the mean is the most appropriate measure of central tendency. We will learn about measures of central tendency later in this lesson.

Line graphs

If both variables are continuous (meaning that they can have any value within a certain range) – such as body mass, age in months or IQ – a **line graph** would be more appropriate than a column graph. For example, suppose your teacher sets you a group classwork assignment and you want to find out what sized group is the most efficient.

The data in Table 3 is presented as the line graph shown in Figure 10.

Study tip

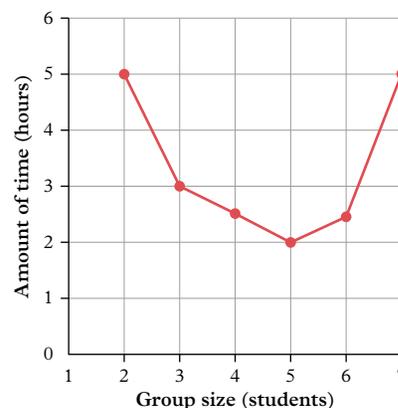
Column graphs are different from bar graphs, where the bars are arranged horizontally, but in everyday use, the terms are used interchangeably.

line graph

a pictorial representation of data linking two variables, where one is plotted on the y-axis and the other on the x-axis

TABLE 3 Time taken to complete classwork for different-sized study groups

| Group size | Time (hours) |
|------------|--------------|
| 2 | 5.0 |
| 3 | 3.0 |
| 4 | 2.5 |
| 5 | 2.0 |
| 6 | 2.5 |
| 7 | 5.0 |

**FIGURE 10** Time taken to complete classwork for different-sized study groups**box and whisker plot**

graph showing the distribution of data that shows the median, quartiles and outliers

outlier

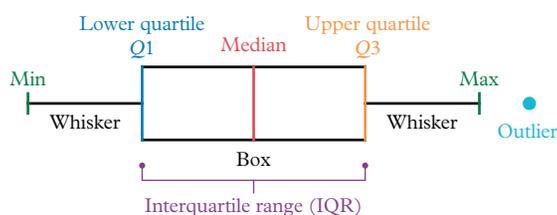
extreme score that can be objectively calculated as an observation greater than three standard deviations above or below the mean

Study tip

You do not need to be able to construct box and whisker plots by hand (you can use software) but you must be able to interpret them and return values such as the median (Q2), or calculate the IQR.

Box and whisker plots

Box and whisker plots (or box plots) are used for experimental research designs where the median is the most appropriate measure of central tendency. The lines extending parallel from the boxes are known as the “whiskers”, which are used to indicate variability outside the upper and lower quartiles. **Outliers** are sometimes plotted as individual dots that are in-line with whiskers, as shown in Figure 11.

**FIGURE 11** Box and whisker plots show median and interquartile range (IQR).

Box and whisker plots can be graphed vertically or horizontally. The convention for experimental designs is to plot the boxes for each condition vertically next to one another, as it makes comparisons easier.

Scatterplots

scatterplot

diagram that shows the values of the two variables for each participant in the sample by representing the intersection of those two values with a dot on a graph

line of best fit

a straight line drawn through a scatterplot of data points that best expresses the relationship between those points

A **scatterplot** shows the values of the two variables for each participant in the sample by representing the intersection of those two values, one plotted along the x -axis and the other plotted along the y -axis, with a dot on a graph. The dots are unconnected; however, adding a **line of best fit** is helpful to identify and describe the relationship between the two variables (Figure 12).

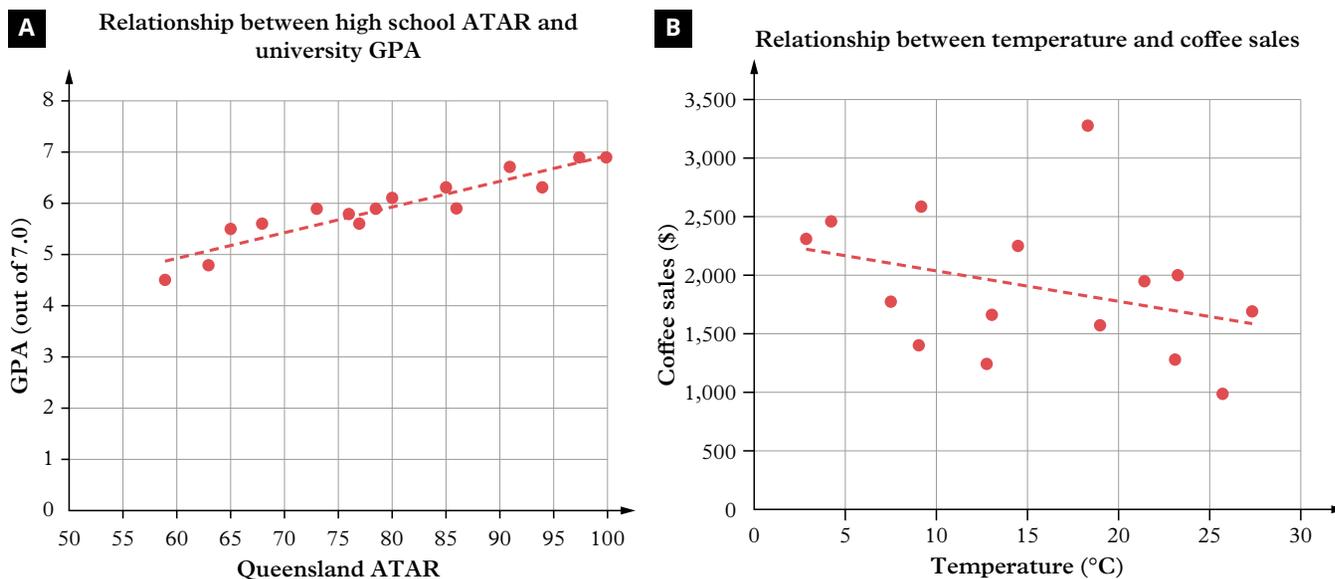


FIGURE 12 Two scatterplots depicting different relationships as shown by the line of best fit

Scatterplots are used for correlational designs. If the line of best fit slopes upwards (Figure 12A), it indicates a **positive correlation**; that is, as one variable increases, there is an associated increase in the other variable. On the other hand, if the line of best fit slopes downwards (Figure 12B) it indicates a **negative correlation**; that is, as one variable increases, there is an associated decrease in the other variable.

Remember that in a correlation, there is no independent variable, in which case, it does not matter which variable is plotted on the x -axis. The variable presumed to influence or predict the outcome of the other (a pseudo IV) is called the predictor variable. The one presumed to depend on the predictor variable is called the criterion variable. If these are known, then like the IV, the predictor variable is plotted on the x -axis while the criterion variable is plotted on the y -axis.

positive correlation

two variables change in the same direction; as one increases (or decreases), so does the other

negative correlation

two variables change in opposite directions; as one increases, the other decreases

Processing data

While graphs help us to visualise the data, descriptive statistics help us to describe the data. A graph can be described by three features:

- shape (symmetrical or skewed)
- central tendency (where the majority of scores are)
- spread of scores.

We will discuss each of these in turn.

Shape

When all scores in a set of data are plotted in a graph, the shape of the distribution is noted. The shape can be symmetrical (Figure 13A) or skewed (Figures 13B and 13C). Skewed distributions are described according to the direction of the tail (where the data tapers off on either side). If the tail heads away from zero, the distribution is said to be **positively skewed** (Figure 13B). Conversely, if the tail is moving towards zero, it is said to be **negatively skewed** (Figure 13C).

positively skewed

the tail of the distribution heads away from zero

negatively skewed

the tail of the distribution heads towards zero

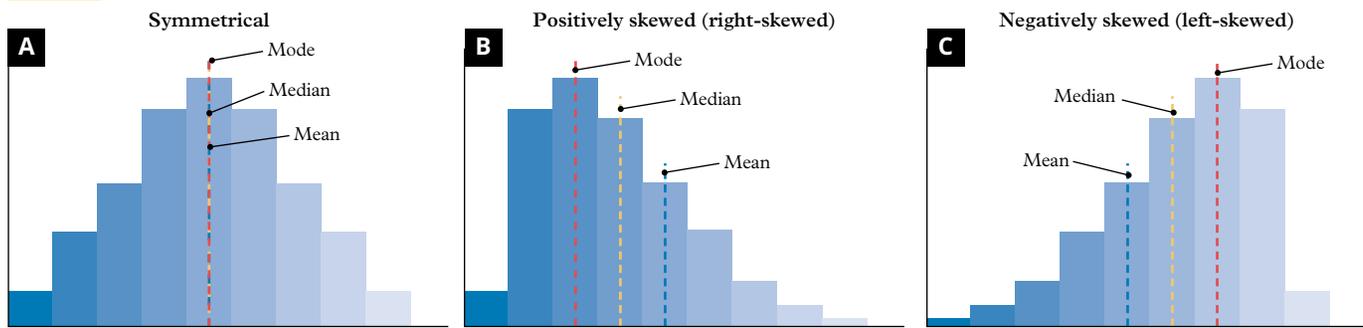


FIGURE 13 Histogram examples showing the relationship between mean, median and mode for (A) a normal or symmetrical distribution, and (B and C) skewed distributions

Sometimes a dataset will have more than one “peak” (Figures 14B and 14C) or no clear peaks (Figure 14A). The curve in Figure 14B shows a bimodal distribution – this often occurs where two distinct populations are plotted on the same curve. What we need to do in this case is to sort out the members of the two different populations.

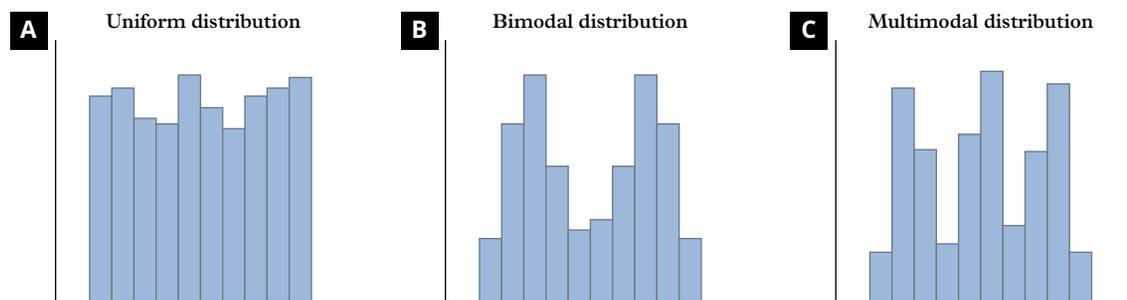


FIGURE 14 Histogram distributions

Normal distribution

normal distribution

a symmetrical, bell-shaped distribution of data where most observations are clustered around the mean and decrease with distance from the centre

Study tip

When visually inspecting a histogram to test the assumption of normality, it is unlikely that you will see a perfectly symmetrical distribution. As long as the distribution resembles a bell shape and there is no obvious skew, the assumption is met.

The **normal distribution** is a probability distribution, characterised by a bell-shaped curve (Figure 15) where the area under the curve equals 1. The probability distribution describes how the values of a variable are distributed, with the highest frequency of occurrence in the centre (unimodal) and the frequency of occurrence decreasing with distance from the centre. If the distribution is symmetrical, the mean is equal to the median and mode, so that 50% of all the data points lie above the mean and 50% below the mean.

Given these properties, we can further break down the proportion of data that lies away from the mean using standard deviations (we will learn about standard deviations shortly). As shown in Figure 15, 68% of all the scores in a normal distribution lie within one standard deviation from the mean, 95% lie within two standard deviations and 99.7% lie within three standard deviations.

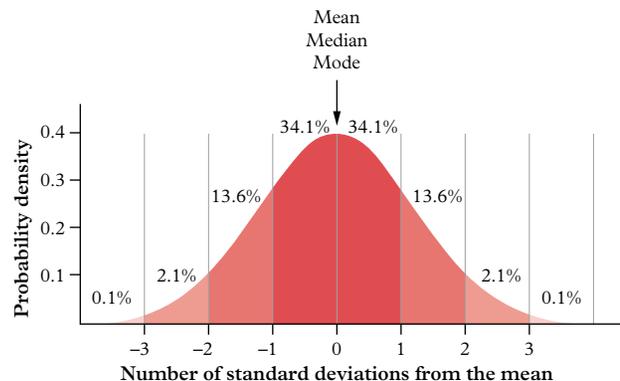


FIGURE 15 The standard normal curve probability distribution based on standard deviation

A **percentile** is a measure that helps us to understand the position or relative standing of a score within a dataset. For example, IQ scores are normally distributed with a mean of 100 and a standard deviation of 15. From Figure 15, if a person has an IQ of 115, they are one standard deviation above the mean, which places them in the 84th percentile (calculated by adding the percentages in Figure 16: $0.1 + 2.1 + 13.6 + 34.1 + 34.1 = 84$). This means that they performed better on the IQ test than 84% of others.

percentile
measure that indicates the value below which a given percentage of observations in a group fall

Introducing measures of central tendency

Central tendency is a statistical measure used to quantify the centre of a distribution, i.e. where most of the scores are located. While we could find central tendency by looking for the peak in a histogram, quantifying central tendency makes it easier to compare two or more distributions. Central tendency is a single value that is most typical or representative of the entire set of scores. There are three measures of central tendency: mean, median and mode. The syllabus does not require you to calculate the mode, but it is included here for completeness.

Mean

The **mean** (or average) of all the scores is calculated by adding up all the scores and dividing that total by the number of scores in the dataset. This can be represented mathematically:

$$M = \frac{\sum X}{n} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

where x is the raw scores in the dataset and n is the size of the sample.

For example, the mean for the dataset 11, 13, 14, 15, 12, 13, 13 is

$$M = \frac{\sum X}{n} = \frac{11+13+14+15+12+13+13}{7} = \frac{91}{7} = 13$$

Changing a value of a score or adding a new score (not equal to the mean) changes the mean. If the scores are very large or very small (outliers), they can skew the mean and give a misleading result.

For example, imagine if the last score in the above data set changed from 13 to 23:

$$M = \frac{\sum X}{n} = \frac{11+13+14+15+12+13+23}{7} = \frac{101}{7} = 14.4$$

When to use the mean

The mean is only the most appropriate measure of central tendency to use if the following conditions are met:

- level of measurement is interval or ratio (Lesson 1.6)
- there are no outliers
- the distribution is normal.

If these conditions are not met, the mean could be misleading and it would be better to use a different measure of central tendency.

mean
the average of all the scores, calculated by adding up all the scores and dividing that total by the number of scores

Study tip

In maths, the mean is often shown as \bar{x} . In psychology it is more common to use the APA recommended statistical symbol to represent mean, which is a capital and italicised M . By convention, the mean is typically reported to the same level of precision as the data values, but no more than 2 decimal places.

Median

median

the middle number (or mean of the two middle numbers) of a number series listed in numerical order

The **median** is the middle value (or mean of the two middle values) of a dataset. To calculate the median, the data first needs to be organised sequentially, before finding the middle number:

11, 12, 13, **13**, 13, 14, 15

The median = 13.

For an even number of scores, the median is found by calculating the mean of the two middle scores. For example:

11, 12, 13, **13, 13**, 14, 15, 17

$$\text{median} = \frac{(13+13)}{2} = 13$$

Changing a value of a score does not change the value of the median, making it less susceptible to outliers than the mean. Using the same example as before:

11, 12, 13, **13, 13**, 14, 15, **23**

the median is still 13.

When to use the median

The median is the most appropriate measure of central tendency to use when:

- level of measurement is ordinal
- level of measurement is interval/ratio but there are outliers
- the distribution is skewed.

Mode

mode

the most commonly occurring score in the dataset

The **mode** is the most commonly occurring score in the dataset. For this dataset – 11, 12, 13, 13, 13, 14, 15 – the mode is 13.

The mode is the most appropriate measure of central tendency to use for nominal data. (Remember that the syllabus does not require you to calculate the mode.)

Worked example 1.7B

Calculating measures of central tendency

Calculate the mean and median of the dataset in Table 4. (2 marks)

TABLE 4 IQ scores of 12 students in a Year 6 class

| Student | IQ score | Student | IQ score |
|---------|----------|---------|----------|
| John | 88 | Hanna | 111 |
| Robert | 94 | Jacob | 111 |
| Kiet | 99 | Adelina | 119 |
| Luke | 102 | Ahmed | 125 |
| Kerry | 105 | Arisa | 125 |
| Shelley | 111 | Akash | 130 |

| Think | Do |
|---|--|
| Calculate the mean. Step 1: Write the formula. Step 2: Sum all the values in the dataset – this is the numerator. Step 3: Count the number of values in the dataset and write it in the denominator. Step 4: Solve and present your answer. | $M = \frac{\sum X}{n}$ $= \frac{1320}{12}$ $= 110$ The mean IQ score for this group of students is 110. (1 mark) |
| Calculate the median. Step 1: Organise the data sequentially. Step 2: If there is an odd number of scores, the median is the middle number. If there is an even number of scores, the median is the mean of the middle two numbers. Step 3: Present your answer. | 88, 94, 99, 102, 105, 111, 111, 111, 119, 125, 125, 130 $\text{Median} = \frac{(111+111)}{2} = 111$ The median IQ score for this group of students is 111. (1 mark) |

Your turn

Calculate the mean and median for the following dataset: 2, 5, 7, 3, 9, 6, 4, 6. (2 marks)

Introducing measures of variability (spread)

Another way to describe data is by looking at the spread of scores within a distribution. Like measures of central tendency, measures of variability provide a quantitative measure to indicate the degree to which scores in the distribution are spread out or clustered together. When used along with measures of central tendency, they tell us a great deal about the features of a dataset. Common measures of spread include range, standard deviation and interquartile range.

Range

The most basic measure of spread is range. The **range** is the difference between the highest score and the lowest score in the dataset.

$$\text{range} = x_{\max} - x_{\min}$$

For the IQ scores listed in Table 4 in Worked example 1.7B, the range would be $130 - 88 = 42$.

Range is not a very informative measure of spread because it is based on only two scores rather than all the data. As such, it gives no indication of how the scores are spread along the range and it is considered an unreliable measure of variability.

range

the difference between the highest score and the lowest score in the dataset

Standard deviation

Standard deviation (SD) is the most common and most precise measure of variability from the sample mean. The standard deviation uses information for each score in the dataset and gives us a measure of how much, on average, the scores differ from the mean.

standard deviation

a statistical measure of the average deviation of scores from the mean, calculated as the square root of variance

Study tip

The SD indicates the amount of variability (or certainty) in the sample mean. The higher the SD, the greater the variability in the distribution, which lowers the certainty in the sample mean estimate.

The standard deviation:

- describes the sample distribution, indicating whether the scores are clustered or more spread out around the mean
- tells us how well the mean represents the sample.

Standard deviation for a sample is given by the formula:

$$SD = \sqrt{\frac{\sum(X - M)^2}{n - 1}}$$

where X is the score, M is the mean, and n is the sample size.

Study tip

The standard deviation for a sample is calculated differently than for a population. In your psychology studies, you will only calculate the standard deviation for samples.

When to use standard deviation

Like the mean, standard deviation is sensitive to outliers. Standard deviation is the most appropriate measure of variability to use when:

- level of measurement is interval or ratio
- there are no outliers
- data has a normal distribution.

Note that the QCAA General Senior Syllabus for Psychology 2025 does not require you to calculate standard deviation; however, you must understand what standard deviation is, and knowing how it is calculated, as shown in Worked example 1.7C, will help you achieve that understanding.

Study tip

There is no rule for determining whether an individual standard deviation of a distribution is high or not. Typically, the variability of two or more datasets is compared.

Worked example 1.7C**Calculating standard deviation**

Calculate the standard deviation of the IQ scores shown in Table 5.

Note: The purpose of this worked example is to help you understand what standard deviation is and what it represents. You may use a calculator.

TABLE 5 IQ scores of 12 students in a Year 6 class

| Student | IQ score | Student | IQ score |
|---------|----------|---------|----------|
| John | 88 | Hanna | 111 |
| Robert | 94 | Jacob | 111 |
| Kiet | 99 | Adelina | 119 |
| Luke | 102 | Ahmed | 125 |
| Kerry | 105 | Arisa | 125 |
| Shelley | 111 | Akash | 130 |

| Think | Do |
|-----------------------------|--|
| Step 1: Calculate the mean. | $M = \frac{\sum X}{n} = \frac{1320}{12} = 110$ |

| Think | Do | | | |
|--|--|-------------------|-----------------------------|---------------|
| Step 2: Calculate the difference between each score and the mean. | Score | Subtract the mean | Deviance of score from mean | Variance, v |
| | 88 | $-110 =$ | -22 | |
| | 94 | $-110 =$ | -16 | |
| | 99 | $-110 =$ | -11 | |
| | 102 | $-110 =$ | -8 | |
| | 105 | $-110 =$ | -5 | |
| | 111 | $-110 =$ | 1 | |
| | 111 | $-110 =$ | 1 | |
| | 111 | $-110 =$ | 1 | |
| | 119 | $-110 =$ | 9 | |
| | 125 | $-110 =$ | 15 | |
| | 125 | $-110 =$ | 15 | |
| 130 | $-110 =$ | 20 | | |
| Step 3: Square the answers to remove the negative deviations. | Score | Subtract the mean | Deviance of score from mean | Variance, v |
| | 88 | $-110 =$ | -22 | 484 |
| | 94 | $-110 =$ | -16 | 256 |
| | 99 | $-110 =$ | -11 | 121 |
| | 102 | $-110 =$ | -8 | 64 |
| | 105 | $-110 =$ | -5 | 25 |
| | 111 | $-110 =$ | 1 | 1 |
| | 111 | $-110 =$ | 1 | 1 |
| | 111 | $-110 =$ | 1 | 1 |
| | 119 | $-110 =$ | 9 | 81 |
| | 125 | $-110 =$ | 15 | 225 |
| | 125 | $-110 =$ | 15 | 225 |
| 130 | $-110 =$ | 20 | 400 | |
| Step 4: Average the sum of the squared deviations (known as variance, v). | $v = \frac{484 + 256 + 121 + 64 + 25 + 1 + 1 + 1 + 81 + 225 + 225 + 400}{12 - 1}$ $= 171.3$ | | | |
| Step 5: The standard deviation is equal to the square root of the variance. $SD = \sqrt{\text{variance}}$ | $SD = \sqrt{171.3} = 13.1$ <p>The standard deviation of the sample is presented as $SD = 13.1$.</p> | | | |

Standard deviation and outliers

Outliers are extreme scores. As we've seen, outliers can skew the distribution, resulting in misleading descriptive statistics. Therefore, outliers need to be identified so that the most appropriate statistics can be calculated.

Outliers can be identified by visually inspecting graphs to spot scores that are far away. However, this relies on subjective interpretation, and researchers prefer to use more objective ways to identify outliers.

One such way is to use the mean plus or minus three standard deviations (Howell, 1999). For example, using the IQ scores from Table 6:

$$\text{lower limit} = M - 3 \times \text{SD} = 110 - (3 \times 13.1) = 70.7$$

$$\text{upper limit} = M + 3 \times \text{SD} = 110 + (3 \times 13.1) = 149.3$$

Since none of the scores in the dataset are less than the lower limit of 70.7, nor higher than the upper limit of 149.3, we can conclude that there are no outliers.

Interquartile range

The interquartile range (IQR) divides the dataset into four equal quarters and indicates variability by calculating the difference between the first and third quartiles. This is represented mathematically as:

$$\text{IQR} = Q3 - Q1$$

Higher IQR indicates greater variability or spread of scores in the dataset.

When to use interquartile range

IQR is the most appropriate measure of variability to use when:

- the level of measurement is ordinal
- you have calculated the median
- the data does not have a normal distribution.

Worked example 1.7D

Calculating interquartile range

Calculate the IQR of the IQ scores shown in Table 6. (2 marks)

TABLE 6 IQ scores of 12 students in a Year 6 class

| Student | IQ score | Student | IQ score |
|---------|----------|---------|----------|
| John | 88 | Hanna | 111 |
| Robert | 94 | Jacob | 111 |
| Kiet | 99 | Adelina | 119 |
| Luke | 102 | Ahmed | 125 |
| Kerry | 105 | Arisa | 125 |
| Shelley | 111 | Akash | 130 |

| Think | Do |
|---|--|
| Step 1: Organise the scores sequentially. | 88, 94, 99, 102, 105, 111, 111, 111, 119, 125, 125, 130 |
| Step 2: Divide the dataset into four equal portions and identify Q1, Q2 and Q3. | 88, 94, 99, 102, 105, 111, 111, 111, 119, 125, 125, 130 Q1 Lower quartile Q2 Middle quartile (median) Q3 Upper quartile |
| Step 3: Calculate Q1 and Q3 if needed. | $Q1 = \frac{99 + 102}{2} = 100.5$ $Q3 = \frac{119 + 125}{2} = 122.0 \text{ (1 mark)}$ |
| Step 4: Subtract Q1 from Q3. | $\text{IQR} = Q3 - Q1 = 122.0 - 100.5 = 21.5 \text{ (1 mark)}$ |

Your turn

Calculate the IQR for the following dataset: 13, 16, 30, 17, 20, 29, 20, 24, 30, 16, 20, 28. Show your working. (2 marks)

Worked example 1.7E**Calculating interquartile range from box and whisker plots**

Calculate the interquartile range ($IQR = Q3 - Q1$) for the noisy test condition. Show your working. (2 marks)

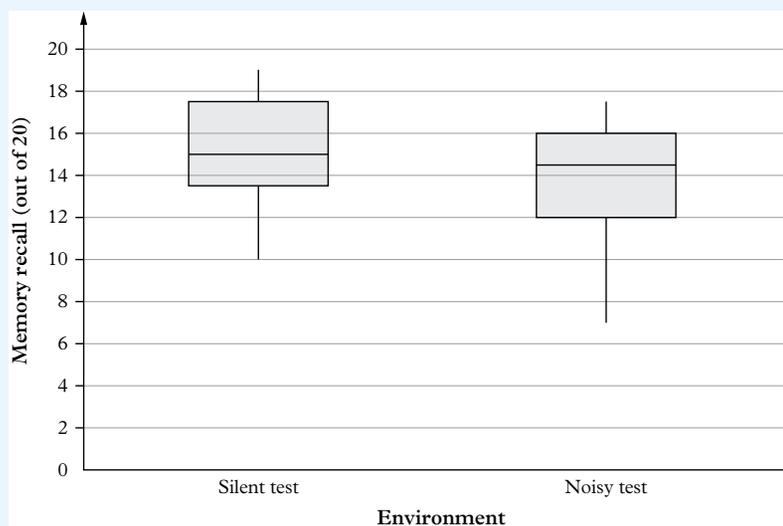


FIGURE 16 Graph showing the median and IQR of scores for participants in the noisy and silent environments

| Think | Do |
|--|---|
| Step 1: Identify the cognitive verb. | The cognitive verb is “calculate”, which means to work out the amount or number of something mathematically. |
| Step 2: Identify cues in the question. | Cues are instructions or other pieces of information that are needed to answer the question. Cues in this question include the IQR formula and the instruction to “show working”. |
| Step 3: Identify how many marks this question is worth and plan your response. | This question is worth 2 marks, so 1 mark is likely to be for the correct answer and 1 mark is for showing the working. |
| Step 4: Draft the response. | <ol style="list-style-type: none"> 1 Inspect the graph and make sure to choose the correct condition. 2 Use a ruler to draw lines from the top of the box (Q3) and the bottom of the box (Q1) that are parallel to the axis. 3 Read the corresponding y-values and substitute into the formula. 4 $IQR = Q3 - Q1$ $= 16 - 12$ (1 mark) $= 4$ (1 mark) |
| Step 5: Check that you have completed all the steps as per your plan in step 3. If necessary, update your draft response and present the final answer. | The IQR for the noisy test condition is 4. |

Your turn

Calculate the interquartile range ($IQR = Q3 - Q1$) for the silent test condition. Show your working. (2 marks)

statistic

numerical value that describes aspects of a sample

parameter

numerical value that describes aspects of a population

standard error

numerical value that quantifies the variability of the sample mean estimate with respect to the true population mean

Study tip

SE indicates the amount of variability in the sample mean estimate. A lower SE indicates that the sample mean is a more accurate estimate of the population mean, which leads to higher certainty in the conclusions drawn. The converse is also true.

confidence interval

range of values, derived from sample statistics, that is likely to contain the value of an unknown population parameter

confidence level

a percentage that reflects the proportion of times the confidence interval is likely to contain the true population parameter (e.g. mean)

Introducing uncertainty

A **statistic** is a numerical value that describes aspects of the data collected from a sample, while a **parameter** describes a population. In most psychological investigations, researchers do not have access to population parameters and instead, use statistics to estimate population parameters.

All measurements and estimates are subject to uncertainty, or a degree of unknown variability. Uncertainty arises from many sources including random measurement error and, of course, variability in people.

Uncertainty reduces the confidence with which we can make inferences and draw conclusions about the findings. Two methods to help us identify uncertainty in the data are standard error and confidence intervals.

Standard error

While standard deviation is a statistic that tells us about how well the mean represents the sample data, **standard error** (SE) (or standard error of the mean) tells us how well the sample mean estimates the population mean.

Standard error is given by the formula:

$$SE = \frac{SD}{\sqrt{n}}$$

where SE = standard error, SD = standard deviation, and n = the sample size.

From the mathematical formula, we can see that the lower the variability in the sample (that is, the lower the SD), the lower the SE. Similarly, increasing the sample size reduces SE.

SE is visually shown as error bars on a column graph.

Confidence intervals

Confidence intervals (CI) provide a range of estimated values within which we can be confident that the true population parameter lies.

Confidence intervals are associated with a specific **confidence level** (CL), which represents the proportion of times that the interval would contain the true population mean if the study were repeated many times. In psychology, we typically estimate to a 95% confidence level.

95% confidence level is calculated using the following formula:

$$95\% \text{ CL} = 1.96 \times SE$$

From this, we can calculate the 95% confidence interval:

$$95\% \text{ CI} = M \pm 95\% \text{ CL}$$

The confidence interval is reported as a range: 95% CI [lower bound, upper bound] where the lower bound is the mean minus the CL and the upper bound is the mean plus the CL.

Similar to SD and SE, CI can be displayed as error bars on a graph.

Worked example 1.7F**Calculating confidence intervals**

The IQ scores of 12 Year 6 students were recorded ($M = 110$, $SD = 13.1$). **Calculate** the 95% confidence interval of the sample. (2 marks)

| Think | Do | |
|---|--|--|
| Step 1: Calculate the confidence level. | $95\% \text{ CL} = 1.96 \times SE$ $= 1.96 \times \frac{SD}{\sqrt{n}}$ $= 1.96 \times \frac{13.1}{\sqrt{12}}$ $= 7.4 \text{ (1 mark)}$ | |
| Step 2: Calculate the upper and lower bounds of the interval. | $\text{Lower bound} = M - 95\% \text{ CL}$ $= 110 - 7.4$ $= 102.6$ | $\text{Upper bound} = M + 95\% \text{ CL}$ $= 110 + 7.4$ $= 117.4$ |
| Step 3: Report the confidence interval. | 95% CI [102.6, 117.4] (1 mark) | |

Your turn

Calculate the 95% confidence interval for a sample of 24 students with a mean IQ of 111 and a standard deviation of 13. Show your working. (2 marks)

Making inferences using error bars

There is a lot of controversy over using confidence intervals to draw conclusions because they are not as precise as using a p -value. However, the appeal is that conclusions about statistical significance can be drawn by visually inspecting a graph where the error bars represent confidence intervals. Rules for visually interpreting statistical significance using confidence intervals are summarised in Figure 17 (Cumming & Finch, 2005).

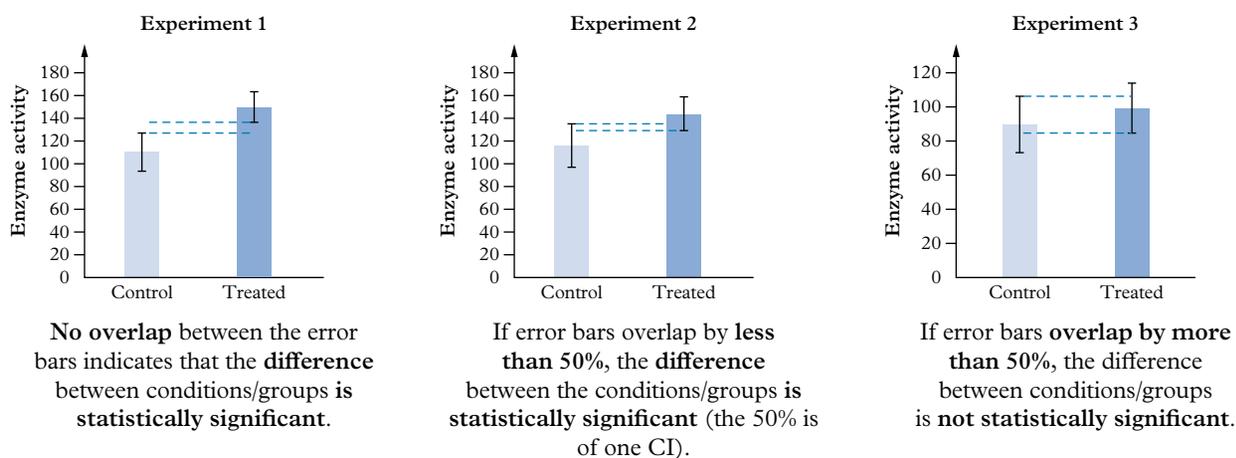


FIGURE 17 Inferring statistical significance from confidence intervals

Study tip

Make sure that you identify the type of error bar being used (SE or CI) when interpreting statistical significance. If in doubt, refer to the p -value for a more objective measure of significance.

We can also infer statistical significance using SE error bars. Recall that confidence intervals are a multiple of standard error ($CI = 1.96 \times SE$) and therefore the bars are always longer than SE. Thus, CI error bars make it easier to identify when results are not likely to be significant than SE error bars.

Introducing measuring relationships

Unlike the experimental method, the correlational method makes no attempt to manipulate variables (Lesson 1.4). Rather, the intent of such a study is usually to establish the strength and direction of the relationship that may exist between the two observed variables.

Correlation coefficients

A correlation coefficient is a statistical measure of the strength and direction of a relationship. It is a numerical value, expressed as a decimal between -1.00 and $+1.00$ (Figure 19). The direction of the relationship is indicated by the sign, “+” or “-”, of the coefficient.

- A “+” sign indicates that the relationship is positive: A positive correlation is one in which the two variables change in the same direction – that is, as one increases, so does the other, or as one decreases, so does the other. For example, we might expect to find a positive correlation between hours spent studying each week and results in Senior Psychology – meaning that as the number of hours spent studying each week increases, there is an associated increase in average study scores in Psychology.
- A “-” sign indicates that the relationship is negative: A negative correlation is one in which the two variables change in the opposite direction – that is, as one increases, the other decreases. For example, we might expect to find a negative correlation between hours spent playing online games and study scores for Psychology – meaning that as the number of hours spent playing online games increases, there is an associated decrease in average study scores in Psychology.

The strength of the relationship is determined by the absolute value of the correlation coefficient. The closer the value is to 1.00 the stronger the relationship, while a value of 0 indicates no relationship. The stronger the relationship, the more confidently we can predict changes in one variable as another changes. It is important to remember, however, that even with a perfect correlation of 1.00, a causal conclusion cannot be drawn.

Study tip

When interpreting correlation coefficients, identify the strength and direction separately. This is because a “-” symbol indicates the direction of the relationship rather than an integer value that is less than zero.

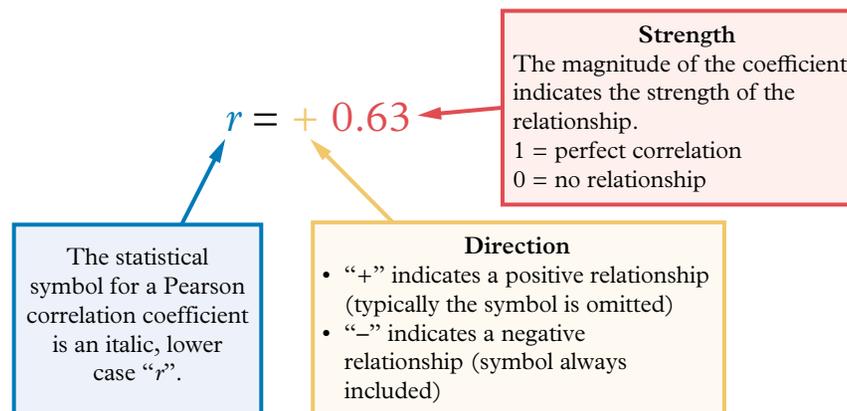


FIGURE 18 A correlation coefficient communicates the strength and direction of the relationship between two variables.

Describing strength of relationship

The strength of a correlation coefficient can be described based on its numerical value (Figure 19). A correlation is often described as:

- **weak** or low if the r -value is greater than 0 up to +0.30
- **moderate** if the r -value is greater than +0.30 and less than +0.70
- **strong** if it is greater than +0.70.

These ranges are a rough guide and can change in different texts. People may also prefer to use descriptors such as low, moderate and high.

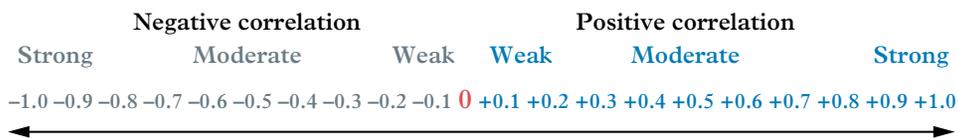


FIGURE 19 Negative and positive correlation

Study tip

In statistics, you may come across the statistical symbols R , r , or even r^2 . These are all different types of statistics that offer different information about the data. When reporting your work, it is important to communicate scientifically and use the correct statistical symbol. In your QCE Psychology course, you are only concerned with r , the correlation coefficient.

Types of correlation coefficients

The **Pearson correlation coefficient**, denoted r , measures the linear relationship between two continuous variables: a change in one variable (variable A) is associated with a proportional change in the other variable (variable B).

In contrast, the Spearman correlation, denoted r_s , measures the relationship between two ordinal variables and uses the ranked values for each to examine how the variables tend to change together, but not necessarily at a constant rate. Note, if one variable is continuous while the other is not, you should also use a Spearman's correlation.

Pearson correlation coefficient

a measure of the strength of the linear relationship between two continuous variables

Examining relationships with scatterplots

The relationship between variables can also be examined using a scatterplot (Figure 20). Visual inspection of the trendline indicates the direction of the relationship, while the spread of dots indicates the strength. The closer the dots are to the trendline, the stronger the relationship.

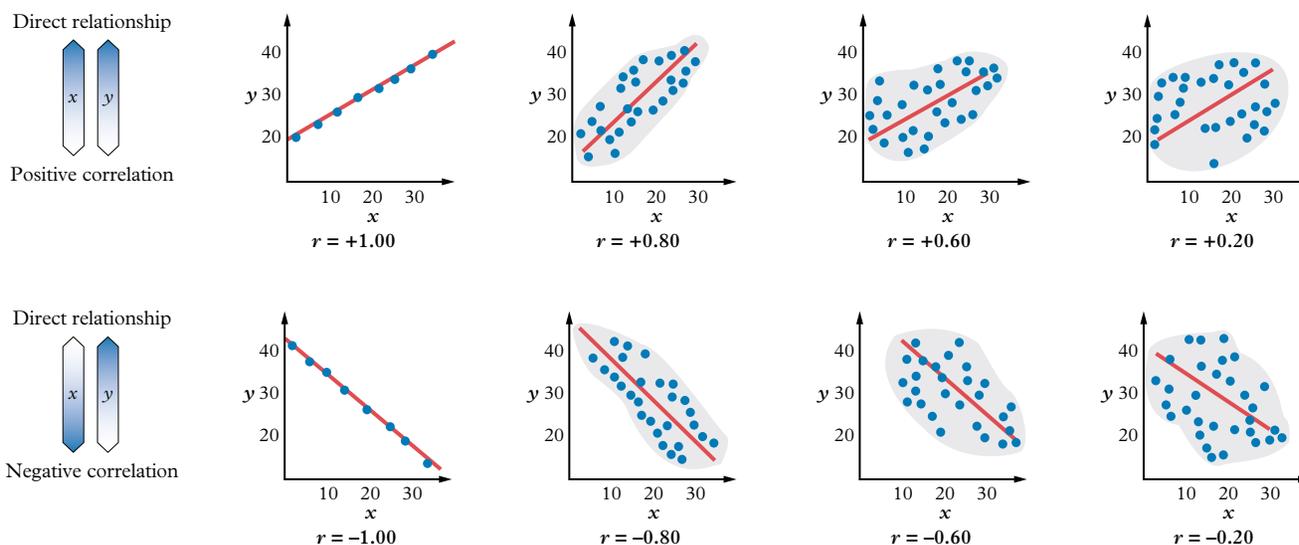


FIGURE 20 Scatterplots showing relationships and correlations – the scatterplots show various strengths and directions of correlation, from perfect positive correlation to perfect negative correlation.

Introducing inferential statistics

As discussed at the start of this lesson, the goal of research is to gather evidence to test the hypothesis and help answer the research question. Descriptive statistics help us organise, summarise and present data to make meaning, whereas inferential statistics help us draw conclusions about the findings.

Inferential statistics, as the name suggests, are mathematical processes that help us make inferences about the findings of a study. Typically, we use a statistical method called null hypothesis testing. In simple terms, we calculate the probability (represented by a ***p*-value**) of the null hypothesis being true and compare it to a pre-determined level of statistical significance (α).

In psychology, the level of statistical significance that is most used is 5%, which is expressed in decimal form, 0.05. If the probability of the null hypothesis being true is less than the level of significance, that is, $p < 0.05$, the results are said to be statistically significant. This means we are confident that we do not have sufficient evidence to support the null hypothesis. We consequently reject the null hypothesis and gain confidence that the alternative hypothesis is true. On the other hand, if the *p*-value is greater than 0.05 we are not confident that the evidence is sufficient to reject the null hypothesis, so we accept the null hypothesis and lose confidence that the alternative hypothesis is true.

So how do we calculate *p*-values?

***p*-value**

decimal value indicating the probability that observed results occurred by chance under the assumption that the null hypothesis is true

Study tip

Recall from Lesson 1.3 that the null hypothesis predicts that there will be no statistically significant relationship (correlation design) or no statistically significant difference (experimental design).

Tests of statistical significance

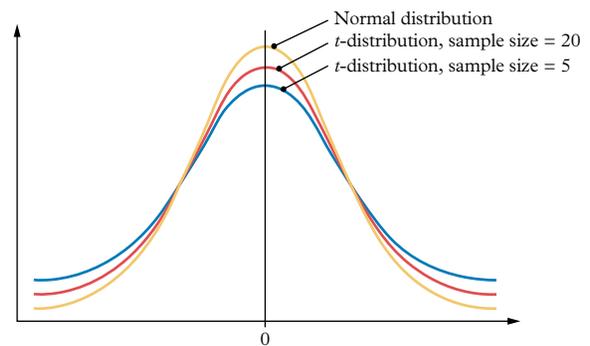
Researchers collect data through experiments or observations and use that data to calculate a test statistic (e.g. *t*-statistic) that measures the degree of difference between the observed data and what would be expected if the null hypothesis were true, and then determine the probability (*p*-value) of the observation. Here, we will look at parametric *t*-tests.

Parametric *t*-tests

A parametric ***t*-test** is a statistical method used to determine whether there is a significant difference between the means of two groups or between the mean of one group and a known standard. The *t*-test uses the *t*-distribution, which is similar to the normal distribution but flatter. The shape of the curve depends on the number of participants.

The *t*-test calculates a *t*-statistic (symbol *t*) using the sample data, which represents the difference between the group means relative to the variability in the data. For the difference between two sample means, the *t*-statistic is calculated using the following formula:

$$t = \frac{M_1 - M_2}{\sqrt{\frac{SD_1^2}{n_1} + \frac{SD_2^2}{n_2}}}$$



Source: Gravetter and Wallnau (2014)

FIGURE 21 Example *t*-distributions compared to normal distribution

***t*-test**

comparison of means in data that reveals how significant the differences are

where:

- M_1, M_2 are the means of samples 1 and 2 respectively
- SD_1, SD_2 are the standard deviations of samples 1 and 2 respectively
- n_1, n_2 are the sample sizes of samples 1 and 2 respectively.

Assumptions of parametric t -tests

Parametric t -tests are widely used in psychological research and other sciences to test hypotheses about differences in means. They offer robust measures for analysing experimental data, provided the underlying assumptions are met:

- level of measurement
- independence
- normality
- equal variance.

Violations of these assumptions can change the interpretation of the results and reduce the certainty of the conclusion reached. Alternatively, non-parametric equivalent tests can be used when assumptions are violated.

The first two assumptions, level of measurement and independence, are controlled methodologically (i.e. through the design of the investigation):

- **Level of measurement:** Is the DV nominal, ordinal, interval or ratio? Parametric tests require interval or ratio data. For nominal or ordinal data, non-parametric equivalent tests should be used instead.
- **Independence:** Observations are independent of each other when the occurrence of the first has no effect on the probability of the other, and the dependent variable is measured at the interval or ratio level.

The remaining two assumptions need to be assessed during data processing.

- **Normality:** Parametric tests of statistical significance require data that has a normal distribution. **Normality** can be assessed by:
 - visually inspecting the shape of the distribution. That is, create a histogram, and if it resembles a bell curve with a hill in the middle that decreases on either side, then you can state that the normality assumption has been met. If the distributions are clearly skewed, state that the assumption has been violated
 - using the central limit theorem to assume normality if the sample (per group) is greater than 30 (Field, 2013; Gravetter & Wallnau, 2014). We will look at the central limit theorem shortly.
- **Equal variance** (or homoscedasticity): The variances in the two groups are equal when conducting an independent samples t -test. To assess this assumption:
 - compare the standard deviation scores to see whether they are similar. Note: this method is subjective and should consider the context of the data
 - use Levene's test. Academics prefer objective ways to assess **homogeneity of variance**, such as Levene's test. You can use online calculators for this. To interpret the results of Levene's test, a p -value greater than 0.05 indicates that the variances are equal; that is, the assumption is met. If the assumption is violated, choose a t -test for unequal variances.

Presuming the assumptions are met, a t -test can be conducted and the results interpreted with confidence.

Study tip

You do not need to know or use this formula in your high school studies because you can use Excel or other online calculators to calculate a t -statistic. Furthermore, you don't need to record or report t -statistics, only the p -value which is calculated from them.

normality

the assumption that a dataset is approximately normally distributed, following the classic bell-shaped curve

variance

a statistical measure of the spread of data, calculated as the average of the squared differences from the mean

homogeneity of variance

the assumption that different samples or groups have similar variances in their respective distributions

Types of t -tests

There are different types of t -tests. Make sure that you choose the one that is most appropriate based on the type of experimental design you have chosen.

- Independent samples t -tests (or unpaired t -tests) are used to compare the means of two independent experimental groups (e.g. males vs females on a psychological trait).
- Dependent samples t -tests (or paired t -tests) are used to compare the means of two related groups; that is, groups from a repeated measures or matched experimental design.

Mann-Whitney U test

non-parametric test of statistical significance used to compare differences between two independent groups with either ordinal data or continuous data that does not have a normal distribution

Wilcoxon signed-rank test

non-parametric test used to compare two matched samples, or repeated measurements with either ordinal data or continuous data that does not have a normal distribution

central limit theorem

given a sufficiently large sample size, the sampling distribution of the sample mean will approximate a normal distribution, regardless of the shape of the population distribution

Violations of assumptions

Where testing reveals violations of assumptions, the violations should be identified as limitations and sources of uncertainty in your evaluation. Alternatively, you could use an equivalent non-parametric test of statistical significance; however, these are not required by the syllabus.

- The **Mann-Whitney U test** is an alternative to the unpaired t -test as it does not require the assumption of normal distributions. The U test is used to compare the differences between two groups when the dependent variable is either ordinal or continuous.
- The **Wilcoxon signed-rank test** can similarly be used as an alternative to the paired t -test, when the population cannot be assumed to be normally distributed. It is used to compare two from the same or matched set of participants.

The central limit theorem

Somewhere along the way, some very clever statisticians demonstrated that when samples are large enough (30 or more), the sampling distribution will approximate a normal distribution (Field, 2013; Gravetter & Wallnau, 2014). This is known as the **central limit theorem** (CLT). Furthermore, t -tests are fairly robust against violations of the normality assumption (Knief & Forstmeier, 2021), meaning that we can use the CLT to “test” for normality.

Calculating p -values from t -tests using Excel

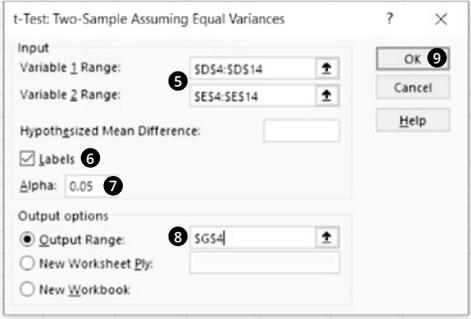
The good news is that you don't require fancy or expensive statistical software to calculate p -value from t -tests, you can use the “Data analysis” tool in Excel.

Worked example 1.7G

Calculating p -values from t -tests using Excel

Calculate the p -value from t -tests using the Data analysis tool in Excel. (1 mark)

| Think | Do |
|--|----|
| <p>Step 1: In the Excel menu, click on “Data”.</p> <p>Step 2: Select “Data analysis” from the menu.</p> <p>Step 3: From the pop-up menu, select the type of t-test you need. For:</p> <ul style="list-style-type: none"> • Repeated measures, select “t-test: Paired Two Sample for Means” • Independent groups, select either “t-test: Two Sample Assuming Equal Variances” if the variances are equal, or “t-test: Two Sample Assuming Unequal Variances” if the variances are not equal. <p>Step 4: Click “OK”.</p> | |

| Think | | Do | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------|---|--|-------------|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|--|-------------|-------------|------|-----|-----|----------|-----|-------------|--------------|----|----|-----------------|-------------|--|------------------------------|---|--|----|----|--|--------|--------------|--|------------------|-------------|---|---------------------|-------------|--|------------------|-------------|---|---------------------|------------|--|
| <p>Step 5: Select the data range for variable 1 and for variable 2.</p> <p>Step 6: Check the “Labels” box if your data selection from Step 5 includes column headings (recommended). Leave blank if it does not. (Hint: including column headings makes it easier to interpret the result.)</p> <p>Step 7: Check the level of statistical significance (α) is correct; the default is 0.05.</p> <p>Step 8: Choose where in Excel you would like the results to be displayed.</p> <p>Step 9: Click “OK”.</p> <p>Step 10: The results are presented in a table and include p-values for both one-tailed (A, directional hypothesis) or two-tailed (B, non-directional hypothesis) t-tests.</p> | | <table border="1"> <thead> <tr> <th>Condition A</th> <th>Condition B</th> </tr> </thead> <tbody> <tr><td>5</td><td>8</td></tr> <tr><td>6</td><td>9</td></tr> <tr><td>4</td><td>6</td></tr> <tr><td>7</td><td>7</td></tr> <tr><td>8</td><td>8</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>4</td><td>9</td></tr> <tr><td>5</td><td>7</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>4</td><td>4</td></tr> </tbody> </table>  <table border="1"> <thead> <tr> <th colspan="3">t-Test: Two-Sample Assuming Equal Variances ¹⁰</th> </tr> <tr> <th></th> <th>Condition A</th> <th>Condition B</th> </tr> </thead> <tbody> <tr><td>Mean</td><td>5.2</td><td>6.9</td></tr> <tr><td>Variance</td><td>2.4</td><td>2.766666667</td></tr> <tr><td>Observations</td><td>10</td><td>10</td></tr> <tr><td>Pooled Variance</td><td>2.583333333</td><td></td></tr> <tr><td>Hypothesized Mean Difference</td><td>0</td><td></td></tr> <tr><td>df</td><td>18</td><td></td></tr> <tr><td>t Stat</td><td>-2.365068368</td><td></td></tr> <tr><td>P(T<=t) one-tail</td><td>0.014730267</td><td>A</td></tr> <tr><td>t Critical one-tail</td><td>1.734063607</td><td></td></tr> <tr><td>P(T<=t) two-tail</td><td>0.029460533</td><td>B</td></tr> <tr><td>t Critical two-tail</td><td>2.10092204</td><td></td></tr> </tbody> </table> <p>(1 mark)</p> | | Condition A | Condition B | 5 | 8 | 6 | 9 | 4 | 6 | 7 | 7 | 8 | 8 | 3 | 5 | 4 | 9 | 5 | 7 | 6 | 6 | 4 | 4 | t-Test: Two-Sample Assuming Equal Variances ¹⁰ | | | | Condition A | Condition B | Mean | 5.2 | 6.9 | Variance | 2.4 | 2.766666667 | Observations | 10 | 10 | Pooled Variance | 2.583333333 | | Hypothesized Mean Difference | 0 | | df | 18 | | t Stat | -2.365068368 | | P(T<=t) one-tail | 0.014730267 | A | t Critical one-tail | 1.734063607 | | P(T<=t) two-tail | 0.029460533 | B | t Critical two-tail | 2.10092204 | |
| Condition A | Condition B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 5 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| t-Test: Two-Sample Assuming Equal Variances ¹⁰ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Condition A | Condition B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mean | 5.2 | 6.9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Variance | 2.4 | 2.766666667 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Observations | 10 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pooled Variance | 2.583333333 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hypothesized Mean Difference | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| df | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| t Stat | -2.365068368 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P(T<=t) one-tail | 0.014730267 | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| t Critical one-tail | 1.734063607 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P(T<=t) two-tail | 0.029460533 | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| t Critical two-tail | 2.10092204 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Your turn

Calculate the p -value using the data shown in the worked example. (1 mark)

Interpreting experimental p -values

When interpreting experimental p -values, keep the following in mind:

- If $p < 0.05$, then we reject the null hypothesis and accept the alternative hypothesis. The alternative hypothesis predicts that there will be a statistically significant difference between the groups and that the difference in the means between the experimental group(s) and the control group are not due to chance. We are therefore confident that the measured changes in the DV were caused by changes in the IV.
- If $p > 0.05$, then we accept the null hypothesis and reject the alternative hypothesis. This means that the difference in mean values between the groups was not sufficiently large for us to be confident that it wasn't just a coincidence. We cannot infer a cause-and-effect relationship, and therefore conclude that the IV did not affect the DV.

Interpreting correlational p -values

Calculating a p -value from the Pearson correlation coefficient, r , involves assessing the statistical significance of the observed correlation between two variables. The process typically relies

on the sample size (n) and the correlation coefficient itself to determine the likelihood that the observed correlation could have occurred by chance if the true correlation in the population is zero (null hypothesis).

When interpreting correlational p -values, keep the following in mind:

- If $p < 0.05$, then we reject the null hypothesis and accept the alternative hypothesis. The alternative hypothesis predicts that there will be a statistically significant relationship between the two variables.
- If $p > 0.05$, then we accept the null hypothesis and reject the alternative hypothesis. This means that the sample is not large enough to detect a statistically significant relationship.

Check your learning 1.7

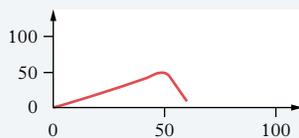


Check your learning 1.7: Complete these questions online or in your workbook.

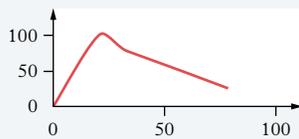
Retrieval and comprehension

- 1 Identify** the three measures of uncertainty that can be represented as error bars. (3 marks)
- 2 Identify** what statistic the vertical bar in a column graph represents. (1 mark)
- 3 Describe** the characteristics of a normal distribution. (3 marks)
- 4 Explain** how to identify outliers in a dataset. (2 marks)
- 5 Explain** the central limit theorem. (2 marks)
- 6 Identify** the assumptions that need to be tested to use parametric t -tests. (4 marks)
- 7 Identify** whether the following graphs are positively or negatively skewed.

a (1 mark)



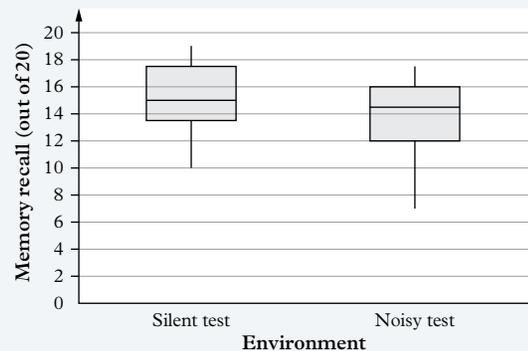
b (1 mark)



- 8 Calculate** the mean, median and mode of the following data: 20, 23, 23, 25, 25, 26, 29, 33, 35, 31, 29, 22, 27, 28. (3 marks)

Analytical processes

- 9 Determine** the most appropriate visual representation for the following types of data
 - a** showing an experiment with a categorical independent variable (1 mark)
 - b** plotting raw data points from a correlational design (1 mark)
 - c** demonstrating demographic data. (1 mark)
- 10 Organise** the following correlation coefficients in order of increasing strength.
 $r = +0.35$, $r = -0.60$, $r = +0.28$, $r = -0.89$,
 $r = +0.70$ (1 mark)
- 11 Distinguish** between the types of conclusions that can be drawn from a p -value for experimental and correlational studies. (1 mark)
- 12 Analyse** the following graph.
 - a Identify** the median for the silent condition. (1 mark)
 - b Contrast** the IQR for the silent and noisy test conditions. (1 mark)



Knowledge utilisation

13 Professor Prada investigated whether personality type is related to the proportion of income spent on clothes. She assessed participants on the extroversion–introversion scale and found the following results:

| Group | Proportion of net income spent on clothes |
|------------|---|
| Extroverts | 45% |
| Introverts | 33% |

Professor Prada uses a t -test and finds that, for this difference, $p = 0.06$.

- Identify** the trend, pattern or relationship between personality type and income spent on clothes. (1 mark)
- Draw a conclusion** about the effect of personality type on spending. Use evidence to support your answer. (2 marks)
- Determine** the generalisability of the results. Use evidence to support your answer. (3 marks)

14 A researcher investigated the effectiveness of a new sleep hygiene intervention aimed at improving cognitive performance. Participants ($n = 35$) were recruited locally. Each participant underwent a cognitive performance under two conditions: once after their usual sleep routine (baseline) and once after 2 weeks of adhering to the new sleep routine. Cognitive performance is measured using a scale of 0 to 100, where higher scores indicate better results.

| Sleep routine | M | SD |
|--------------------------------|----|----|
| Usual sleep routine (baseline) | 62 | 8 |
| After new sleep routine | 68 | 7 |

Determine the most appropriate test of statistical significance to use. **Justify** your response. (2 marks)

Lesson 1.8**Evaluating evidence****Key ideas**

- A conclusion is a judgment about the hypothesis and/or research question. Generalisations extend conclusions beyond the study to broader population and context.
- Limitations limit a researcher's ability to confidently answer the research question, generalise the findings or extrapolate to a claim.
- The quality of an investigation depends on the extent to which the evidence is reliable (consistent) and valid (measured what was intended). Uncertainty and confounding variables reduce the quality of the evidence.
- Secondary sources should be evaluated for biases, currency, relevance, authority and accuracy. Peer-review is a control measure to verify the quality of published research.



Learning intentions and success criteria

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- select, synthesise and use evidence to
 - explain findings
 - construct scientific arguments
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- extrapolate findings to determine unknown values, predict outcomes and evaluate claims
- use data and reasoning to discuss and evaluate the reliability and validity of evidence
- judge the reliability and validity of the experimental process
 - reliability of observers (selection, training)
 - reliability of psychological tests/measures
 - internal validity and external validity
 - validity of psychological tests/measures
- suggest improvements and extensions to minimise uncertainty, address limitations and improve the overall quality of evidence
- identify and explain the uncertainty associated with conclusions, with reference to limitations of the data, including violations of the assumptions of inferential tests, e.g. small sample size
- appreciate the role of peer review in scientific research

Study tip

Scientists typically avoid using the term “prove” in describing their findings. The scientific method allows for the formulation of hypotheses, theories and laws that can be supported or refuted by data, but it seldom offers the absolute certainty implied by “proof” due to limitations of the methodology, uncertainty, errors, complexity and reasoning flaws.

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Drawing conclusions

A **conclusion** is the final decision about what the results mean in terms of whether the evidence “supports” or “does not support” the hypothesis (student experiment) or the claim (research investigation) and the corresponding answer to the research question. The overall conclusion takes into account the findings, uncertainty and limitations, and also the overall evaluation of the quality of the investigation (the reliability and validity of the evidence).

A **generalisation** is a judgment about the extent to which the research findings can be applied to populations, environments or tasks outside of the study. The extent to which results from a sample can be generalised depends on:

- the representativeness of the sample
- methodological limitations
- reliability and validity of the procedures
- statistical significance of the findings.

Extrapolation refers to the process of extending or projecting results beyond the original scope of the study, to evaluate a claim or make predictions. This means using the data collected and the trends, patterns or relationships observed within the controlled conditions of a study to make inferences about what might happen in situations or populations that were not directly studied.

A **justified** conclusion is one that:

- logically follows from the collected evidence and adheres to sound reasoning
- is supported by empirical data and aligns with established theories, demonstrating consistency and transparency in how it was derived
- acknowledges any limitations that influence the quality and generalisability of the findings.

conclusion

an evidence-based decision about the hypothesis and/or research question

generalisation

a judgment about the extent to which the research findings can be applied outside the study

extrapolate

to extend or project known information to estimate unknown values or outcomes beyond the original observation range, based on the trends and patterns identified in the data

justify

to provide sound reasons or evidence in support of a decision

Introducing limitations and uncertainty

Limitations are assumptions, features or constraints from an investigation that limit a researcher's ability to confidently answer the research question, generalise the findings or extrapolate to a claim. Limitations can arise from various aspects of the research process, including constraints in the research question, the design and methodology (including sample size), and ethical considerations.

Uncertainty refers to the ambiguity that exists in data or findings. Uncertainty can be identified by looking for:

- contradictory or incomplete data
- alternative explanations (confounding variables)
- uncertainty calculations
- measurement errors
- type I and type II errors.

limitation

assumption, feature or constraint from an investigation that limits a researcher's ability to confidently answer the research question, generalise findings or extrapolate to a claim

uncertainty

ambiguity that exists in data or findings

Sample size as a limitation

Sample size is a methodological limitation that can affect uncertainty, or **precision**, in sample estimates.

A larger sample size:

- reduces the effect of outliers and reduces the variability in the results (indicated by lower standard deviation and interquartile range)
- leads to more precise estimates (indicated by lower standard error and confidence intervals), which enhances reliability
- better represents the target population, which increases external validity and the ability to generalise the findings.

The opposite is likely to occur for smaller sample sizes.

precision

the extent to which repeated observations or measurements yield similar results

What is considered a large or small sample?

There isn't a strict rule that universally defines a "small" or "large" sample size. In psychological research, the appropriate size of the sample varies based on the research question, the specific statistical analysis used, the expected effect size, and variability of the data. A general rule of thumb is to consider the central limit theorem. Statistically, a sample of 30 or above is considered to approximate a normal distribution.

There are other factors you can also consider:

- Compare your sample to previous research: Look at similar studies in the literature to see what sample sizes have been commonly used. This can provide a point of reference to judge whether your sample size is in line with what other researchers have used for similar studies.
- Consider variability: If your sample size is small, pay attention to the variability within your data. High variability can reduce the confidence in your findings, while low variability might make your results more convincing.
- Acknowledge limitations: In your research report, acknowledge any limitations related to sample size. Highlight that a small sample size is less likely to be representative of the target population, which limits the generalisability of the findings.
- Suggest extension: If your study suggests interesting findings despite a small sample, recommend that future research with larger sample sizes could further investigate and validate your findings.

Type I and type II errors as a source of uncertainty

It is also important to be aware of errors as a source of uncertainty when deciding to accept or reject a hypothesis on p -values. Acceptance or rejection of the null hypothesis is based on the level of statistical significance (α) set by the researcher before conducting the study. In psychological research, the α -level is usually 0.05; however, in medical research the α -level is set much lower at 0.01 or even 0.001. Since hypothesis testing is based on probabilities, it is possible that we incorrectly reject or accept the null hypothesis when the opposite is true. This gives rise to errors.

type I error

when a true null hypothesis is incorrectly rejected, also known as a “false positive”

type II error

when a false null hypothesis is not rejected, also known as a “false negative”

- If $p < 0.05$, it is possible that we are making a **type I error**, which is incorrectly rejecting the null when it is true. This is also known as a false positive because we have incorrectly accepted the alternative hypothesis.
- If $p > 0.05$, it is possible that we are making a **type II error**, which occurs if we incorrectly accept the null hypothesis when it is false. A type II error is also called a false negative.

While there are yet more statistical methods that help us determine the likelihood of a type I or type II error having occurred, we won't really know until the study is replicated. You can identify the type of error that may have occurred as a source of uncertainty in your analysis.

The quality of research

The purpose of conducting research is to be able to provide an answer to the research question with confidence. Researchers seek answers to important real-world questions that can have applications in education, health, business, sports, environment, the legal system, technology, the military, marketing and public policy. However, the research is not meaningful if the results are not reliable and valid.

Therefore, it is equally important for researchers and those who use their work to be able to critically evaluate the quality, or the reliability and validity, of the evidence. Experimental processes and evidence that are reliable and valid can be used to predict outcomes and evaluate claims.

Reliability

In psychological research, the reliability of the experimental process ensures that the findings are consistent and replicable. **Reliability** refers to the degree to which an experiment, test or any measuring procedure yields the same results on repeated trials. The experimental process is reliable if it produces similar results under similar conditions. Reliability can be assessed by using a correlation; the stronger the correlation, the higher the reliability.

There are different types of reliability related to the experimental process; these are summarised in Table 1.

TABLE 1 Types of reliability related to the experimental process

| Type of reliability | Description | How to evaluate | How to improve |
|-----------------------------|---|---|--|
| Internal reliability | The extent to which a study or instrument is consistent within itself | Consider: <ul style="list-style-type: none"> • low precision in measurements due to random error • lack of standardised instructions and processes. | <ul style="list-style-type: none"> • Use standardised instructions and processes. • Reduce sources of random error. • Increase sample size. |

reliability

the degree to which an experiment, test or any measuring procedure yields the same results on repeated trials

internal reliability

the extent to which a study or instrument is consistent within itself

| Type of reliability | Description | How to evaluate | How to improve |
|-----------------------------|---|---|---|
| | Internal consistency is internal reliability calculated across items within a test instrument. | Measure using correlational techniques; a higher r -value indicates higher internal consistency. | Use a more reliable instrument. |
| External reliability | The extent to which a study or instrument yields findings that are consistent across repeated measures | Ask if the findings of the study are: <ul style="list-style-type: none"> replicable (by the same researchers, using the same instruments under the same conditions) reproducible (measuring the same quantity under changed conditions) consistent with other researchers. | <ul style="list-style-type: none"> Use reliable and precise instruments. Use standardised procedures and instructions. Reduce sources of error and confounds. |
| | Inter-rater reliability is external reliability calculated across individuals. A reliable instrument should give consistent results no matter who administers or grades it. | Consider the level of agreement or consistency between different observers or raters. Lower inter-rater reliability suggests that the ratings may be influenced by rater subjectivity or bias. | <ul style="list-style-type: none"> Select properly trained raters, or train raters on the techniques to use for scoring. Clearly operationalise variables (stating how the variable(s) will be measured). Use a score sheet. |
| | Test-retest reliability is external reliability calculated across time. Low test-retest reliability suggests that either the testing conditions are not consistent or the instrument is problematic. | Consider the strength of the correlation between multiple attempts (by the same or different researchers). Stronger correlation indicates higher test-retest reliability. | <ul style="list-style-type: none"> Use standardised instructions and processes. Check the instrument design. |

internal consistency
internal reliability calculated across items within a test instrument

external reliability
consistency of a measure or test across different occasions or different observers

inter-rater reliability
the extent to which different observers or raters agree in their assessments

test-retest reliability
the stability of test scores or measurements over time with repeated administrations

Study tip

You will most often see "observer reliability" referred to as "inter-rater reliability" in psychology references.

Validity

The **validity** of the experimental process is the extent to which the research or instrument accurately measured what it was intended to measure. Validity ensures that the conclusions drawn from the research are trustworthy and can be used to support broader theories or applications.

- Internal validity** refers to whether the effects observed in a study are due to the manipulation of the independent variable and not other factors. It ensures that the study is methodologically sound and that the cause-and-effect relationships are accurately identified within the study.
- External validity** concerns the extent to which the findings from a study can be generalised to other contexts beyond the study's setting, including other populations, locations and times. It is essential for the applicability of the research findings to real-world settings.

Both types of validity are reduced by confounding variables. These are summarised in Table 2.

validity
the extent to which a study or instrument accurately measures what it intends to measure

internal validity
the extent to which the observed changes in a study can be attributed to the manipulation of the independent variable and not other factors

external validity
the extent to which the findings of a study can be generalised

TABLE 2 Controlling errors and confounding variables in research

| Possible confound | Description | Control procedures (to do before the experiment) | Effect on the quality of the study |
|-------------------------------|---|--|---|
| Systematic error | Can be caused by: <ul style="list-style-type: none"> confounding variables and bias instrumental errors. Detect by examining the experimental process or inspecting data. | <ul style="list-style-type: none"> Carefully design the experiment. Inspect and test equipment (e.g. calibrate and zero before use). Use test instruments with demonstrated validity and in the manner for which they are intended. | Decreases accuracy and reduces internal validity |
| Random error | Can be caused by: <ul style="list-style-type: none"> variations in procedures or instructions confounds related to participants unreliable instruments. Detect by examining the experimental process or inspecting data. High variability in measurements indicates random error. | <ul style="list-style-type: none"> Use standardised instructions and procedures. Increase the sample size. | Decreases precision and reduces internal reliability, which, in turn, reduces internal validity |
| Sample bias | Caused by a non-representative sample. Detect by comparing the sample characteristics to those of the target population. | Use a better sampling procedure, e.g. stratified sampling, to obtain a more representative sample. | Reduces external validity (or population validity); findings may not be generalisable to the target population |
| Participant variables | Caused by individual differences among participants that can influence the outcome. Detect by inspecting the data; for example, did one group perform much better than the other because of the independent variable or because they had certain characteristics (such as higher average IQ) that could provide an alternative explanation? | Use: <ul style="list-style-type: none"> random allocation repeated measures matched pairs. | Reduces interval validity if the outcome could be due to participant variables rather than the independent variable |
| Demand characteristics | Caused by participants guessing the aim of the experiment and changing their behaviour | Use: <ul style="list-style-type: none"> independent groups experimental design blinding deception standardised instructions and procedures. | Reduces the study's reliability and internal validity |

| Possible confound | Description | Control procedures (to do before the experiment) | Effect on the quality of the study |
|-------------------------------|--|---|--|
| Order effects | Caused by participants' responses changing because of the order in which the experiment is conducted; for example: <ul style="list-style-type: none"> practice effect: improved performance over time due to repeated testing fatigue effect: declined performance over time due to fatigue or boredom | <ul style="list-style-type: none"> Use independent groups or matched design. Counterbalance the order of conditions or randomise the order for each participant. | Reduces internal validity if performance changed due to order effects rather than the independent variable |
| Attrition | Caused by participants dropping out of the study | <ul style="list-style-type: none"> Use designs with shorter time frames (e.g. independent groups or cross-sectional designs). Provide incentives. Over-sample initially. | Reduces validity as the final sample may differ from the initial sample |
| Cohort effect | Caused by differences in characteristics or experiences of particular age groups that may affect outcomes | Use cross-sectional methods, or ensure the sample includes multiple cohorts. | Reduces validity; results may be specific to one cohort and not applicable to others |
| Placebo effect | Caused by actual or perceived improvements due to participants' belief that they are receiving real treatment | Use single-blind procedure. | Reduces internal validity if performance changed due to the placebo effect rather than the independent variable |
| Experimenter effect | Caused by cues given by the experimenter that change the outcome | Use double-blind procedure. | Reduces internal validity if performance changed due to the experimenter effect rather than the independent variable |
| Situational variables | Caused by changes in the environment or inconsistencies in the experimental procedure | Use standardised instructions and procedures. | Reduces reliability and internal validity |
| Mundane realism | Caused by using artificial tasks or stimuli | Use more realistic tasks. | Reduces external validity and the ability to generalise findings to the real world |
| Artificial environment | Caused by conducting the study in an artificial or contrived environment | Use naturalistic observation. | Reduces external, ecological validity and the ability to generalise findings to the real world |

Study tip

Demand characteristics and experimenter effects are confounding variables, but come from different sources. Demand characteristics come from participants and experimenter effect comes from the researcher.

Validity and psychological test instruments

There are different types of validity related to psychological test instruments:

face validity

a subjective judgment on the extent to which a psychological instrument appears to measure what it is supposed to measure

content validity

whether a test comprehensively accounts for all the relevant aspects of the construct it aims to assess

predictive validity

how well a test score or measure predicts outcomes or behaviours in the future

concurrent validity

the extent to which a test correlates with a benchmark test or measure taken at the same time

- **Face validity** is a subjective judgment of whether a psychological test *appears* to measure what it claims to measure. For example, do the questions on your exam appear to assess the content you learnt in class?
- **Content validity** reflects whether a psychological instrument measures all aspects of the construct it intends to measure. For example, an IQ test should assess a variety of cognitive functions related to intelligence, such as verbal skills, abstract thinking and memory.
- **Predictive validity** gauges the instrument's ability to predict relevant future outcomes such as an individual's performance or behaviour. For example, correlating students' university GPA with their high school ATAR to determine whether ATAR has high predictive ability.
- **Concurrent validity** refers to the degree to which scores on one measure of intelligence are correlated to scores on another measure taken at the same time. This is measured by correlating test results from the current instrument with those from an established, validated instrument measuring the same construct.

When psychologists select instruments for evaluation or diagnosis, it is important that the instruments are valid and measure what they intend to measure.

Evaluating secondary sources

For both your student experiment and research investigation, you will need to conduct your own research to choose good sources and evaluate the quality of evidence from those secondary sources.

When you conduct research, seek out credible sources. Credible sources are those that are current, relevant to your investigation, come from authoritative sources, and have reliable and valid evidence. Sources of information such as opinions (personal views), anecdotes (story) and non-scientific ideas have low credibility and may not be suitable to the aim of the investigation.

Here are some criteria you can use to assess the quality of secondary sources before relying on them for your investigations:

- **Currency:** Ensure the source is up-to-date and relevant to current understandings in the field.
- **Relevance:** Choose sources that are directly related to your research question or hypothesis, and that contribute meaningfully to your investigation.
- **Authority:** Check the credentials of the author or organisation responsible for the content.
- **Accuracy and verifiability:** High-quality sources present information that can be verified through citations and references to primary research, official data or other reliable secondary sources.
- **Objectivity:** Assess the source for potential biases. Scholarly and peer-reviewed articles tend to be more objective, whereas materials from advocacy groups or commercial entities may have inherent biases.

Peer review is an essential component of scientific research, acting as a quality control mechanism. When researchers submit a study for publication, other experts in the same field evaluate their work. These peer reviewers critically assess the study's methodology, data analysis, results and conclusions, ensuring the research is robust and sound, and adds value to the field. Thus, peer-reviewed journal articles make excellent secondary sources.

It is also important that you don't only read information that suits your hypothesis or research question. A well-rounded literature review looks at all sides of a theory. For example, if you were researching the effects of caffeine on memory, your literature review would need to present prior research that supports and refutes the impact of caffeine on memory.

peer review
process where experts in a field evaluate the quality and accuracy of a research paper, study or scholarly work before it is published

Check your learning 1.8



Check your learning 1.8: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Recall** which statistic is used to draw conclusions in psychological research. (1 mark)
- 2 Identify** three sources of uncertainty. (3 marks)
- 3 Describe** what limitations are. (1 mark)
- 4 Explain** why sample size is important in research. (1 mark)
- 5 Explain** how you would detect a potential type I or type II error. (2 marks)

Analytical processes

- 6 Distinguish** between inter-rater reliability test-retest reliability. Include examples for each. (3 marks)
- 7 Compare** external and internal validity. (2 marks)
- 8 Distinguish** between generalisation and extrapolation. (1 mark)
- 9 Explain** how you would detect the following sources of uncertainty when analysing a secondary source. **Determine** whether the uncertainty would impact the reliability, validity or both of an investigation.
 - a** Results that are inconsistent with other research (2 marks)
 - b** Bias (2 marks)
 - c** Order effects (2 marks)

- 10** Dr Johnson conducted a study to investigate how cultural background affects people's perception and therefore preference for Vegemite. She surveyed 50 Australian students and 50 international students and found that 45 of the Australian students liked Vegemite, while only 10 international students liked it ($p = 0.045$).

Infer whether a type I or type II error may have occurred. (1 mark)

Knowledge utilisation

- 11** Search online for the news article titled "The mixed-up brothers of Bogota". In the article, journalist Susan Dominus reports the story of how one twin from each of the two sets born on the same day in the same hospital were swapped. They ran into each other by accident and compared how similar their lives were despite different upbringings.

Evaluate the credibility of the article as a secondary source for a research investigation on the claim "Intelligence is fixed". Copy the table and record your evaluation. (1 mark for each step)

| Criteria | Evaluation |
|----------------------------|------------|
| Currency | |
| Relevance | |
| Authority | |
| Accuracy and verifiability | |
| Objectivity | |

Lesson 1.9

Communicating scientifically



Learning intentions
and success criteria

Key ideas

- Scientific writing has its own particular requirements and expectations around terminology, representations, and conventions for reporting and referencing.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- use appropriate psychological terminology, representations and conventions for reporting research
- acknowledge sources of information with standard scientific referencing conventions

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

 oxforddigital

This lesson is available on Oxford Digital.

Lesson 1.10

Preparing for your data test



Learning intentions
and success criteria

Key ideas

- The data test requires you to apply understanding of the dataset, analyse the data presented and interpret the evidence presented by the data.
- Prepare for your data test by participating in class practicals and practising your science inquiry skills.

Assessment objectives

This lesson provides support for achieving the assessment objectives for a data test:

2. Apply understanding of brain function, sensation and perception, memory or learning to given algebraic, visual or graphical representations of scientific relationships and data to determine unknown scientific quantities or features.
3. Analyse data about brain function, sensation and perception, memory or learning to identify trends, patterns, relationships, limitations or uncertainty in datasets.
4. Interpret evidence about brain function, sensation and perception, memory or learning to draw conclusions based on analysis of datasets.

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Lesson 1.11

Conducting your student experiment

Key ideas

- The student experiment requires you to conduct your own practical by modifying an existing experiment.
- Ensure that ethical and informed consent obligations will be met before you start your experiment.
- If you write a scientific report to present your findings, consider following APA style.



Learning intentions and success criteria

Assessment objectives

This lesson provides support for achieving the assessment objectives for a student experiment:

1. Describe ideas and experimental findings about brain function, sensation and perception, memory or learning.
2. Apply understanding of brain function, sensation and perception, memory or learning to modify experimental methodologies and process data.
3. Analyse experimental data about brain function, sensation and perception, memory or learning.
4. Interpret experimental evidence about brain function, sensation and perception, memory or learning.
5. Evaluate experimental processes and conclusions about brain function, sensation and perception, memory or learning.
6. Investigate phenomena associated with brain function, sensation and perception, memory or learning through an experiment.

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Study tip

Before writing your student experiment, make sure you look at the instrument-specific marking guide (ISMG) in the *Psychology 2025 v1.2 General Senior Syllabus*.

Lesson 1.12

Conducting your research investigation

Key ideas

- The research investigation requires you to evaluate a claim about a significant issue from your study of psychology.
- You must use credible sources to answer your research question.
- To avoid bias, it is good practice (but not necessary for your research investigation) to consider sources that both support and refute the claim.



Learning intentions and success criteria

Assessment objectives

This lesson provides support for achieving the assessment objectives for a research investigation:

1. Describe ideas and findings about social psychology, interpersonal processes, attitudes or cross-cultural psychology.
2. Apply understanding of social psychology, interpersonal processes, attitudes or cross-cultural psychology to develop research questions.
3. Analyse research data about social psychology, interpersonal processes, attitudes or cross-cultural psychology.
4. Interpret research evidence about social psychology, interpersonal processes, attitudes or cross-cultural psychology.
5. Evaluate research processes, claims and conclusions about social psychology, interpersonal processes, attitudes or cross-cultural psychology.
6. Investigate phenomena associated with social psychology, interpersonal processes, attitudes or cross-cultural psychology through research.

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Lesson 1.13

Preparing for your exams

Key ideas

- Exam preparation should be an ongoing process throughout your course, which includes managing your class time and at-home study wisely.
- Use exam techniques and understanding of the cognitive verbs to maximise your exam outcomes.



Learning intentions and success criteria

Assessment objectives

This lesson provides support for achieving the assessment objectives for an examination:

1. Describe ideas and findings about brain function, sensation and perception, memory, learning, social psychology, interpersonal processes, attitudes and cross-cultural psychology.
2. Apply understanding of brain function, sensation and perception, memory, learning, social psychology, interpersonal processes, attitudes and cross-cultural psychology.
3. Analyse data about brain function, sensation and perception, memory, learning, social psychology, interpersonal processes, attitudes and cross-cultural psychology to identify trends, patterns, relationships, limitations or uncertainty.
4. Interpret evidence about brain function, sensation and perception, memory, learning, social psychology, interpersonal processes, attitudes and cross-cultural psychology to draw conclusions based on analysis.

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Lesson 1.14

Review: Psychology toolkit

Summary

- 1.1 • Psychology is the scientific study of human behaviour and mental processes.
- Studying psychology can lead to a diverse range of career pathways.
- QCE Psychology is divided into units and topics.
- The science inquiry skills and their application are important for success in QCE Psychology.
- 1.2 • First Nations peoples are the traditional custodians of the land we know now as Australia.
- First Nations cultures are the oldest living cultures in the world.
- Correctly acknowledging cultural and/or language groups, rejecting deficit discourse, avoiding Eurocentrism and critically evaluating sources of information can help you to respectfully engage with First Nations perspectives in QCE Psychology.
- 1.3 • The scientific method is a framework that helps to eliminate bias in research so that valid, evidence-based conclusions can be drawn.
- A research question is a clearly formulated question that defines the focus of an investigation.
- A hypothesis is a scientific prediction about the outcome of a study; there are different types of hypotheses: alternative (either directional or non-directional, and either experimental or correlational) and null.
- In psychology, we statistically test the probability of the null hypothesis being true.
- 1.4 • Each different type of scientific investigation and research design has strengths and weaknesses that need to be considered.
- Participants in a study can be selected through convenience, random or stratified sampling methods.
- Errors and confounds can influence the quality of results, but they can be minimised through careful design.
- 1.5 • Ethical principles should be applied in psychological research to ensure the safety and wellbeing of participants.
- Ethical understanding should be applied when conducting research by acknowledging sources and referencing.
- 1.6 • Data can be classified as qualitative (descriptive), quantitative (numerical), subjective (personal) or objective (non-personal), continuous or discrete (categorical).
- Levels of measurement include nominal, ordinal, interval or ratio in order of increasing precision and usability for statistical analysis.
- Psychologists use case studies, observations, self-reports, interviews and computerised instruments to systematically and safely collect information for research.
- Researchers use logbooks to systematically record information, observations and data.
- 1.7 • Statistics are mathematical procedures that help us to make sense of data.
- Descriptive statistics are numerical or graphical methods used to summarise and organise data in a meaningful way.
- Inferential statistics allow us to interpret meaning from the data such as drawing conclusions, making inferences and predictions.
- Statistics, tables and figures should be represented scientifically.

- 1.8 • A conclusion is a judgment about the hypothesis and/or research question. Generalisations extend conclusions beyond the study to broader population and context.
- Limitations limit a researcher's ability to confidently answer the research question, generalise the findings or extrapolate to a claim.
- The quality of an investigation depends on the extent to which the evidence is reliable (consistent) and valid (measured what was intended). Uncertainty and confounding variables reduce the quality of the evidence.
- Secondary sources should be evaluated for biases, currency, relevance, authority and accuracy. Peer-review is a control measure to verify the quality of published research.
- 1.9 • Scientific writing has its own particular requirements and expectations around terminology, representations, and conventions for reporting and referencing.
- 1.10 • The data test requires you to apply understanding of the dataset, analyse the data presented and interpret the evidence presented by the data.
- Prepare for your data test by participating in class practicals and practising your science inquiry skills.
- 1.11 • The student experiment requires you to conduct your own practical by modifying an existing experiment.
- Ensure that ethical and informed consent obligations will be met before you start your experiment.
- If you write a scientific report to present your findings, consider following APA style.
- 1.12 • The research investigation requires you to evaluate a claim about a significant issue from your study of psychology.
- You must use credible sources to answer your research question.
- To avoid bias, it is good practice (but not necessary for your research investigation) to consider sources that both support and refute the claim.
- 1.13 • Exam preparation should be an ongoing process throughout your course, which includes managing your class time and at-home study wisely.
- Use exam techniques and understanding of the cognitive verbs to maximise your exam outcomes.

Review questions 1.14A Multiple choice



Revision questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 A research study categorises participants into groups such as “creative”, “musical” or “sporty”. The level of measurement being used is
 - A nominal.
 - B ordinal.
 - C interval.
 - D ratio.
- 2 Dr Brown conducts a study where she observes children in a playground without participating or interfering with their activities. What type of observation is Dr Brown using?
 - A Controlled
 - B Participant
 - C Naturalistic
 - D Structured
- 3 A sociologist uses census data to examine the demographic changes in a region over the past 50 years. What type of data are they using?
 - A Primary qualitative
 - B Secondary quantitative
 - C Primary quantitative
 - D Secondary qualitative
- 4 The term that describes the ability to apply findings from a sample to a larger population, ensuring that the sample is representative of the population from which it was drawn, is
 - A generalisability.
 - B validity.
 - C reliability.
 - D standardisation.

- 5 When researchers manage all variables in a study to ensure that the results are solely due to the treatment and not other factors, the study is said to have high
- A external validity.
 - B internal validity.
 - C concurrent validity.
 - D experimental validity.
- 6 Professor Bugs is researching the effects of increased vitamin intake through drinking carrot juice on eyesight. He gives his experimental group 125 mL of carrot juice each day, while he gives the control group carrot juice that has been boiled and cooled to remove the vitamin content. The purpose of the control group in this experiment is to
- A show the effects of the independent variable.
 - B control or eliminate the effects of participant variables.
 - C form a basis for comparison with the experimental group.
 - D show the effects of the dependent variable.
- 7 Select the response that correctly identifies the characteristics of each type of research investigation.

| | Experimental analysis | Experimental conclusion | Correlational analysis | Correlational conclusion |
|---|-----------------------|-------------------------|------------------------|--------------------------|
| A | Scatterplot | Causal | Column graph | Non-causal |
| B | Scatterplot | Non-causal | Column graph | Causal |
| C | Column graph | Causal | Scatterplot | Non-causal |
| D | Column graph | Non-causal | Scatterplot | Causal |

- 8 The type of research design that involves testing different age groups only once is known as
- A longitudinal.
 - B cross-sectional.
 - C sequential.
 - D matched pairs.
- 9 Inferential statistics are statistical procedures. They allow us to
- A prove or disprove a hypothesis.
 - B draw conclusions from data.
 - C describe the properties of the data gathered.
 - D manipulate data and calculate standard scores.
- 10 A researcher wishes to use deception in an experiment, where participants would believe that they were taking part in research that investigated their ability to solve visual puzzles on a computer,

but in reality the computer would “crash” near the end of the test and their emotional response to the frustration would be measured.

Identify the statement that best describes this scenario.

- A This research would be ethical if no psychological or physical harm was caused to the subjects in the long term and debriefing procedures were carried out.
 - B This research would be ethical if the research aim was considered sufficiently important and the ethics committee of the researcher’s university had approved it, and debriefing procedures were carried out.
 - C This research would be ethical if the subjects gave informed consent about the deceit and debriefing procedures were carried out.
 - D This research would be unethical since deceit in research can never be ethical and is not permitted even if debriefing procedures are carried out.
- 11 How does sample size affect the standard error of the mean?
- A Increasing the sample size has no effect on the standard error.
 - B Increasing the sample size increases the standard error.
 - C Increasing the sample size decreases the standard error.
 - D The standard error is only affected by the range of the sample, not the size.
- 12 A researcher investigated the effect playing video games had on academic success. He compared the memory skills of students who spent more than 5 hours per week playing video games with the memory skills of students who spent less than 5 hours per week playing video games, by having each group memorise a list of 40 botanical names of plants.
- What is the dependent variable and how is it operationalised in this research?
- A Excessive time spent playing video games; number of hours per week spent playing video games
 - B Students who play video games; more than 5 hours per week spent playing video games
 - C Academic success; average percentage score in school examinations
 - D Academic success; score on test of memory of 40 botanical names of plants

Use the following information to answer questions 13 to 15.

A researcher investigated the effects of using a lavender-scented pillow on the sleep cycle of participants. It was hypothesised that the pillows would decrease nightmares. The study included two groups of participants: group 1 was given lavender-scented pillows and group 2 was given pillows scented with other herbs. The researcher analysed the subjects' dreams for negative content the next day. The subjects were not aware of which herbs were thought to reduce nightmares and the researcher was not aware of which subjects were given the lavender or other herbs.

13 What type of design was used?

- A A single-blind design to eliminate the placebo effect
- B A single-blind design to eliminate subject expectations

- C A double-blind design to eliminate experimenter bias
- D A double-blind design to eliminate placebo and experimenter effects

14 Which one of the following ethical guidelines was violated in the study?

- A Confidentiality of participant information
- B Informed consent from participants
- C Voluntary participation in the research
- D Withdrawal rights for participants

15 Which of the following is most likely a confounding variable?

- A Attrition
- B Order effects
- C Demand characteristics
- D Participant variable (e.g. whether they have nightmares)

Review questions 1.14B Short response



Revision questions: Complete these questions online or in your workbook.

Retrieval and comprehension

16 **Describe** the following types of validity

- a ecological validity (1 mark)
- b mundane realism. (1 mark)

17 **Describe** a strength and limitation of using case studies in research. (2 marks)

18 **Explain** the role and bias of the experimenter with respect to ethical conduct of psychological research. (2 marks)

Analytical processes

Use the following information to answer questions 19 to 23.

A study was conducted to evaluate the effectiveness of a new teaching strategy aimed at improving test scores in mathematics for high school students. A sample of 25 students participated in the study. They were given a maths test before and after being taught for a term using the new strategy. The scores out of 100 were as follows:

Raw data:

Pre-teaching strategy test scores: 45, 48, 50, 51, 52, 54, 55, 56, 57, 58, 59, 60, 62, 63, 64, 65, 66, 67, 68, 70, 72, 74, 76, 82, 85

Post-teaching strategy test scores: 55, 56, 57, 58, 60, 61, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 76, 78, 80, 86, 92.

Descriptive statistics:

| | M | SD | SE |
|-----------|-------|-------|------|
| Pre-test | 62.36 | 10.36 | 2.07 |
| Post-test | 68.16 | 9.32 | |

19 **Determine** the mode for the pre-teaching strategy condition. (1 mark)

20 **Identify** two characteristics of the data that make the mean the most appropriate measure of central tendency. (2 marks)

21 **Calculate** the standard error of the post-test condition. Use the formula $SE = \frac{SD}{\sqrt{n}}$. (2 marks)

22 **Identify** the trend in the mean values. (1 mark)

23 **Contrast** the standard deviation scores. (1 mark)

Knowledge utilisation

Use the following information to answer questions 24 to 30.

A guidance officer wished to compare the moods of Year 10 students after they had role-played being a victim of bullying (Condition 1) with their mood after they had role-played helping an injured person (Condition 2).

She decided to measure mood using a 40-item “mood test” downloaded from the internet. Responses were given on a scale of 1 to 10, with 1 being “depressed” and 10 being “elated”.

The first 30 students on the school’s alphabetical roll were measured. The role-plays took place on Monday afternoons, 1 week apart. The guidance officer made sure that half the students role-played Condition 1 the first week and Condition 2 the second, with the other half role-playing the conditions in the opposite sequence.

The results showed that the mean mood score for Condition 1 was 3.4 and the mean mood score for Condition 2 was 7.2. This difference was statistically significant ($p = 0.04$).

24 Identify the population in this research. (1 mark)

25 With respect to the sample

- a identify** the type of sampling method used (1 mark)
- b determine** whether the sampling method was appropriate. **Justify** your response. (2 marks)

26 With respect to the variables in this research

- a identify** the operationalised independent variable (1 mark)
- b identify** the operationalised dependent variable. (1 mark)

27 Create a directional, alternative hypothesis for the experiment. (1 mark)

28 Answer the following questions about the design.

- a Identify** the experimental design used in this research. (1 mark)
- b Explain** why the guidance officer made sure that “half the students role-played Condition 1 the first week and Condition 2 the second, with the other half role-playing the conditions in the opposite sequence”. (3 marks)
- c Identify** the type of data collection method. (1 mark)
- d Identify** the level of measurement of the dependent variable. (1 mark)

29 Draw a conclusion about the effect of the role-play on mood. (1 mark)

30 Evaluate the quality of the evidence by answering the following questions.

- a Identify** a potential confounding variable, **describe** its effect on the quality of the study and **propose** an improvement. (3 marks)
- b Identify** a limitation and **explain** how it affects the quality of the study. (2 marks)



Module 1 checklist: Psychology toolkit

UNIT

3

**Individual
thinking**

Unit 3 overview

Psychology is the scientific study of human thoughts, feelings and behaviours. In Unit 3, we will examine all aspects of human behaviour, from the workings of the brain to larger biological and social influences on our individual thinking.

We will examine how the structure and function of the human nervous system – including the role of specialised areas of the brain – enable us to make sense of, and navigate, an incredibly complex world.

We will also learn about the cognitive processes involved in sensation and perception, memory and learning. We will use visual and auditory perception as our key examples of sensory processes and discuss the biological, psychological and cultural influences on visual and auditory perception.

How can we learn and remember new information so that we repeat our successes and grow from our mistakes? There is no easy answer, as our memory mechanisms can be fickle. Sometimes we remember things vividly, but have vague and sometimes faulty memories of other past events. By examining different models of memory, we will explore the brain structures responsible for specific aspects of remembering. We will also discuss different retrieval methods and strategies for improving our memories.

Finally, the different theories of learning will be compared to help us better understand changes in the way an individual responds based on prior experiences. We will explore how we interact with our world and how we use physiological and psychological strategies to interpret and understand our environment as well as cope with adversity.

Unit 3 objectives

- 1 Describe ideas and findings about brain function, sensation and perception, memory and learning.
- 2 Apply understanding of brain function, sensation and perception, memory and learning.
- 3 Analyse data about brain function, sensation and perception, memory and learning.
- 4 Interpret evidence about brain function, sensation and perception, memory and learning.
- 5 Evaluate processes, claims and conclusions about brain function, sensation and perception, memory and learning.
- 6 Investigate phenomena associated with brain function, sensation and perception, memory and learning.

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Unit 3 topics

| Topic | Module |
|---|---|
| Topic 1 Brain function | Module 2 The nervous system and the brain |
| | Module 3 Neurotransmission and neurotransmitters |
| Topic 2 Sensation and perception | Module 4 Processes of seeing and hearing |
| | Module 5 Influences on sensation and perception |
| Topic 3 Memory | Module 6 Understanding memory |
| | Module 7 The formation and storage of memories |
| | Module 8 How we remember and forget |
| Topic 4 Learning | Module 9 Learning |

The nervous system and the brain

Introduction

Imagine you're in an aeroplane, flying over Brisbane at night. As you look down, you can see the amazing network of communication and transport infrastructure: car headlights dotted along freeways and side streets; trains speeding along designated routes; arterial roads converging on transport hubs; and CityCats hurtling across the Brisbane (Maiwar) River towards the Story Bridge. Imagine that all this is being controlled from one central point. Now you have an idea of the intricacies of your brain and nervous system – only yours would be more than 20,000 times larger and more complex!

Sometimes extra pressure can be put on the system – comparable with how a car accident on the Riverside Express can cause delays both in and out of Brisbane city, or when a train delay in Ipswich interrupts the ebb and flow of commuters' working day. The system is subjected to stress and the same can happen to a person. Strategies to deal with such stressors and return the system to normal can be implemented through our understanding of psychological processes. We can also use our knowledge of our nervous system to help deal with both biological and psychological stress on our bodies and minds.

In this module, you will learn more about the human nervous system and how it functions. You will describe the different divisions of the nervous system (central and peripheral nervous systems and their associated subdivisions) in responding to, and integrating and coordinating with, sensory stimuli received by the body. You will understand how brain function can be viewed as both localised and distributed with some functions. For example, the occipital lobe's localised role in vision versus the multiple brain regions involved in memory. Knowledge of the human nervous system is important for understanding how we navigate, move, survive and make the best of the everyday world we live in.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to the nervous system and the brain before you start.

Subject matter

Science understanding

- Describe the structure of the human nervous system, with reference to the central (i.e. brain and spinal cord) and peripheral (i.e. somatic and autonomic) nervous systems.
- Describe the role of the spinal cord in the human nervous system, with reference to monosynaptic and polysynaptic spinal reflexes.
- Describe how brain function can be viewed as both localised and distributed, with
 - some functions being identified with specific areas in the cerebral cortex, including the frontal, occipital, parietal and temporal lobes
 - some functions being distributed across large or multiple brain regions, e.g.
 - the storage of explicit memory is associated with the hippocampus, the neo-cortex and the amygdala
 - the formation of implicit memories relies upon the basal ganglia and cerebellum.
- Explain that Broca's area, Wernicke's area, and Geschwind's territory have specific roles in language processing.
- Explain the interaction of the primary motor cortex, cerebellum and basal ganglia in coordinating voluntary movement.
- Explain the importance of the limbic system and the prefrontal cortex for the experience of emotion.

Science as a human endeavour

- Appreciate how plasticity assists in the recovery from brain injury.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify, research and construct questions for investigation
- identify and operationalise variables to be manipulated, measured and controlled
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through descriptive statistics
 - measures of central tendency: mean and median
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - explain findings
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors.

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Lesson 2.1

The human nervous system

Key ideas

- The human nervous system has two main divisions: the central nervous system and peripheral nervous system.
- The central nervous system comprises the brain and spinal cord.
- The peripheral nervous system comprises the somatic and autonomic nervous systems.
- The autonomic nervous system comprises the sympathetic and parasympathetic nervous systems.



Learning intentions
and success criteria

central nervous system (CNS)

comprises the brain and the spinal cord; controls the body by processing and responding to sensory input from the peripheral nervous system

peripheral nervous system (PNS)

comprises all the nerves and ganglia outside the brain and spinal cord that communicate information to and from the central nervous system

Introducing the human nervous system

The nervous system can be divided into two main divisions: the **central nervous system (CNS)** and the **peripheral nervous system (PNS)**. Neuroimaging techniques have enabled scientists to observe the parts of the brain that are active during different types of cognitive processes, many of which are active at any given time. It is important to remember that different parts of the brain interact with each other and are not isolated structures. The brain needs to receive information from the body's sense organs – the eyes, ears, skin, nose and tongue – which are constantly receiving information from the environment. The brain is also connected with the muscles and glands in the body so that an organism is able to respond to and act on the environment.

The central nervous system

The central nervous system comprises the brain and the spinal cord. It helps the brain to communicate with the rest of the body by sending messages to the peripheral nervous system.

The brain

The brain is made up of the hindbrain, the midbrain and the forebrain; each structure is detailed in Unit 1. The hindbrain links the spinal cord with the rest of the brain, and is important for movement and balance. The midbrain coordinates movement, sleep and arousal. The forebrain is responsible for receiving and processing sensory information and for higher order thinking processes, including problem-solving, planning, memory, language and emotions (Figure 1). Lesson 2.3 will contain further detail on brain structure and functioning.

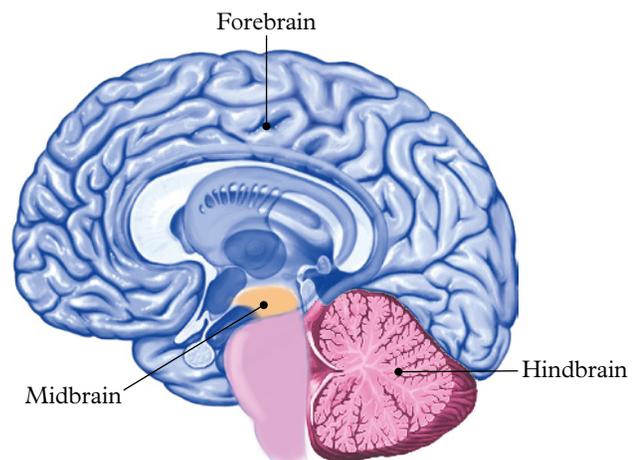


FIGURE 1 Forebrain, midbrain and hindbrain

The spinal cord

The **spinal cord** is a dense column of nerve tissue running from the brain stem down inside the vertebrae to the lower-middle section of the spine. It carries nerve signals from the brain to other parts of the body, as well as receiving signals from the body and transmitting this information to the brain. The upper section is responsible for communication between the brain and the upper parts of the body; the lower section is responsible for communication between the brain and the lower parts of the body, such as the legs, toes and feet (Figure 2). The spinal cord is also involved in spinal reflexes, which will be discussed in more detail in Lesson 2.2.

The spinal cord contains grey and white matter. The grey matter (Figure 3) is surrounded by a column of white matter, containing **axons** travelling in both directions, allowing for smooth communication between the brain and body, and vice versa.

The spinal cord is divided into several segments: cervical, thoracic, lumbar, sacral and coccygeal, each corresponding to a different region of the body and containing specific pairs of spinal nerves. There are 31 pairs of these spinal nerves, with two spinal nerves exiting each side of the cord through the vertebrae.

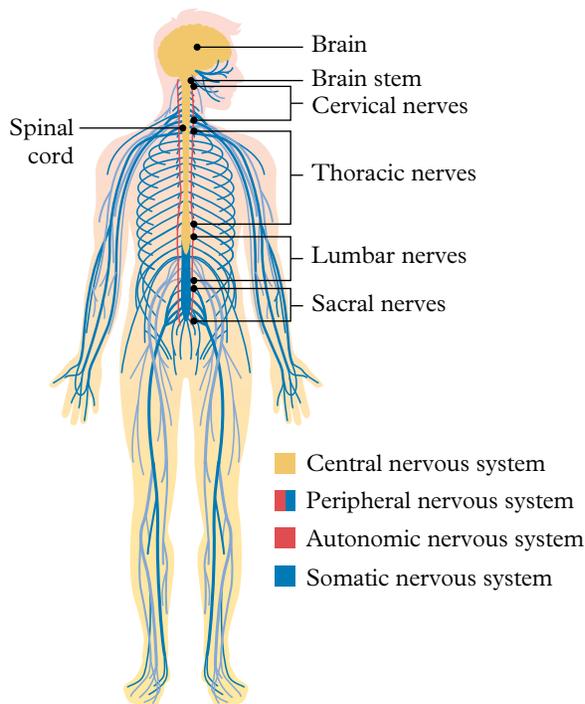


FIGURE 2 The human nervous system

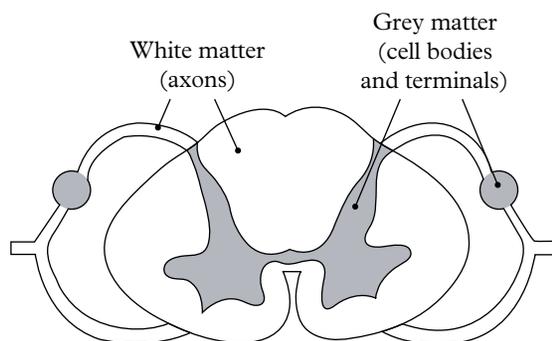


FIGURE 3 The spinal cord

spinal cord
a bundle of nerve fibres that carries sensory and motor signals between the peripheral nervous system and the brain

axon
the part of a neuron along which the electrochemical nerve impulse is transmitted

motor neuron
a neuron that communicates messages from the central nervous system to the particular muscles that an organism intends to move at any particular moment or glands to support bodily functions; also known as efferent

sensory neuron
a neuron that carries sensory information from the body and the outside world into the CNS; also known as afferent

Introducing the peripheral nervous system

The peripheral nervous system works with the central nervous system to enable you to interact with your environment. Imagine that you find a feather. You pick it up and stroke it and find that it feels soft on your fingers. In this scenario, the **motor neurons** of your peripheral nervous system are responsible for initiating the movement of your muscles in your arm and hand so you can touch the feather. The **sensory neurons** of your peripheral nervous system convey the sensation of the feather from the sensory receptors in the skin on your hand to the brain via the central nervous system. Your brain then registers the feather as being soft.

In the peripheral nervous system, axons are grouped together in bundles known as fibres. These fibres combine to form nerves, which also include connective tissue and blood vessels, extending to muscles, glands and organs throughout the body. The sciatic nerve, the longest nerve in the human body, begins in the lumbar region of the spine and extends

its branches all the way to the tips of the toes, measuring a metre or more in a typical adult. The peripheral nervous system has two subdivisions: the somatic nervous system and the autonomic nervous system.

The somatic nervous system

somatic nervous system

the branch of the PNS that transmits sensory information to the CNS and carries motor commands from the CNS to the skeletal muscles

The **somatic nervous system** controls the voluntary movement of skeletal muscles (striated or striped muscles). It contains both afferent nerves (made of sensory neurons sending information to the CNS) and efferent nerves (made of motor neurons sending information from the CNS). The nerves in the somatic nervous system are categorised by their location, either in the spinal or head regions. There are 31 pairs of spinal nerves that carry sensory information from the periphery to the spinal cord and relay muscle instructions from the spinal cord to the skeletal muscles. Additionally, there are 12 pairs of cranial nerves that transmit information to and from the brain stem, playing an essential role in sensation and for movements of the head, neck and tongue.

autonomic nervous system

consisting of the parasympathetic and sympathetic branches; responsible for the communication between the body's non-skeletal (visceral) and involuntary striated (heart) muscles and the internal organs and the glands that carry out bodily functions

The autonomic nervous system

The **autonomic nervous system** is regulated by the hypothalamus. It is mostly responsible for the communication of information between the central nervous system and the body's non-skeletal muscles, also known as smooth or visceral muscles (found in the stomach and bladder), together with the internal organs and glands that carry out basic bodily functions such as digestion and respiration.

For the most part, the autonomic nervous system operates without the organism's voluntary control or conscious awareness, enabling it to pay attention to other matters, such as responding to threats in the environment. However, some actions of the autonomic nervous system, such as breathing and blinking, can be voluntary. For example, you generally don't notice each time you inhale and exhale but, during a medical examination, you can deliberately hold your breath and then breathe out on demand. Table 1 lists the muscles and glands controlled by the autonomic nervous system.

TABLE 1 Muscles and glands controlled by the autonomic nervous system

| Muscles | Glands |
|--|--|
| <ul style="list-style-type: none"> In the skin (around hair follicles; smooth muscle) Around blood vessels (smooth muscle) In the eye (the iris; smooth muscle) In the stomach, intestines and bladder (smooth muscle) Of the heart (cardiac muscle, i.e. involuntary striated muscle) Gastrointestinal tract Gall bladder Liver | <ul style="list-style-type: none"> Pancreas Adrenal medulla (adrenal gland) Sweat gland |

sympathetic nervous system

a branch of the autonomic nervous system that changes the activity levels of internal organs, muscles and glands to prepare for increased activity during times of high physical or emotional arousal

parasympathetic nervous system

a branch of the autonomic nervous system responsible for maintaining day-to-day functioning of the body such as digestion, heart rate, breathing and some glandular functions; reverses changes in bodily function caused by the sympathetic nervous system

The sympathetic and parasympathetic nervous systems

The autonomic nervous system is further divided into two branches: the **sympathetic nervous system** and the **parasympathetic nervous system**. These two systems have different roles, which are complementary.

The **fight-flight-freeze response** is activated by both the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system is like an emergency system that becomes active when the organism is threatened. It prepares the body for action, such as running away or fighting the threat. In contrast, the parasympathetic nervous system controls the freeze response. This is activated when you are aware that you are unable to fight or outrun the threatening stimulus. The parasympathetic nervous system is also responsible for **homeostasis**; that is, maintaining balance in automatic day-to-day bodily functions, such as digestion, normal heart rate and breathing.

fight-flight-freeze response
a physiological response to stress that causes an organism to react in a combative manner (fight), remove itself from the situation (flight) or not react at all (freeze)

homeostasis
a self-regulating process by which the body maintains a stable internal balance while adjusting to a changing environment

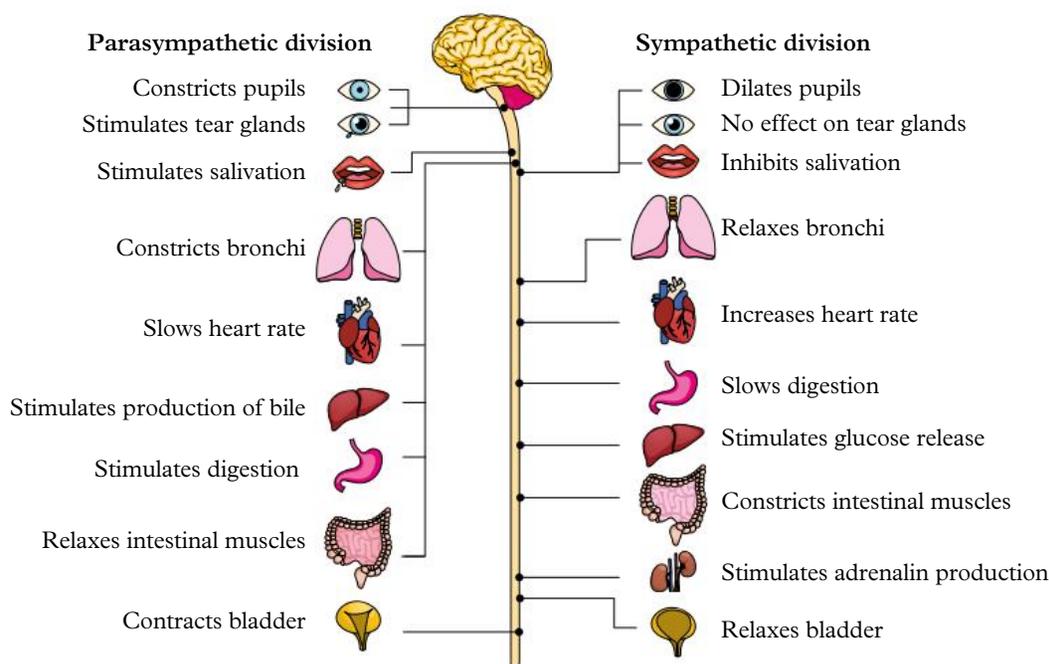


FIGURE 4 The role of the autonomic nervous system during different levels of arousal

Check your learning 2.1



Check your learning 2.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- Construct** a labelled diagram to illustrate your understanding of the structure of each component of the nervous system. Make sure that you include the following
 - central nervous system (brain and spinal cord) (1 mark)
 - peripheral nervous system (1 mark)
 - somatic nervous system (1 mark)
 - autonomic nervous system (sympathetic and parasympathetic). (1 mark)
- Describe** the structures of the peripheral nervous system. (4 marks)

- Describe** the structure of the spinal cord. (3 marks)

Analytical processes

- Compare** the autonomic nervous system and the somatic nervous system. (2 marks)

Knowledge utilisation

- When people sustain an injury to their nervous system, they can have impaired motor coordination and movement initiation. **Hypothesise** a possible explanation. (HINT: consider the role of the CNS and the PNS.) (3 marks)

Lesson 2.2

Spinal reflexes



Learning intentions
and success criteria

Key ideas

- A reflex (or reflex action) is an involuntary, almost instantaneous movement in response to a specific stimulus.
- A reflex arc is a neural pathway that controls a reflex action.
- A monosynaptic spinal reflex arc consists of only two neurons: one sensory neuron and one motor neuron.
- A polysynaptic spinal reflex arc involves one or more interneurons connecting sensory and motor neurons.

Introducing spinal reflexes

For our bodies to respond to what is happening in both our external and internal environments, messages need to be relayed to and from our central nervous system (CNS; the brain and the spinal cord). Our peripheral nervous system (PNS) is responsible for ensuring that we are able to make both voluntary and involuntary movements in response to external and internal stimuli. The PNS also ensures that we are able to maintain appropriate levels of arousal, respond to our environment in appropriate ways and maintain homeostasis. Without these messages, our body would be unable to react to dangers in our environment (such as pulling away from a hot object or a venomous spider).

Our basic life-preserving processes, such as breathing, are also controlled by the PNS. Breathing is an unconscious response, which explains why you typically don't think about it unless, for example, you're asked to "breathe in and breathe out" or if you are practising mindfulness. This lesson will examine the role of the spinal cord in the human nervous system and introduce you to various innate spinal reflexes.

reflex

automatic, involuntary response to sensory information (stimulus)

reflex arc

the path taken by the nerve impulses in a reflex

monosynaptic spinal reflex arc

a reflex arc made up of only two neurons (one sensory and one motor) synapsing in the spinal cord

polysynaptic reflex arc

a reflex arc made up of multiple neurons, with one or more interneurons in the spinal cord connecting the sensory and motor neurons

Spinal reflexes

The somatic nervous system is involved in reflex actions without the involvement of the CNS so that the reflex can occur very quickly. **Reflexes** are responses to sensory stimuli, which are innate, not learnt. These responses tend to be simple behaviours that contribute to our safety and survival. Many of these are controlled within the spinal cord without involving the brain and are therefore referred to as spinal reflexes. This enables an organism to respond faster than if a nerve impulse has to be sent to the brain. This means that pulling away from a hot or sharp object, for example, can be almost instantaneous.

The process of receiving a sensation and responding to it reflexively involves a **reflex arc**. There are two forms of spinal reflex arc:

- **monosynaptic spinal reflex arc:** involving only one synapse, where a sensory neuron brings a sensation from receptors in the body and a motor neuron carries motor messages to the muscles of the body (Figure 1)
- **polysynaptic spinal reflex arc:** involving interneurons connecting the sensory and motor neurons, and, therefore, at least two synapses (Figure 2).

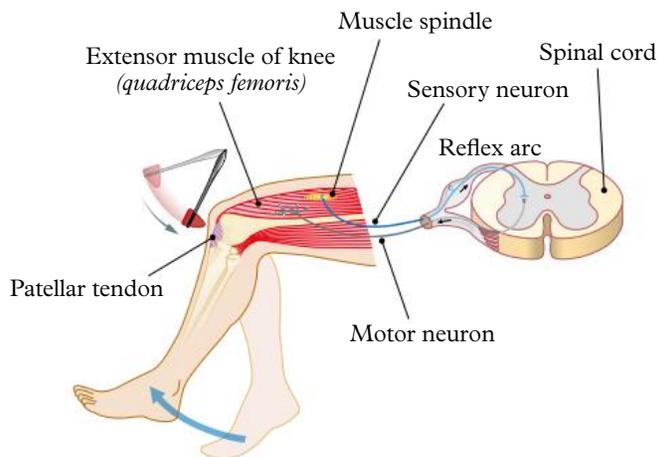


FIGURE 1 A two-neuron spinal reflex arc (monosynaptic)

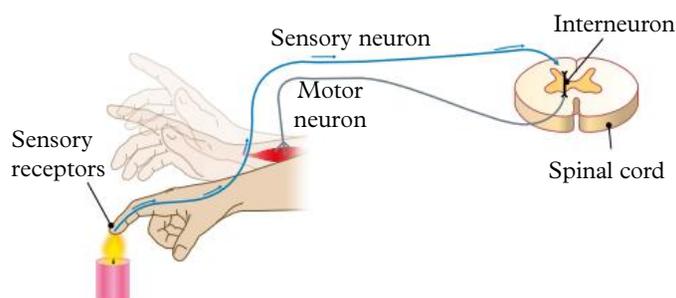


FIGURE 2 Three-neuron reflex arcs (polysynaptic spinal reflex arc) are more common than two-neuron reflex arcs.

Only a few of the simplest reflexes, such as the “knee-jerk” or patellar reflex, are monosynaptic. An example of a polysynaptic reflex is the pupillary reflex. This reflex controls the diameter of the pupil and hence the amount of light entering the eye.

The role of the synapse in transmitting neural impulses, such as those in a spinal reflex arc, is explained in detail in Module 3.

Check your learning 2.2



Check your learning 2.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- Identify** the spinal reflex arc that contains only one synapse. (1 mark)
- Describe** a polysynaptic spinal reflex and give an example. (2 marks)
- Identify** an example of a monosynaptic spinal reflex arc. (1 mark)

Analytical processes

- Consider** the effect on survival if you did not have reflexes. (2 marks)

- Differentiate** between monosynaptic and polysynaptic spinal reflex arcs. (1 mark)

Knowledge utilisation

- Humans have evolved to possess certain physical and neurological features to increase survival. **Propose** how the dilation and constriction of our pupils is beneficial to human survival. (4 marks)

Lesson 2.3

Brain function



Learning intentions and success criteria

cerebral cortex

the multilayered outer surface of the cerebrum responsible for receiving information from the environment, controlling our responses, and allowing complex voluntary movements and higher order thinking processes; consists of the neocortex and allocortex

cerebrum

the part of the brain most responsible for voluntary movement and complex thought processes such as perception, imagination, judgment and decision-making

corpus callosum

the thick band of about 200 million nerve fibres connecting the right and left hemispheres of the brain

frontal lobe

the largest lobe of the brain; has several functions, including initiating movement of the body, language, planning, judgment, problem-solving, aspects of personality and emotions; extremely well developed in higher order mammals

Key ideas

- The cerebral cortex is the outermost layer of the cerebrum. The cerebrum is divided lengthways into two cerebral hemispheres.
- Each cerebral hemisphere can be divided into four lobes: frontal, parietal, temporal and occipital.
- Some functions can be seen as localised to specific areas of the brain.
- The storage of explicit memories is distributed across three main brain regions: the hippocampus, the neocortex and the amygdala.
- The formation of implicit memories involves the basal ganglia and cerebellum.
- Broca's area (speech production), Wernicke's area (speech comprehension) and Geschwind's territory (combine word properties) are brain regions involved in language processing.

Introducing brain function

Brain function can be understood as both localised and distributed. This means that while certain functions are associated with specific regions of the cerebral cortex, these functions may also involve networks that span multiple areas of the brain. Examples of localised brain function are evident in the cerebral cortices of the lobes; for example, the occipital lobe is primarily responsible for visual processing. However, many brain activities require the integration of multiple regions working together. For example, language processing involves the frontal lobe (Broca's area) for speech production and the temporal lobe (Wernicke's area) for comprehension, along with other areas for reading and writing. This dual nature of brain function highlights the complexity and interconnectivity of our neural processes.

The **cerebral cortex** is the outer layer of the cerebrum and crucial to our understanding of how we process sensory information and how we move and speak. It helps us to detect the difference between pieces of information, to understand the meaning of this information, and to think in abstract and symbolic ways, enabling creativity in art, writing, debating and the use of metaphor (Burton et al., 2015). The cerebral cortex is the name given to the outer area of the **cerebrum**. The cerebrum (located in the forebrain) is separated into the left and right cerebral hemispheres. Each hemisphere is almost symmetrical in appearance and they are joined by a set of neural fibres known as the **corpus callosum**.

Lobes of the cerebral cortex

The cerebral cortex of each hemisphere of the brain is made up of four distinct lobes: the **frontal lobe**, the **parietal lobe**, the **occipital lobe** and the **temporal lobe** (Figure 1). Both hemispheres have one of each of these lobes, making eight lobes in total. From the sensory receptors (for all senses except smell), signals are sent to the **thalamus**, deep beneath the cerebral cortex. The thalamus then relays this information to the primary cortex of the relevant lobe, which then processes and interprets it. We are constantly bombarded by stimuli – sights,

sounds, smells, feelings and tastes – and we cannot address each one. The thalamus also selects which incoming information most requires our attention at any given moment.

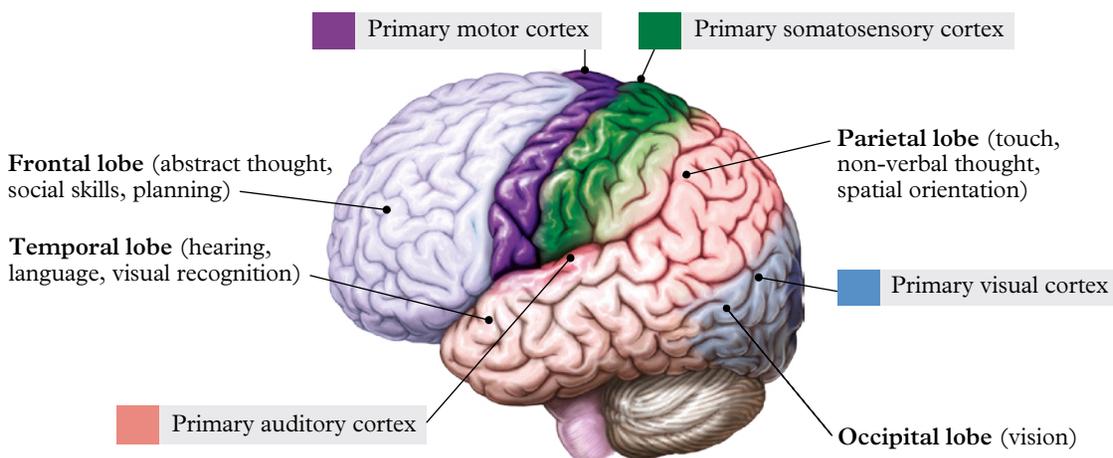


FIGURE 1 The lobes of the brain

Frontal lobes

The frontal lobes are the largest of the lobes and are responsible for speech, abstract thought, planning and social skills. The **primary motor cortex** is situated at the rear of each frontal lobe, adjacent to the central fissure; it is responsible for the movement of the body's skeletal muscles. The primary motor cortex functions contralaterally, meaning that the left primary motor cortex is responsible for the movement of the right-hand side of the body, and vice versa.

Parietal lobes

The parietal lobes enable a person to perceive three-dimensional shapes and designs. They help you to perceive your own body, the space around yourself, and the location of objects in your environment. The **primary somatosensory cortex** is situated at the front of each parietal lobe, adjacent to the central fissure. It is responsible for processing sensation such as touch, pressure, temperature and pain. Like the primary motor cortex, it functions contralaterally: the left primary somatosensory cortex is responsible for processing sensation in the right-hand side of the body, and vice versa. If the right primary somatosensory cortex is damaged, a person will be unable to process sensation from parts of the body on the left side, and the relevant body part will be numb. The reverse will happen if the left primary somatosensory cortex is damaged. The cortical area responsible for sensation on the toes is located at the top of the somatosensory cortex, and the area responsible for sensation in the mouth is located at the bottom.

Temporal lobes

The temporal lobes process auditory information (sensations received by the ears). The **primary auditory cortex** is in the upper part of the temporal lobes. The temporal lobes perform the complex auditory analysis necessary for understanding human speech or listening to music. Parts of the lobes specialise in sensitivity to particular types of sounds. People with a damaged right temporal lobe tend to be unable to recognise songs, faces or paintings. People with a damaged primary auditory cortex often experience forms of deafness – or complete deafness if the entire primary auditory cortex is removed.

parietal lobe
the location of the primary somatosensory cortex in the brain; enables a person to perceive their own body and where things are located in their immediate environment

occipital lobe
the cerebral cortex at the rear of the brain; the location of the primary visual cortex and association areas involved with integration of visual stimuli

temporal lobe
the part of the forebrain beneath the temporal plate of the skull, at the side of the head above the ears; contains Wernicke's area and the primary auditory cortex

thalamus
a structure in the brain located between the cerebral cortex and the midbrain, just above the brain stem; responsible for relaying motor and sensory signals to the cerebral cortex

primary motor cortex
located at the rear of each frontal lobe; responsible for movement of the skeletal muscles of the body

primary somatosensory cortex
located at the front of each parietal lobe; processes sensations such as touch, pressure, temperature and pain

primary auditory cortex
located in the upper part of the temporal lobe; receives sounds from the ears

Occipital lobes

The occipital lobes are responsible for vision. Information from the left side of each retina is processed in the left occipital lobe and information from the right side of each retina is processed in the right occipital lobe. Information from the centre of the visual field and the centre of each retina is processed in both occipital lobes. The **primary visual cortex** is located at the back of the occipital lobes. Different parts of the primary visual cortex process different types of visual stimuli. A person with a damaged primary visual cortex would be unable to process any visual stimuli that their eyes see; it would be as if they were blind. If part of an occipital lobe were damaged, there would be a gap in the person's visual field where some specific visual stimuli would not be processed.

primary visual cortex

located at the back of the occipital lobe; processes information from the eyes

neuron

nerve cell, responsible for communication within the body

Association areas of the cerebral cortex

The parts of the cerebral cortex dissociated from the lobes are comprised of the association areas. The **neurons** in the association areas are typically less specific in their function than those in the primary cortices (of each lobe). Neurons in the association areas located closest to a primary cortex for a specific sense specialise in analysing and interpreting that particular sensory information. Neurons in the association areas that are further from a primary cortex may be more involved in the integration of information from several senses and memories. These areas form a large-scale network of interconnected regions involved in higher-order cognitive functions. This is an example of how brain function can be distributed across areas.

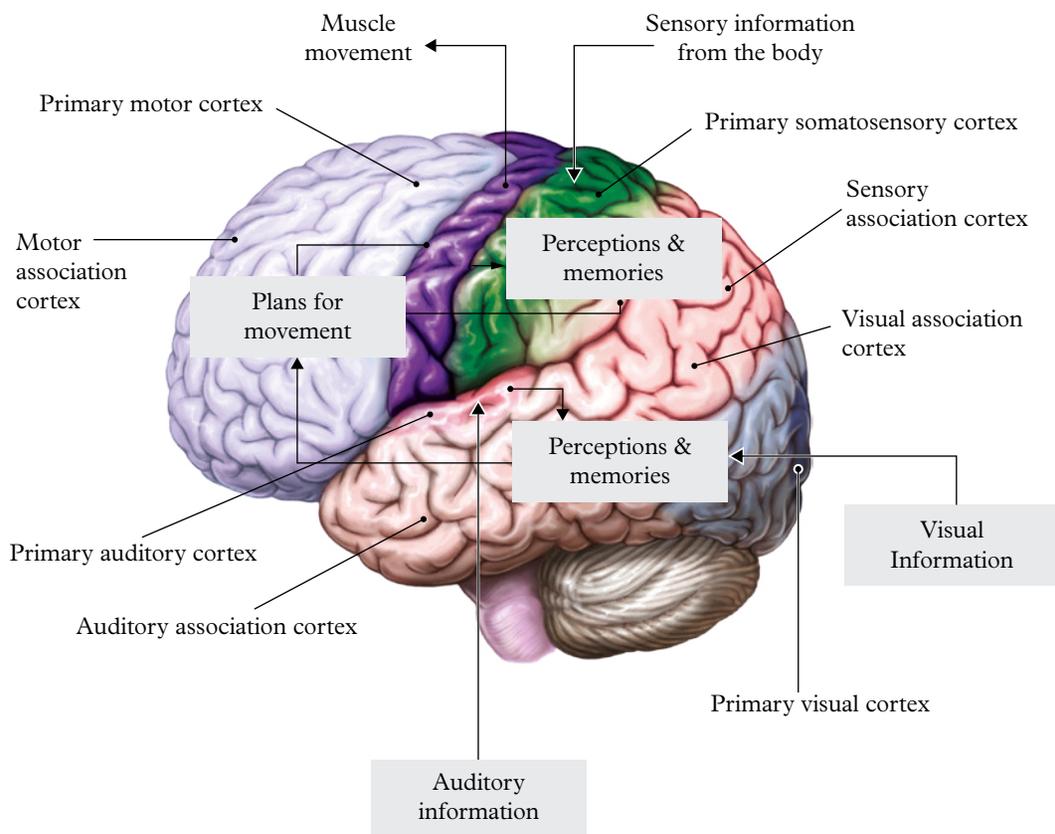


FIGURE 2 The association areas in the left hemisphere of the brain. The arrows indicate the communication channels.

Distribution of brain function

Memory is an example of a brain function that is distributed across several brain regions. Different types of memories are stored in different, interconnected brain regions. For explicit memories, which include personal experiences (episodic) and general knowledge (semantic), three key areas are involved: the hippocampus, the neocortex and the amygdala. Implicit memories, such as those related to motor skills, involve the brain regions of the basal ganglia and cerebellum. Module 7 discusses memory in more detail.

Explicit memory

Explicit memory, also known as declarative memory, involves the conscious recall of general knowledge, facts and events (semantic memory) and personal experiences (episodic memory). Three key brain regions are primarily involved in this brain function: the hippocampus, the neocortex and the amygdala. The hippocampus, located in the temporal lobe, is crucial for forming and indexing episodic memories. The **neocortex**, the largest part of the cerebral cortex, is involved in the long-term storage of these memories, transforming them into general knowledge over time. The amygdala, a structure located in the temporal lobe, improves the retention of memories by attaching emotional significance to the memory. Memories associated with strong emotions like fear and joy are the most difficult memories to forget. Together, these regions work to encode, store and retrieve explicit memories, allowing us to recall past experiences and learnt information.

neocortex

the largest part of the cerebral cortex, located on the outermost regions of the cerebrum; responsible for higher-order brain functions such as memory, sensory perception and spatial reasoning

Implicit memory

Implicit memory, also known as non-declarative memory, involves unconscious recall of motor memories, crucial for skills such as playing the piano or tennis. The main brain regions involved in implicit memory are the basal ganglia and the cerebellum. The basal ganglia, located deep within the brain, plays an important role in motor control and habit formation, which are essential for implicit procedural memories, such as learning to ride a bike or play a musical instrument. The cerebellum, situated at the back of the brain, is vital for fine motor skills and coordination, contributing to tasks like typing and using chopsticks. These regions work together to enable the smooth execution of learnt skills and conditioned responses without conscious thought. Your study of the involvement of brain structures in memory (Unit 3 Topic 3) continues in more depth in Module 7.

Processing language

Human communication engages nearly the entire brain. Language processing in the brain involves several key areas, most notably Broca's area, Wernicke's area and Geschwind's territory. It is important to recognise that modern research suggests that language functions are distributed across the brain beyond just these three areas.

Broca's area

Broca's area is found in the association area of the left frontal lobe. It is primarily responsible for speech production, coordinating the

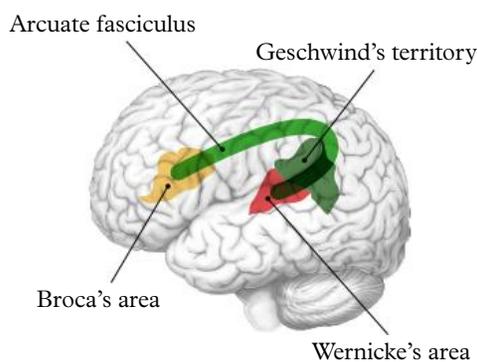


FIGURE 3 Geschwind's territory is located between Broca's area and Wernicke's area.

Study tip

For more information on the location of Broca's area, Wernicke's area and Geschwind's territory, review Unit 1 Topic 1.

Broca's area

part of the left frontal lobe; the speech production centre of the brain

localisation of function of the brain

specific parts of the brain are responsible for different functions

Wernicke's area

part of the left temporal lobe, responsible for language reception and interpretation and for creation of grammatically correct speech

Geschwind's territory

area of the brain that provides a connection between Broca's area and Wernicke's area; helps to process the multiple properties of words, and classify and label things, which is a prerequisite for developing concepts and thinking abstractly

Study tip

Remember: Broca's area affects speech production, Wernicke's area affects speech comprehension and Geschwind's territory links the two!

movement of the lips, tongue and vocal cords to articulate words. It is also important in the use and understanding of grammar. Damage to Broca's area can result in Broca's aphasia: difficulty speaking, putting grammatically correct sentences together and articulating words. However, people with Broca's aphasia can comprehend language. This indicates that Broca's area is the motor region for language production. Surgeon Pierre Paul Broca conducted scientific studies of patients with damage (or lesions) to Broca's area, providing the first clinical evidence for **localisation of function of the brain**, whereby specific behaviours were linked to specific areas in the brain (Burton et al., 2018; Carlson, 2008).

Wernicke's area

Wernicke's area is located in the left temporal lobe, not too far from Broca's area. In contrast to Broca's area, which is involved with the production of speech, Wernicke's area is associated with the comprehension of speech. It is responsible for storing receptor codes that interpret the meaning of language and for creating grammatically correct speech. Basically, the main function of Wernicke's area is to make sure the language makes sense. German physician Carl Wernicke discovered this area by studying patients who were able to speak, but unable to comprehend language due to lesions in the posterior region of the temporal lobes of their brains. Therefore, Wernicke's area is thought to be the sensory region for language comprehension. People with damage to Wernicke's area may suffer from Wernicke's aphasia. They struggle to comprehend language, and they produce sentences that are fluent but meaningless – often referred to as “word salad”. Scientific studies of Wernicke's area extended the clinical evidence provided by Broca for localisation of function in the brain (Burton et al., 2018; Carlson, 2008).

Geschwind's territory

Geschwind's territory exists in the inferior parietal lobe. It is a multimodal integration region directly linked to Wernicke's and Broca's areas via the arcuate fasciculus (a bundle of nerve fibres). This region develops with age and allows people to understand the meaning of particular words. The connection between the motor (Broca's area) and sensory (Wernicke's area) regions of the brain involved in language helps to explain how we input words we hear or read, and link them to those areas of the brain responsible for producing speech (Catani & Mesulam, 2008; *Science Daily*, 2004; Oestreich et al., 2018; *The Brain from Top to Bottom*, 2018a).

Geschwind's territory is located in an area in the brain where the neurons are multimodal – capable of simultaneously responding to and processing a range of stimuli, including auditory and visual stimuli (*Science Daily*, 2004; *The Brain from Top to Bottom*, 2018a). It is the ideal area for processing the properties of words: how they sound, how they look and what they represent. Geschwind's territory provides a platform for abstract thinking by enabling the brain to interpret and classify stimuli. Evidence for the existence and functional role of Geschwind's territory was gathered by studying people with aphasia and the neural structure of animals (rhesus monkeys), and comparing them with human neural structures involved with language.

Challenge

Multilingual speakers

What is the secret of people who can speak multiple languages? Are their brains different, or is it their ability to persist in learning languages? **Investigate** current research to see if you can present a scientific argument that answers this question.

Check your learning 2.3



Check your learning 2.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** the function of each of the following
 - a frontal lobe (1 mark)
 - b parietal lobe (1 mark)
 - c temporal lobe (1 mark)
 - d occipital lobe. (1 mark)
- 2 **Identify** which lobe would be involved in processing the following sensory information
 - a listening to music on the radio (1 mark)
 - b navigating a crowded room (1 mark)
 - c looking at beautiful scenery. (1 mark)
- 3 **Identify** the brain regions associated with the storage of explicit memories. (3 marks)
- 4 **Describe** the role of the cerebellum in the formation of implicit memories. (1 mark)

- 5 **Explain** what each of Broca's area, Wernicke's area and Geschwind's territory is responsible for. (3 marks)

Analytical processes

- 6 **Select** one of the lobes of the brain. **Consider** its importance in responding to, and integrating and coordinating with, sensory stimuli received by the body. Write a brief paragraph about this process. (3 marks)
- 7 **Determine** the brain regions involved in playing a musical instrument correctly. (2 marks)

Knowledge utilisation

- 8 **Discuss** how brain function can be distributed across brain areas, with reference to memory storage. (5 marks)

Lesson 2.4

Voluntary movement

Key ideas

- The coordination of voluntary movement involves the primary motor cortex, cerebellum and basal ganglia.
- The basal ganglia helps regulate voluntary movements by processing information from different brain regions.
- The cerebellum coordinates information about movements from other areas in the brain to fine-tune motor activity.
- The primary motor cortex is crucial in initiating voluntary movements.



Learning intentions and success criteria

Introducing voluntary movement

We use **voluntary movement** to control parts of our body (e.g. our arms and legs), to move our head to visually explore the world, to control our facial expressions to reflect our emotions, and to communicate with each other by moving our lips, mouth and tongue. Voluntary movement can be defined as the intended execution of an action that is the result of cognitive processes (Schwarz, 2016). The coordination of voluntary movement involves many areas of the brain, with the primary motor cortex, the basal ganglia and the cerebellum

voluntary movement
the intentional execution of an action involving cognitive processes

playing key roles (Figure 1). In this lesson, we will explore how these parts of the brain plan, coordinate and communicate using feedback loops to cause specific muscle contractions that allow us to interact with our environment.

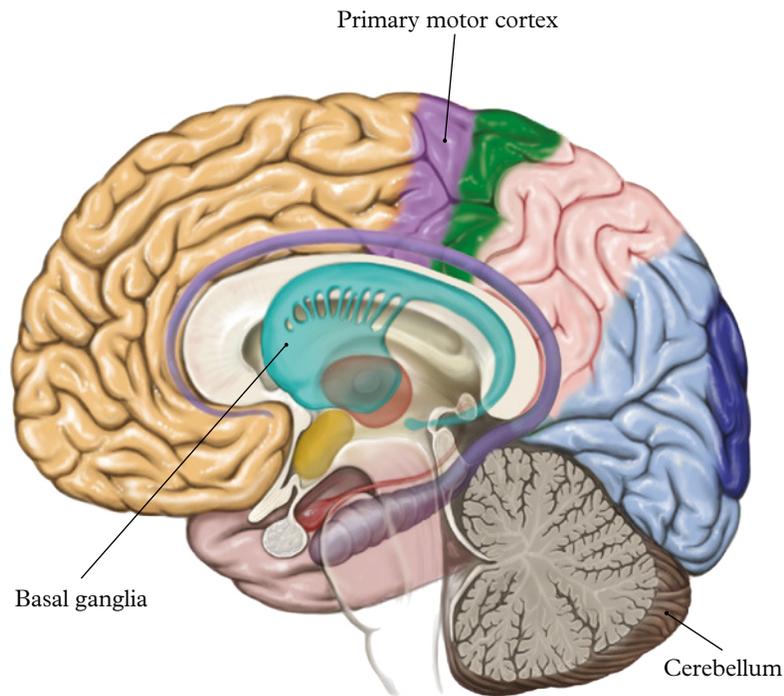


FIGURE 1 Voluntary movement is controlled by the basal ganglia, the cerebellum and the primary motor cortex.

Steps in voluntary movement



FIGURE 2 Picking up a glass of water is an example of voluntary movement.

The brain processes different kinds of information at a rapid pace to initiate voluntary movement. These voluntary movements are performed in a series of steps. The first step is to select a response that will achieve the desired goal of the movement. This is done by rapidly analysing all the possible responses and choosing the one that best corresponds with what we want to achieve. For example, if we want to pick up a glass of water, our brain would “sift” through all the movements related to picking up an object and choose the one that best matches grasping and lifting a glass. The second

step is the planning stage: working out how the movement will physically happen. It includes planning and selecting the sequence of muscle contractions needed to carry out the movement. The third step is to actually carry out the movement by activating the motor neurons that will trigger the movement (Burton et al., 2018).

The basal ganglia

Before we can engage in voluntary movements, our motor cortex (located in the frontal lobes) must gather information from other areas of the brain. This includes information such as our body’s current position, what goal the movement will achieve, a strategy for attaining this goal, and memories of strategies we have previously used to achieve this goal successfully. This information-gathering process is controlled by the **basal ganglia**, a group of structures in the brain that includes the caudate nucleus, the putamen and the globus pallidus, and the subthalamic nucleus. The basal ganglia enables voluntary movement by operating a complex

basal ganglia
a set of structures involved in the control of movement, gathering and channelling information from different areas of the brain

feedback loop. It channels information from various regions of the brain to the motor cortex to initiate and regulate motor commands. It also acts to block movements that may not suit the goal of the movement. It receives input from the frontal, parietal and temporal lobes.

The cerebellum

The **cerebellum** is located in the hindbrain at the back of our brain, playing an essential role in motor movement regulation and balance control. It stores sequences of movements that have been previously learnt (where it is involved in the formation of implicit memories and motor learning). It also coordinates and integrates information about movements from other areas in the brain to help us move in ways that are smooth and well sequenced, and seem effortless. The cerebellum communicates with the primary motor cortex by sending signals through a dense nerve bundle that consists of a large number of axons, supporting the coordination and fine-tuning of voluntary movements.

cerebellum
the area of the brain responsible for coordinating and remembering smooth, well-sequenced movements

Primary motor cortex

The primary motor cortex is located at the rear of each frontal lobe next to the central fissure. It is responsible for movement of the body's skeletal muscles, and activates the neural impulses that initiate and execute voluntary movement. The left primary motor cortex is responsible for the movement of the right side of the body. The right primary motor cortex is responsible for the movement of the left side of the body. This is called contralateral organisation. If damage occurs to the right primary motor cortex, a person will be unable to move parts of their body on the left side such as their left hand and leg; the reverse will happen if the left primary motor cortex is damaged.

The extent of the primary motor cortex devoted to voluntary movement of different parts of the body is proportional to the number of neurons required to move different anatomical parts. For example, the mouth and hands require more motor neurons to move the many small muscles for fine motor activity; other parts of the body require fewer neurons and therefore have less space on the primary motor cortex.

Real-world psychology

Neuroplasticity helps with recovery from brain injury

Psychologists once believed that our brains were structured and that they functioned in a fixed way. They thought that the only changes to our brains occurred through normal development from childhood to adulthood, and that they would then deteriorate in old age. In Unit 1, you learnt how researchers have discovered that the brain and neural networks are not fixed, but they change dynamically throughout life depending on the experiences that we have (Burton et al., 2018; Demarin et al., 2014; Su et al., 2016). The rewiring occurs in response to environmental experiences including disease, injury and learning experiences (Kolb & Gibb, 2008). This is known as neuroplasticity and is the brain's ability to form

new neural connections and neural pathways, and to fundamentally change how it is wired.

An example of this is the case of a 25-year-old piano player who sustained major damage to the left side of her brain after a stroke (Azari & Seitz, 2000; Pekna et al., 2012). She was subsequently unable to use her right hand or speak properly. This makes sense when we remember our brains are organised contralaterally (the left side controls the right side of our body, and vice versa), and the language structures (e.g. Wernicke's area and Broca's area) are located on the left-hand side of the brain. Her therapy involved repeated training of the right-hand side of her brain. Eventually she recovered her ability to speak, and the ability to use her right hand again. ►

◀ Remarkably, she was able to play the piano as well as she had before her stroke. Neuroplasticity can therefore help explain why some patients are able to recover from serious brain injuries, such as strokes.

Although we still have much to learn about neuroplasticity, the case study documented here highlights the amazing ability of our brain to change, reorganise itself and learn new ways to behave. Neuroscientists continue to investigate this process in the hope that new treatments and therapies can be developed to enrich the lives of people with brain injuries.

Apply your understanding

- 1 **Describe** how our understanding of brain structures and functions has changed over time. (1 mark)
- 2 **Describe** neuroplasticity. (1 mark)
- 3 **Identify** two types of experiences that can lead to the rewiring of neural networks. (2 marks)
- 4 **Describe** how the piano player's recovery from stroke demonstrates neuroplasticity. (1 mark)



FIGURE 3 Neuroplasticity can help explain why some patients recover from brain injury

Skill drill

Constructing a research question

Science inquiry skill: Understanding the scientific method (Lesson 1.3); Evaluating evidence (Lesson 1.8)

The concept of neuroplasticity is relatively new to modern science, but a wealth of research supports the idea that neuroplasticity can help patients with brain injuries. The brain is able to do this by rerouting its neurons to essentially cover the damaged area so that normal functioning can be again achieved by the patient.

As we learnt in the real-world feature in this lesson, after a 25-year-old piano player sustained major damage to the left side of her brain after a stroke, training the right-hand side of her brain helped her recover the ability to speak and to use her right hand.

The following claim was made: “The environment has a profound effect on neuroplasticity.”

The research investigation requires you to create a research question based on a provided claim. An example of a possible research question may look like this: “Does an enriched environment of weekly rehabilitation with physiotherapy (for 6 months) compared to no physiotherapy affect neuroplasticity in adults suffering from a brain injury due to stroke, as measured by walking gain?”

Practise your skills

- 1 **Identify** the key words in this claim. (3 marks)
- 2 **Construct** a research question for this claim starting with either “To what extent ...”, “Can ...” or “Does...”. (It may help to define the key terms first.) (3 marks)
- 3 **Identify** the dependent variable in the research question example. (1 mark)
- 4 **Identify** the independent variable in the research question example. (1 mark)
- 5 **Identify** a peer-reviewed journal that may contain relevant research that could be used in response to your research question. (1 mark)

Study tip

Read the abstract of a journal article before you read the whole article. Abstracts can tell you whether the article will be useful for your research question. Make sure you are using credible sources that are scientific and peer-reviewed.

Check your learning 2.4



Check your learning 2.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Identify** the three regions of the brain involved in voluntary movement. (3 marks)
- 2 Summarise** how each of the three regions is involved in voluntary movement. (3 marks)

Analytical processes

- 3 Differentiate** between the role of the cerebellum and the role of the basal ganglia in voluntary movement. (1 mark)

Knowledge utilisation

- 4 Propose** how voluntary movement may be affected in someone who has damage to the primary motor cortex. (1 mark)
- 5 Propose** how voluntary movement may be affected in someone who has suffered an injury to the basal ganglia. (2 marks)

Lesson 2.5

Emotion and the brain

Key ideas

- The limbic system and prefrontal cortex are brain regions involved in experiencing and regulating emotion.
- Structures in the limbic system include the amygdala, hippocampus, hypothalamus and thalamus.
- The amygdala is involved in regulating and processing emotion, such as aggression and fear.
- The hippocampus works together with the amygdala to connect memories with emotions, which generate an emotional response.
- The hypothalamus plays a role in activating various emotional responses.
- The thalamus receives sensory information and relays this to the sensory cortex and the amygdala.
- The prefrontal cortex contributes to the regulation of emotion.



Learning intentions
and success criteria

Introducing emotion and the brain

In Unit 2, you learnt about the role of the brain in the interpretation, production and regulation of emotion. The limbic system is located on both sides of the thalamus. It includes the hippocampus, hypothalamus and amygdala; the prefrontal cortex is also implicated in emotion. This lesson further explores how the experience of emotion is linked to the limbic system and prefrontal cortex.

The limbic system

limbic system

a group of structures in the brain consisting of the amygdala, hypothalamus and midbrain; involved in memory, emotion, behaviour and motivation

amygdala

an almond-shaped structure, located in the medial temporal lobe of the brain, that is central to emotion, aggression and implicit learning; it is vital in initiating and processing emotional responses and in forming emotional memories

hippocampus

a finger-sized curve structure that lies in the medial temporal lobes; responsible for consolidation of explicit memories and transfers these to other parts of the brain for storage as long-term memory; provides context for emotional meaning by recalling previous experiences

hypothalamus

a structure in the forebrain that plays a major role in homeostasis, and controlling emotion and motivated behaviours such as eating, drinking and sexual activity

HPA axis

a major neuroendocrine system that includes the hypothalamus, pituitary gland and adrenal gland; these structures interact through a feedback system to regulate a number of functions such as a person's digestion, immune system, mood, emotions and responses to stress

The **limbic system** is one of the oldest structures in the brain, first appearing in small mammals over 150 million years ago.. It consists of a collection of structures, including the amygdala, hypothalamus, thalamus and midbrain areas (Figure 1). The limbic system is implicated in memory, emotion, behaviour and motivation. As you learnt in Unit 2, LeDoux proposed that there was a short or long route to processing and acting on emotion. This is shown in Figure 2.

Amygdala

The **amygdala** is involved in the activation of certain emotions, particularly fear. It is also strongly involved in conditioning: a type of learning covered in Module 9 and implicated in social processing and recognising emotions. The amygdala is located in the temporal lobes of the brain; its role is specialised in each hemisphere. The right side is involved in how we perceive emotion, particularly negative emotion. Specifically, the amygdala is responsive to the fear stimulus and fear conditioning. The amygdala appears to modulate our reactions to events that impact our survival. As well as processing emotion, the amygdala is involved in memory recollection and storage.

Hippocampus

The **hippocampus** is involved in the regulation and expression of emotion. It is sent emotional information directly from the amygdala. For example, when we are presented with emotionally charged stimuli, our hippocampus aids us in recalling any information relevant to the situation, providing context for us to make meaning of the emotion. This is where the role of the hippocampus in memory is also relevant in the experience of emotion. When we process emotional stimuli via Le Doux's "long route", sensory information is also processed in the hippocampus, then sent to the amygdala.

Hypothalamus

The **hypothalamus** is implicated in basic survival actions such as running, fighting and reproduction. The hypothalamus is part of the **HPA axis** (the hypothalamic-adrenal-pituitary gland response, which controls our reactions to stressful situations), and is involved

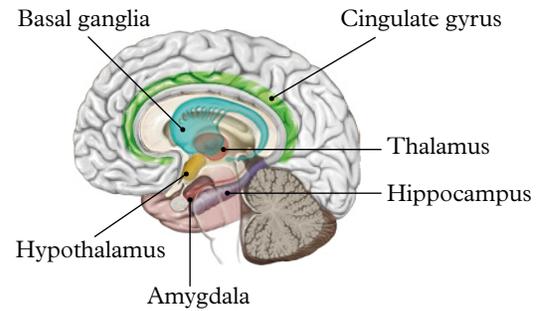


FIGURE 1 The limbic system

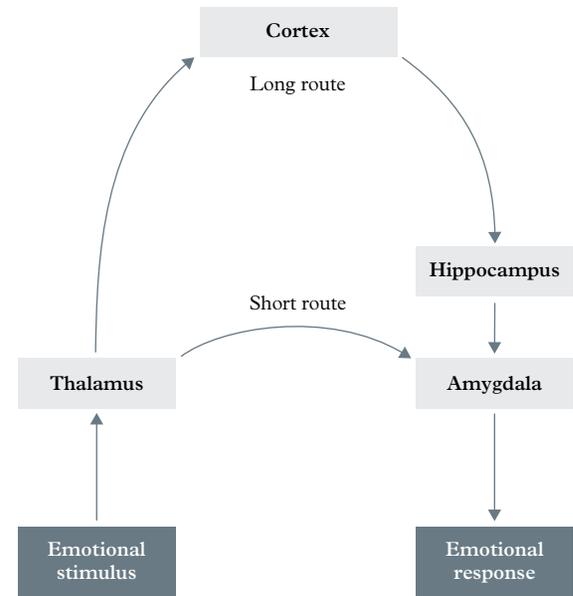


FIGURE 2 LeDoux's model of emotion with the long and short pathways

in physiological responses to fear-inducing emotional stimuli. It is why our bodies can “feel” the emotions of our brain. For example, when you watch a horror movie, the amygdala will send a signal to the hypothalamus that something scary has occurred in the movie. This results in the hypothalamus triggering the fear response (fight-flight-freeze response) or an adrenalin rush by activating the sympathetic nervous system.

Thalamus

The thalamus plays a crucial role in experiencing emotion by acting as a relay station in the brain for sensory information and connecting with other brain regions involved in emotional processing. When sensory information enters the brain, the thalamus processes and transmits it to the cerebral cortex and other structures in the limbic system (amygdala and hippocampus) for interpretation and generation of appropriate emotional responses.

Challenge

The brain and depression

Depression is a mood disorder involving decreases in pleasurable experiences from rewards and an overemphasis on negative emotions. Chronic stress has been linked to the development of depression as it can cause changes in how the brain balances positive and negative information. **Consider** the role of the limbic system in the stress response, specifically the HPA axis.

The prefrontal cortex

The **prefrontal cortex (PFC)** is the part of the cerebral cortex (neocortex) that sits at the very front of the brain. Specifically, the ventral (underside) of the PFC is associated with and connects brain regions that are involved in emotional processing and production. The PFC is involved in regulating and modifying emotions by integrating them with cognitive processes. It interacts with the limbic system to assess emotional responses and applies rational thought to emotional experiences. The PFC is also involved in executive functioning and deciding between good and bad actions.

prefrontal cortex (PFC)

part of the cerebral cortex that connects brain regions that are involved in the processing and production of emotion; plays a crucial role in executive control and higher cognitive functions such as decision-making

Check your learning 2.5



Check your learning 2.5: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** the role of the amygdala in emotion. (1 mark)
- 2 Identify** four components of the limbic system. (4 marks)
- 3 Explain** the role of the prefrontal cortex in experiencing emotion. (2 marks)

Analytical processes

- 4 Compare** the role of the hippocampus and the role of the hypothalamus in influencing emotion. (2 marks)
- 5 Determine** which area of the limbic system is likely to be damaged if a person is unable to experience fear. (1 mark)

Lesson 2.6

Review: The nervous system and the brain

Summary

- 2.1 • The human nervous system has two main divisions: the central nervous system and peripheral nervous system.
- The central nervous system comprises the brain and spinal cord.
- The peripheral nervous system comprises the somatic and autonomic nervous systems.
- The autonomic nervous system comprises the sympathetic and parasympathetic nervous systems.
- 2.2 • A reflex (or reflex action) is an involuntary, almost instantaneous movement in response to a specific stimulus.
- A reflex arc is a neural pathway that controls a reflex action.
- A monosynaptic spinal reflex arc consists of only two neurons: one sensory neuron and one motor neuron.
- A polysynaptic spinal reflex arc involves one or more interneurons connecting sensory and motor neurons.
- 2.3 • The cerebral cortex is the outermost layer of the cerebrum. The cerebrum is divided lengthways into two cerebral hemispheres.
- Each cerebral hemisphere can be divided into four lobes: frontal, parietal, temporal and occipital.
- Some functions can be seen as localised to specific areas of the brain.
- The storage of explicit memories is distributed across three main brain regions: the hippocampus, the neocortex and the amygdala.
- The formation of implicit memories involves the basal ganglia and cerebellum.
- Broca's area (speech production), Wernicke's area (speech comprehension) and Geschwind's territory (combine word properties) are brain regions involved in language processing.
- 2.4 • The coordination of voluntary movement involves the primary motor cortex, cerebellum and basal ganglia.
- The basal ganglia helps regulate voluntary movements by processing information from different brain regions
- The cerebellum coordinates information about movements from other areas in the brain to fine-tune motor activity.
- The primary motor cortex is crucial in initiating voluntary movements.
- 2.5 • The limbic system and prefrontal cortex are brain regions involved in experiencing and regulating emotion.
- Structures in the limbic system include the amygdala, hippocampus, hypothalamus and thalamus.
- The amygdala is involved in regulating and processing emotion, such as aggression and fear.
- The hippocampus works together with the amygdala to connect memories with emotions, which generate an emotional response.
- The hypothalamus plays a role in activating various emotional responses.
- The thalamus receives sensory information and relays this to the sensory cortex and the amygdala.
- The prefrontal cortex contributes to the regulation of emotion.

Review questions 2.6A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 The central nervous system is made up of
 - A the brain and the spinal cord.
 - B the cerebral cortex and the spinal cord.
 - C the spinal cord and somatic nervous systems.
 - D the autonomic and the somatic nervous systems.
 - 2 The peripheral nervous system is made up of
 - A the brain and the spinal cord.
 - B the central and somatic nervous systems.
 - C the somatic and autonomic nervous systems.
 - D the sympathetic and parasympathetic nervous systems.
 - 3 Moving your leg is an action that is made by which system?
 - A The somatic nervous system
 - B The autonomic nervous system
 - C The sympathetic nervous system
 - D The parasympathetic nervous system
 - 4 What do motor neurons enable us to do?
 - A Play the piano.
 - B Smell the scent of a flower.
 - C See a ball when it is thrown.
 - D Feel the silky coat of a puppy.
 - 5 Sensory neurons in your toes are part of which nervous system?
 - A Central
 - B Sensory
 - C Peripheral
 - D Autonomic
 - 6 Which of the following is a true statement about the parasympathetic nervous system?
 - A It operates at a level of conscious awareness.
 - B It is part of the somatic nervous system that operates on the body.
 - C In normal daily life it works all the time to ensure that the body's metabolic systems are in balance.
 - D In normal daily life it has nothing to do; it is used to return the body functions to their normal levels after sympathetic arousal.
- Use the following information to answer questions 7 and 8.*
- Henry was on a hike when he saw a tiger snake. He quickly picked up a stick and tried to hit it. His friend Tom, who also saw the snake, quickly ran away to a safer place on the track.
- 7 Which division of the nervous system was most likely in control of their reactions to the snake?

| | |
|-----------|-------------|
| A Limbic | B Central |
| C Somatic | D Autonomic |
 - 8 What were Henry and Tom demonstrating?
 - A Reflex response
 - B Reticular activating system
 - C Fight-flight-freeze response
 - D Sympathetic arousal response
 - 9 The left cerebral hemisphere generally controls the right side of the body, and vice versa. What is this known as?
 - A Bilateral organisation
 - B Unilateral organisation
 - C Ipsilateral organisation
 - D Contralateral organisation
 - 10 Damage to which region of the brain can result in deficits in the ability to plan and problem solve?
 - A Thalamus
 - B Temporal lobe
 - C Occipital lobe
 - D Association area
 - 11 Wernicke's area plays a critical role in
 - A comprehending language and forming meaningful sentences.
 - B controlling muscles responsible for the production of articulate speech.
 - C coordinating muscle movements and maintaining posture and balance.
 - D regulating emotional balance, resulting in disconnected brain activities.
 - 12 Which brain region is responsible for coordinating the hand movements that musicians use when playing a musical instrument?
 - A Thalamus
 - B Cerebellum
 - C Prefrontal cortex
 - D Primary motor cortex

- 13 Which part of the brain is linked to memory for motor skills?
- Amygdala
 - Cerebellum
 - Basal ganglia
 - Hippocampus
- 14 The hippocampus plays an important role in
- facial recognition.
 - the storage of explicit memories.
 - implicit memory of learnt skills and actions.
 - mathematical, spatial and logical reasoning.
- 15 Which region of the brain is most likely damaged if a person has difficulty coordinating muscle movements?
- Cerebrum
 - Cerebellum
 - Basal ganglia
 - Hypothalamus

Review questions 2.6B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 16 **Identify** two parts of the brain that are responsible for voluntary movements. (2 marks)
- 17 **Identify** which component of the peripheral nervous system involves voluntary activity and which component involves involuntary activity. (2 marks)
- 18 A patient has a head injury that resulted in an inability to move his left hand. **Identify** which part of his brain has most likely been damaged. (1 mark)
- 19 The lobes of the cerebral cortex play a role in processing and responding to sensory information. **Describe** the role of the following primary cortices in processing information from our external environment
- primary somatosensory cortex (1 mark)
 - primary auditory cortex (1 mark)
 - primary visual cortex. (1 mark)
- 20 **Describe** the interaction of the brain regions involved in coordinating voluntary movement. (3 marks)
- 21 **Describe** the role of the amygdala in emotional expression. (1 mark)
- 22 **Summarise** the functions of the given parts of the brain by copying and completing the table. (5 marks)
- | Brain part | Function |
|-------------------|----------|
| Neocortex | |
| Thalamus | |
| Primary cortices | |
| Association areas | |
| Frontal lobe | |
- 23 **Explain** the term “spinal reflex”. Use a diagram to illustrate a polysynaptic spinal reflex arc. (2 marks)
- 24 **Identify** the location and the main role of the amygdala in experiencing emotion. (2 marks)
- 25 **Explain** the role of the basal ganglia in voluntary movement. (2 marks)
- 26 **Explain** the structure and function of the primary motor cortex, including what is known as contralateral organisation. (3 marks)
- 27 **Summarise** the role of Geschwind’s territory in producing and interpreting language. (2 marks)
- 28 Noah tries to pick up a hot saucepan, but burns his hand and quickly retracts it. **Describe** what occurred when Noah removed his hand rapidly. (1 mark)
- 29 **Explain** how the limbic system and the prefrontal cortex are involved in emotional regulation. (2 marks)

Analytical processes

- 30 Distinguish** between a monosynaptic and polysynaptic spinal reflex arc. (1 mark)
- 31 Contrast** the central nervous system and the peripheral nervous system. (4 marks)
- 32 Differentiate** between the function of Broca's area and Wernicke's area in language. (1 mark)

Knowledge utilisation

- 33 Assess** why we may not always be aware of bodily functions such as breathing. Be sure to describe the part of the nervous system involved in this day-to-day bodily function. (3 marks)
- 34 Discuss** how the sympathetic and parasympathetic nervous systems are involved in the fight-flight-freeze response, using an everyday example of when the two systems may be activated. (5 marks)

Data drill

Role of the amygdala in violent behaviour

Jimmy conducted a study on rats to further understand the role of the amygdala in violent behaviours. He observed 20 rats for 3 months and noted the number of aggressive behaviours, such as biting and scratching, exhibited by the rats on a daily basis. Once he had collected all the data, he separated the rats into two groups. The first group consisted of 10 rats, each of which performed less than 30 displays of aggressive behaviours throughout the 3-month period; the second group consisted of 10 rats that had displayed more than 30 acts of aggression throughout the 3-month period. All the rats were humanely euthanised, strictly adhering to ethical committee guidelines. He then measured the mass of their amygdala in grams. The results are shown in Table 1.

Jimmy performed a paired two-sample t -test on the data. The p -value was found to be 0.045.

TABLE 1 Mass of the amygdala in rats displaying low aggression (control) and high aggression

| Group 1 (g) | Group 2 (g) |
|-------------|-------------|
| 3.5 | 2.4 |
| 4.8 | 3.0 |
| 3.8 | 2.2 |
| 4.2 | 3.1 |
| 5.0 | 3.5 |
| 5.1 | 3.3 |
| 4.3 | 2.8 |
| 4.7 | 3.1 |
| 5.2 | 2.1 |
| 4.9 | 3.4 |
| Mean = 4.55 | Mean = |
| SD = 0.58 | SD = 0.50 |

Apply understanding

- 1 Calculate** the mean of the data for Group 2. (2 marks)

Analyse data

- 2 Identify** the group that has the greatest uncertainty. (1 mark)

Interpret evidence

- 3 Determine** whether the results were statistically significant based on the inferential statistic. (1 mark)
- 4 Draw a conclusion** from Jimmy's study based on the results. (1 mark)



Module 2 checklist: The nervous system and the brain

Neurotransmission and neurotransmitters

Introduction

The neurons and neurotransmitters in our bodies are crucial parts of our internal and external experience. The messages we send from our brain to our body, and from our body to our brain, are dictated by the structure and proper functioning of these minuscule components. The way we crave a bar of chocolate while watching our favourite movie, how we feel hanging out with friends over the weekend, the surge of adrenalin we get when competing in an athletic event or even the pain we feel when we trip over the finish line and sprain our ankle – these are all governed by the coordinated firing of millions of minuscule neurons in our nervous system.

The way we think, feel and behave – our emotions, our responses to the world we live in, and our physical and psychological experiences – can all be broken down into a highly coordinated chemical message system controlled by our brain, neurotransmitters and neurons. In this module, we will investigate how these messages are relayed via neurotransmission, contrast the role of inhibitory and excitatory neurotransmitters, describe the physical and psychological functions of different types of neurotransmitters in our nervous system, and explore the impact that interference in neurotransmitter functioning can have on our minds and bodies.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to neurotransmission and neurotransmitters before you start.

Subject matter

Science understanding

- Describe neurotransmission, with reference to action potentials and synaptic transmission.
- Contrast excitatory and inhibitory neurotransmitters, e.g. glutamate (Glu) and gamma-amino butyric acid (GABA).
- Describe the physical and psychological function of acetylcholine, epinephrine, norepinephrine, dopamine and serotonin.

- Explain the impact of interference in neurotransmitter function, with reference to Parkinson's disease and Alzheimer's disease, considering causes, symptoms and treatments.

Science as a human endeavour

- Recognise that changes to neurotransmitter function may have beneficial and/or harmful and/or unintended consequences.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and operationalise variables to be manipulated, measured and controlled
- distinguish between types of investigations, e.g.
 - experiments (independent and dependent variables)
 - independent groups
 - matched participants
 - repeated measures
 - correlational research (related variables)
 - quasi-experiments
 - observational research
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through descriptive statistics
 - measures of central tendency: mean and median
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- suggest improvements and extensions to minimise uncertainty, address limitations and improve the overall quality of evidence.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 3.1

Neurotransmission



Learning intentions
and success criteria

Key ideas

- Neuron structure consists of dendrites, cell body, axon, myelin sheath and axon terminals.
- Neurons communicate with each other via a process called synaptic transmission. Neural pathways allow different parts of the nervous system to communicate with each other.
- Neurotransmitters are chemicals that help communicate across synapses between neurons. They can either excite (e.g. glutamate) or inhibit (e.g. gamma-amino butyric acid) a neuron from firing its own action potential.
- An action potential transmits an electrical signal along a neuron's axon to communicate with other neurons, muscles or glands.

Introducing neurotransmission

To understand how information is processed in the brain, it is important to know that it is a physiological process. Specialised cells, called **neurons**, receive information from other neurons, process this information, and then communicate it to other neurons. These cells share similarities with other cells in the body: they are surrounded by a cell membrane, have a nucleus that contains DNA, and are made up of cytoplasm, mitochondria and other organelles. However, they differ in structure and how they communicate with each other.

Neuron structure

Remember from Unit 1 that there are different types of neurons of different shapes and sizes. They are generally comprised of **dendrites**, the **cell body (soma)**, which includes the nucleus, the **axon** and the **axon terminals**. Most axons are coated with **myelin** (a **myelin sheath**). Figure 1 shows the structure of a neuron, and Table 1 describes the different features of a neuron.

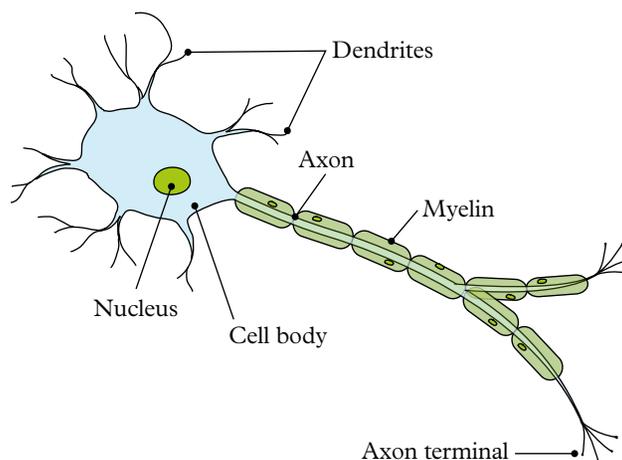


FIGURE 1 Structure of a neuron

neuron

a nerve cell, responsible for communication within the body

dendrite

a branch-like segment of a neuron that receives signals from other neurons or sensory receptors via the synapses and delivers these to the cell body

cell body (soma)

the largest part of a neuron, containing the nucleus; it controls the metabolism and maintenance of the neuron

axon

the part of the neuron along which the electrochemical nerve impulse is transmitted

axon terminal

located at the end of the axon; it transmits messages to the next neuron by releasing neurotransmitters from terminal buttons

TABLE 1 Features of a neuron

| Structure | Description |
|------------------|---|
| Dendrites | A neuron can have dozens to hundreds of dendrites that look like branches coming off the soma (the word <i>dendron</i> is Greek for “tree”). The dendrites receive information (neurotransmitters) from other neurons, which they carry from the synapse to the soma. |
| Cell body (soma) | The largest part of the neuron is the soma or cell body. It controls the metabolism and maintenance of the neuron. In most neurons, the cell body receives messages from other neurons. |
| Axon | The axon is a nerve fibre that extends from the cell body and carries information (as an electrical impulse) towards the axon terminals, which communicate with other neurons. Some axons have two or more offshoots, and some can be up to a metre long. |
| Myelin sheath | The axons of most neurons are covered in a myelin sheath, which is an insulating fatty coating that facilitates the transmission of information to other neurons. Axons with myelin are white rather than grey. Myelin protects the axon from potential chemical and physical interference to the electrical impulses that travel along it. The insulation provided by the myelin sheath also enables information to travel much faster – up to 400 km/h. |
| Axon terminals | Axon terminals are found at the end of the axon branch and transmit messages to the next neuron. Axon terminals have terminal buttons. These terminal buttons have sacs that release a chemical called a neurotransmitter whenever electrical impulses are sent down the axon (Figure 2). Although they never actually touch, the axon terminals of one neuron link with the dendrites of the next neuron. |

The role of neurotransmitters in transmitting information

Neurotransmitters are chemicals that transmit information from one neuron to the next. Neurons are not actually in contact with each other; rather, there is always a tiny space, or **synapse**, between them. The exact location of synapses along the neuron can vary, but it is easiest to think of communication between neurons as beginning with information, in the form of an electrical impulse. This impulse is transmitted from the cell body along the axon to the axon terminal buttons. A neurotransmitter is then secreted from the terminal buttons into a synapse shared with dendrites of other neurons. The process of neurons transmitting information between each other is known as **synaptic transmission** (Figure 2).

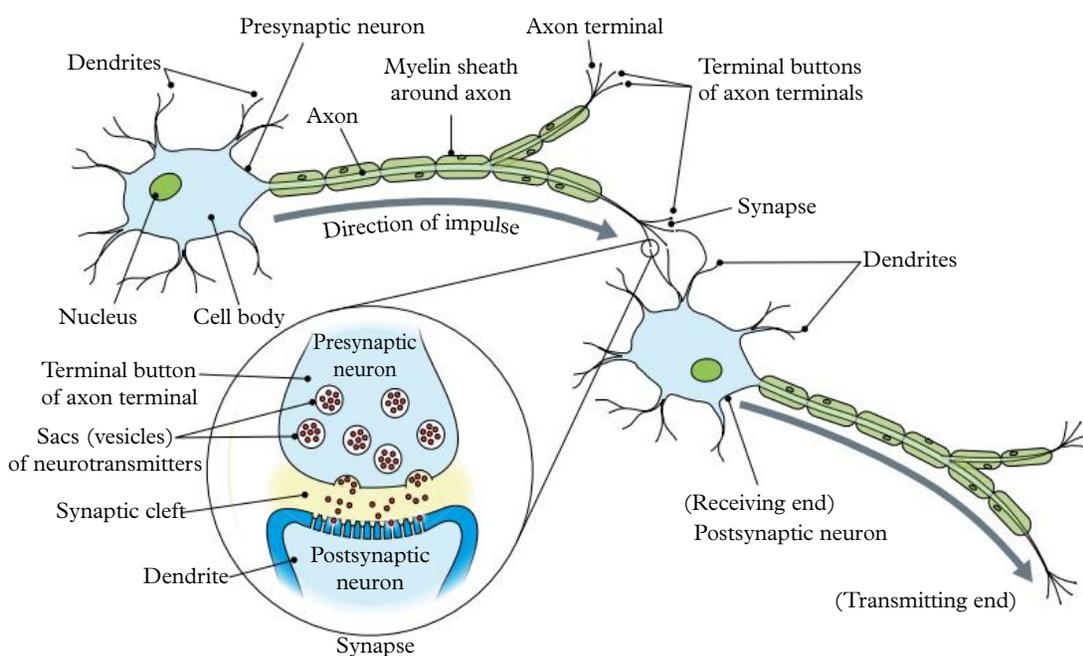


FIGURE 2 Information received by dendrites travels along the axon to the terminal buttons at the end of the axon terminals.

myelin

a white, fatty, waxy substance that coats some axons and insulates them, protecting them from electrical interference from other neurons; this increases the efficiency of transmission of nerve impulses

myelin sheath

an insulating fatty coating that helps facilitate the transmission of information (electrical impulse) to other neurons

neurotransmitter

chemical released from a neuron following an action potential that helps communication across nerve synapses

synapse

the junction between two neurons through which the two neurons communicate

synaptic transmission

the process of neurons sending information to each other via neurotransmitters

Challenge

Synapses

Not all synapses are the same. In the brain, the synapses are often located on other parts of the cell, besides the dendrites. Additionally, in other parts of the nervous system, neurons might send their signals to the glands or muscles rather than other neurons. **Consider** potential evolutionary reasons for this.

The lock and key process

Neurotransmitters are contained in small sacs, known as synaptic vesicles, within the terminal button of each neuron's terminal axon. When a **presynaptic neuron** fires, the synaptic vesicles move towards the presynaptic membrane. Some synaptic vesicles stick to the membrane and break open to release the neurotransmitter into the synaptic cleft.

Once in the synaptic cleft, some of the neurotransmitters will bind with protein molecules known as "receptors" that are located in the dendrites of the **postsynaptic neuron**. The receptors act like locks that can only be opened with one particular "key" or neurotransmitter. When a receptor binds with the neurotransmitter that "fits" (it has the appropriate molecular structure and electrical charge), the postsynaptic neuron is either activated or inhibited.

This is referred to as the "lock and key process" (Figure 3).

Neurotransmission

There are two main types of synapses involved in communication between neurons: **excitatory** (which cause the neuron to fire) and **inhibitory** (those that inhibit neurons from firing).

When an axon of a neuron fires, the terminal buttons of the excitatory synapses release a neurotransmitter (e.g. glutamate) that "excites" the postsynaptic neuron or causes it to reach its **action potential**. This "excitement" increases the amount of firing of the axon of the postsynaptic neuron. In contrast, when inhibitory synapses are activated by inhibitory neurotransmitters (e.g. gamma-amino butyric acid) the "firing" rate of the postsynaptic neuron is reduced, and sometimes it does not fire at all.

presynaptic neuron

a neuron that transmits information to another neuron

postsynaptic neuron

a neuron that receives information from another neuron

excitatory synapse

a synapse that causes the target neuron to become excited, and more likely to fire and propagate an action potential

inhibitory synapse

a synapse that causes the target neuron to become inhibited, and less likely to fire and propagate an action potential

action potential

a momentary change in the electrical potential of a cell, which allows a nerve cell to transmit a signal or impulse towards another nerve cell

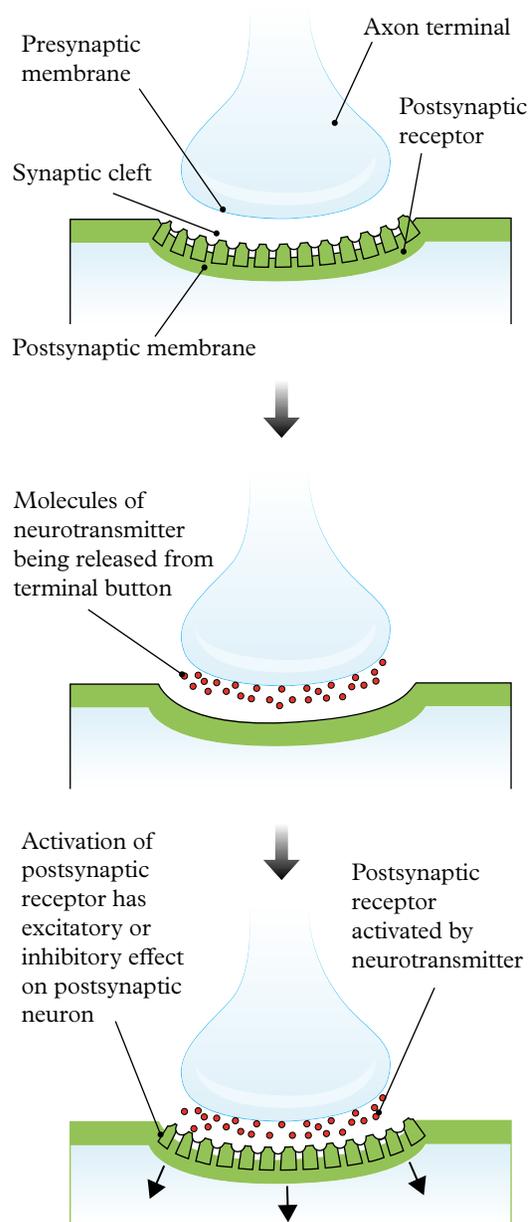


FIGURE 3 The lock and key process, where the neurotransmitter (the key) fits into the receiving postsynaptic neuron receptor (the lock)

How much a neuron “fires” will depend on the level of activity of all of the synapses on the dendrites of the neuron, and also on how active the cell body of the neuron is. For example, if the excitatory synapses are mostly active, the neuron will fire much more than if the inhibitory synapses are mostly active. The excitation or inhibition effects produced by a synapse only last for a fraction of a second.

Action potential

An action potential is a brief electrical event that travels along the axon, triggering the release of neurotransmitters into the synapse and signalling that the neuron is active. This process occurs through the movement of ions in and out of the cell membrane channels. The difference in electrical charge inside and outside the neuron is called the membrane potential, which fluctuates depending on excitatory or inhibitory neurotransmitters. When the **membrane potential** reaches the action potential threshold, the neuron fires. The following three main phases of an action potential (Figure 4) occur in just a few milliseconds.

membrane potential
the difference in electrical charge inside and outside the neuron

- 1 Depolarisation** results when positively charged sodium ions (Na^+) enter rapidly into the neuron through the open voltage-gated sodium channels, resulting in the reversal of the membrane potential's polarity from -70 mV to $+40$ mV for a moment.
- 2 Repolarisation** follows when the sodium channels slowly close and the voltage-gated potassium (K^+) channels open, resulting in the membrane permeability to sodium ions declining to resting levels. The potassium ions rapidly exit the cell through the potassium channels, causing the localised negative membrane potential of the cell to be restored.
- 3 Hyperpolarisation** is the phase where some of the potassium channels stay open, and the sodium channels are reset. During this phase, there is a short period of time when the membrane is more permeable to potassium and these positive ions rapidly exit before the potassium channels close. This results in a slight dip in membrane potential below resting membrane potential (-70 mV).

The neuron is not capable of responding to any new stimulus and propagating an action potential, regardless of its intensity, during a period of time called the refractory period. This period is essential for ensuring proper timing and direction of neuron communication.

Neurotransmission involves the following steps:

- 1 Initiation:** An action potential is triggered in the presynaptic neuron when the membrane potential reaches a certain threshold (typically -50 mV) due to more excitatory inputs.
- 2 Propagation:** The action potential travels down the axon to the axon terminals. This movement is facilitated by the opening and closing of voltage-gated ion channels along the axon.
- 3 Arrival at axon terminal:** Upon reaching the axon terminal, the action potential causes voltage-gated calcium channels to open, allowing Ca^{2+} ions to enter the axon terminal.
- 4 Neurotransmitter release:** The influx of calcium ions results in the synaptic vesicles filled with neurotransmitters fusing with the presynaptic membrane, releasing the neurotransmitters into the synapse.
- 5 Binding to receptors:** The neurotransmitters diffuse across the synapse and bind to specific receptors on the postsynaptic neuron.
- 6 Postsynaptic response:** Binding of neurotransmitters to receptors can either excite or inhibit the postsynaptic neuron, depending on the type of neurotransmitter involved.

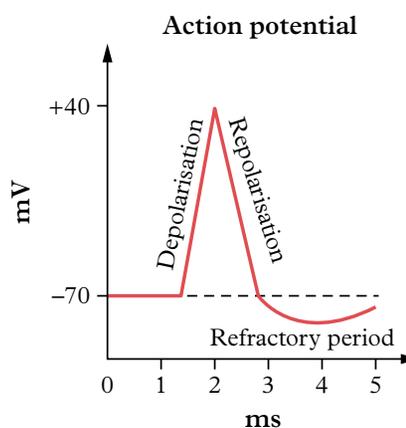


FIGURE 4 An action potential

glutamate

an excitatory neurotransmitter in the brain involved in memory and learning

Glutamate and GABA

Glutamate is the most abundant excitatory neurotransmitter in the central nervous system and can excite almost every neuron in the brain. It does this by increasing the likelihood that the neuron will fire an action potential. Glutamate is different from other neurotransmitters that only bind to one receptor as it has the ability to bind to four different receptors. This allows glutamate more opportunities to be involved in many psychological processes, particularly in learning and memory, where fast signalling and information processing is important.

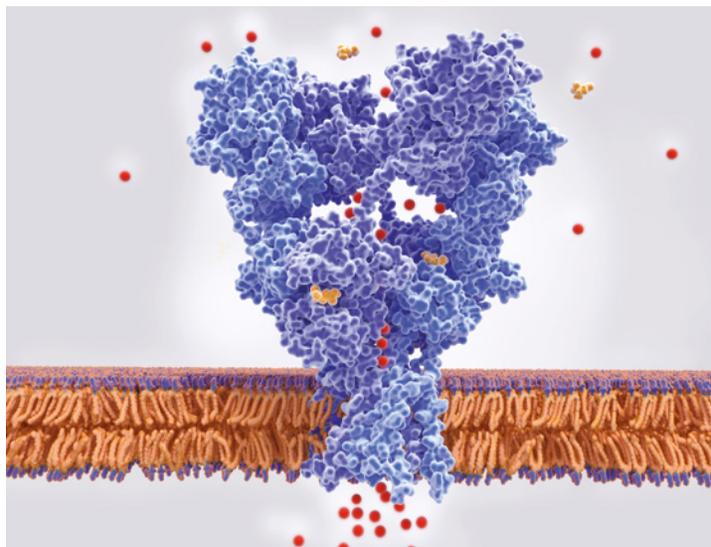


FIGURE 5 This illustration represents a glutamate receptor being activated by glutamate. The dots at the bottom of the image represent the electrical impulse being released to the postsynaptic neuron.

GABA

(gamma-amino butyric acid)

an inhibitory neurotransmitter; imbalance of GABA is implicated in severe anxiety disorders; also involved in arousal and sleep

GABA (gamma-amino butyric acid) has an inhibitory effect on the brain. It decreases the likelihood that a neuron will fire an action potential. Approximately one-third of all neurons in the brain use GABA. It regulates arousal by counteracting the effects of excitatory glutamate (and some other neurotransmitters), thus providing a sense of calm. A lack of GABA predisposes individuals to developing anxiety disorders such as phobias. Maintaining a balance between glutamate and GABA is essential for correct brain function and overall psychological wellbeing.

Check your learning 3.1



Check your learning 3.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** a synapse. (1 mark)
- 2 **Describe** an action potential. (1 mark)
- 3 **Identify** the phase in an action potential when the threshold membrane potential is met. (1 mark)
- 4 **Describe** the process of synaptic transmission. (1 mark)
- 5 **Identify** an excitatory neurotransmitter. (1 mark)

- 6 **Construct** a diagram to explain neurotransmission. (4 marks)

Analytical processes

- 7 **Differentiate** between a presynaptic neuron and a postsynaptic neuron. (1 mark)
- 8 **Distinguish** between excitatory and inhibitory neurotransmitters and give an example of each. (3 marks)

Lesson 3.2

Neurotransmitters

Key ideas

- There are many different types of neurotransmitters that act as chemical messengers in synaptic transmission and have distinct physical and psychological functions.
- Acetylcholine is involved in muscle contractions, learning, memory and REM sleep.
- Epinephrine is involved in the stress response.
- Norepinephrine is involved in stress responses, alertness, arousal, emotional regulation and attention.
- Dopamine is involved in thoughts, feelings, motivation and behaviours.
- Serotonin is involved in the regulation of mood, sleep, eating, arousal and pain.



Learning intentions
and success criteria

Introducing neurotransmitters

A single neuron can release more than one neurotransmitter. So far, research has identified more than 100 neurotransmitters in existence. Although hormones and neurotransmitters are different kinds of chemical messengers, some molecules function as both hormones and neurotransmitters. For instance, norepinephrine is excreted as a hormone by the adrenal glands, but it can also be excreted as a neurotransmitter by nerve endings. In this lesson we will look at five key neurotransmitters:

- acetylcholine
- epinephrine
- norepinephrine
- dopamine
- serotonin.

Acetylcholine

Acetylcholine is a neurotransmitter found in the brain, the spinal cord and the peripheral nervous system. Acetylcholine stimulates muscular contractions, is involved in learning and memory, and promotes REM sleep. This neurotransmitter is responsible for the muscular contractions that help control breathing (respiratory system), digestion and the cardiovascular system. It also helps the quality and intensity of communication between neurons in the brain associated with learning (e.g. the hippocampus, the basal ganglia and the hypothalamus).

Acetylcholine is also involved in the process of neuroplasticity; that is, the way the neural structure of the brain changes itself in response to neural, environmental and behavioural experiences. Evidence of its role in memory and learning comes via studies of rats (Burton et al., 2018). For example, when rats are involved in certain learning activities, acetylcholine activity in their brains appears to increase.

Acetylcholine has also been linked to memory through studies of patients with Alzheimer's disease who have deficits in their memory functioning (Kandimalla & Reddy, 2017; Reddy, 2017). These patients have been shown to have depleted amounts of acetylcholine in their brains. Scientists continue to explore how best to treat Alzheimer's disease by using neural

acetylcholine
a neurotransmitter in the brain, spinal cord and peripheral nervous system involved in muscle contractions, learning and memory, and REM sleep

stem cell therapy to regenerate neurons that make acetylcholine in patients with Alzheimer's disease (refer to Lesson 3.3 for more details)



FIGURE 1 Among other things, acetylcholine is responsible for the muscular contractions that help control digestion.

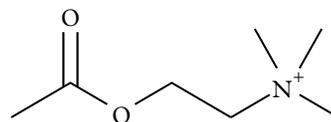


FIGURE 2 Chemical structure of acetylcholine

Epinephrine

epinephrine

a neurotransmitter and hormone involved in stress responses

Epinephrine, also known as adrenalin, is a hormone (secreted by the adrenal glands) and neurotransmitter (secreted from axon terminals). It is released in response to situations provoking anxiety, fear and emotional arousal and is regulated by the autonomic nervous system. It plays a key role in the fight-flight-freeze response. Epinephrine causes increased heart rate, heightened blood pressure and increased respiratory rate. Epinephrine is released in the brain and also in the organs of the body, therefore, it functions as both a neurotransmitter and hormone (Burton et al., 2018; Carlson, 2008).



FIGURE 3 Epinephrine is released in response to situations provoking anxiety, fear and emotional arousal.

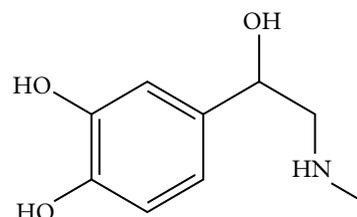


FIGURE 4 Chemical structure of epinephrine

Skill drill

Investigations

Science inquiry skill: Understanding the scientific method (Lesson 1.3); Planning investigations (Lesson 1.4)

Epinephrine is released when the body experiences the fight-flight-freeze response. If you perceive

there is stress or threat around you, there will be an increase in epinephrine to activate your sympathetic nervous system, which, in turn, increases your blood pressure so that you have enough blood supplied to your muscles to fight or run away from a threat.

Thomas decides to test what type of stress can increase blood pressure, and therefore increase epinephrine concentration, the most. Thomas measured the blood pressure of his four participants at the start of the experiment, and then again after the two conditions he subjected them to. In the first condition Thomas showed the participants a scary movie trailer and measured their blood pressure. After 10 minutes Thomas subjected his participants to the second condition, which consisted of a mathematics test that was very tricky but still doable. Thomas measured the participants' blood pressure as they started the test. Thomas recorded all blood pressure measurements for each participant in Table 1.

TABLE 1 Blood pressure recordings (mmHg) in each condition

| Name | Start | Movie | Test |
|-----------|--------|--------|--------|
| Jimmy | 120/80 | 140/80 | 130/80 |
| Charlotte | 110/70 | 180/90 | 140/90 |
| Kimberley | 130/90 | 120/80 | 140/90 |
| Adam | 100/80 | 150/80 | 140/80 |

- 1 Identify** the independent variable and the dependent variable in Thomas's experiment. (2 marks)
- 2 Consider** the type of investigation used in the experiment.
 - a Identify** the research design used and **explain** one possible limitation of this design. (2 marks)
 - b Propose** a modification to this research design to avoid the limitation identified in part **a**. (1 mark)

Norepinephrine

Norepinephrine, like epinephrine, affects the way the brain attends to and responds to triggers in the environment. Like epinephrine, it is both a hormone and a neurotransmitter. Norepinephrine mobilises the brain and body to act. It is responsible for increasing heart rate, triggering the release of glucose into our bloodstream, and increasing blood flow into the muscles. As a neurotransmitter, its main function is to increase alertness and arousal as well as speed up our reaction times. It is also involved in regulating our moods and our ability to concentrate. Low levels of norepinephrine are related to attention deficit hyperactivity disorder, low blood pressure (hypertension) and depression (Burton et al., 2018; Griffith, 2013).

norepinephrine
a neurotransmitter and hormone involved in regulating stress responses, alertness, arousal, emotional regulation and attention



FIGURE 5 Norepinephrine mobilises the brain and body to act.

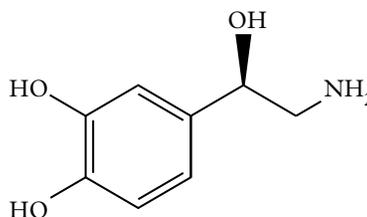


FIGURE 6 Chemical structure of norepinephrine

Dopamine

Dopamine is involved in thoughts, feelings, motivation and behaviour. Dopamine neural pathways are involved in emotional arousal, the experience of pleasure and learning to associate particular behaviours with rewards (Brookshire, 2017; Carlson, 2008).

dopamine
a neurotransmitter involved in thoughts, feelings, motivation and behaviour

Dopamine helps control the brain's reward and pleasure centres. Dopamine release can help explain why we engage in pleasurable activities such as listening to our favourite music or eating our favourite foods. It plays diverse roles in our everyday behaviour, including how we move, what we choose to eat and how we learn. Dopamine also plays a pivotal role in addictive behaviours (e.g. illicit drug use and excessive screen use).

Dopamine is involved in reinforcing our behaviour. It motivates us to engage in activities over and over again in order to obtain "pleasure". It is why we often overindulge in food we love, such as chocolate. It affects our moods, as we tend to feel in a "good mood" when we engage in pleasurable activities. Dopamine is also involved in attention, as we tend to focus on things in our environment that bring us pleasure. Low levels of dopamine are related to a joyless state known as anhedonia, where we lose any sense of pleasure in activities such as eating and drinking.

Dopamine deficiency is also associated with Parkinson's disease (refer to Lesson 3.3), a disorder characterised by uncontrollable tremors, difficulty initiating movement (e.g. standing up) and stopping movements already in progress (e.g. walking). Dopamine deficiency is also linked to depression, reduced facial displays of emotion, and a general slowing of thoughts and behaviours. Finally, dopamine is also associated with sensation-seeking (or risk-taking) behaviours.



FIGURE 7 Dopamine motivates us to engage in activities over and over again to obtain "pleasure". It is why we often overindulge in food we love such as chocolate!

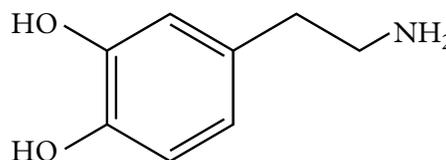


FIGURE 8 Chemical structure of dopamine

Skill drill

Interpreting graphs

Science inquiry skill: Processing and analysing data (Lesson 1.7)

Dopamine is a neurotransmitter that regulates the brain's reward and pleasure centres. Chocolate can increase the level of dopamine in our brain, and therefore gives us a sense of pleasure from eating it. This sense of pleasure is often why we overindulge in certain foods.

Mel decided to conduct correlational research into the relationship between eating chocolate and the perception of stress. She gave questionnaires to her students asking questions about their average weekly chocolate consumption and their feelings of stress in a normal week. Her results are shown in Figure 9.

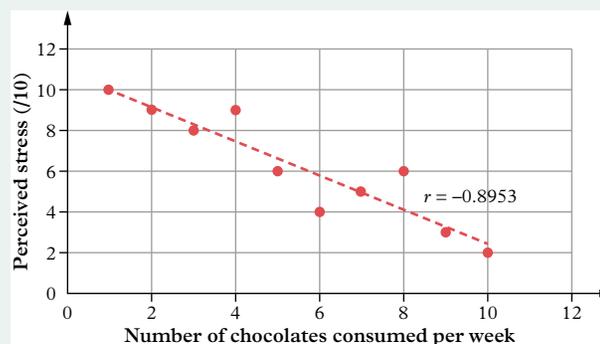


FIGURE 9 Scatterplot and the correlation coefficient (r) between chocolate eaten per week and perceived stress

An appropriate inferential statistic test was used, and the p -value was found to be 0.001.

Practise your skills

- 1 Identify** the direction and strength of the relationship between chocolate consumption and perceived stress. (2 marks)
- 2 Determine** the appropriate inferential statistic used. **Justify** your response. (2 marks)
- 3 Draw a conclusion** about the relationship between the chocolate eaten each week and perceived stress. (1 mark)

Serotonin

Serotonin helps regulate mood and social behaviour, appetite and digestion, sleep, memory and sexual functioning. It is often referred to as a “feel-good” chemical as it affects our feelings of wellbeing and happiness (Burton et al., 2018; Carlson, 2008; McIntosh, 2018).

Serotonin is also thought to be involved in the constriction of smooth muscles (i.e. slow, automatically constricting muscles of blood vessels and organs). Furthermore, serotonin helps regulate our body’s sleep–wake cycle and is responsible for our “internal” body clock.

Decreased serotonin levels in the brain have been linked to depression. This is why many of the medications that are used to treat depression increase serotonin activity. For example, popular antidepressants such as fluoxetine (Prozac) work by boosting serotonin levels. Diet, exercise, exposure to sunlight and increasing our positive mood states can help reduce depression and increase wellbeing by boosting serotonin levels. Serotonin usually plays an inhibitory role by affecting neural circuits involved in aggression, antisocial behaviour and other forms of social behaviour (Burton et al., 2018).

serotonin

a neurotransmitter in the brain involved in the regulation of mood, sleep, eating, arousal and pain



FIGURE 10 Serotonin is often referred to as a “feel-good” chemical as it affects our feelings of wellbeing and happiness.

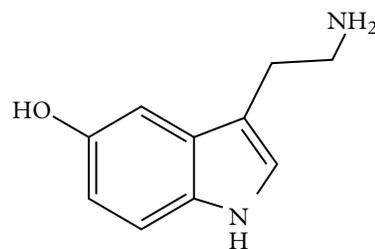


FIGURE 11 Chemical structure of serotonin

Summary of neurotransmitters

Table 2 summarises the physical and psychological functions of the neurotransmitters and hormones we have looked at in this lesson.

TABLE 2 Functions of selected neurotransmitters and hormones

| Neurotransmitter | Physical functions | Psychological functions |
|-------------------------------|--|---|
| Acetylcholine | <ul style="list-style-type: none"> Stimulates muscle contraction enabling movement Regulates autonomic functions (such as heart rate, digestion and respiratory rate) Stimulates secretion of saliva and sweat Regulates and facilitates motor control and movement Suppresses appetite Affects sleep patterns | <ul style="list-style-type: none"> Enhances memory and learning Promotes REM sleep |
| Epinephrine (adrenalin) | <ul style="list-style-type: none"> Increases heart rate, dilates airways and boosts blood flow to muscles Mobilises energy stores (glucose release) | <ul style="list-style-type: none"> Increases alertness and arousal Involved in stress response (fight or flight) preparing the body for action |
| Norepinephrine (noradrenalin) | <ul style="list-style-type: none"> Constricts blood vessels, increases heart rate and blood flow to skeletal muscles and regulates blood pressure | <ul style="list-style-type: none"> Increases alertness and arousal Affects mood and memory Plays a key role in executive functioning, regulating cognition and motivation Involved in stress response (fight or flight) preparing the body for action |
| Dopamine | <ul style="list-style-type: none"> Regulates and facilitates motor control and movement Suppresses appetite Affects sleep patterns | <ul style="list-style-type: none"> Regulates attention and the reward pathways and pleasure centres in the brain Plays a key role in motivation, interest, drive, addiction and positive stress states, e.g. sexual attraction |
| Serotonin | <ul style="list-style-type: none"> Regulates appetite and bowel movements Regulates the sleep cycle by influencing the production of melatonin Affects cortical arousal, leading to alertness and readiness | <ul style="list-style-type: none"> Regulates mood and emotional wellbeing, such as feelings of happiness |

Challenge

Monosodium glutamate

Monosodium glutamate (MSG) is a savoury flavour enhancer that was first extracted in 1908 by Japanese chemist Kikunae Ikeda. After eating it, some people display neurological symptoms, such as tingling or a feeling of numbness in the face, neck and chest; this is because their glutamate receptors have been activated. Based on your knowledge of neurons, neurotransmitters and the human nervous system, **discuss** why this occurs.

Check your learning 3.2



Check your learning 3.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** one physical and one psychological function for each of these neurotransmitters: acetylcholine, dopamine, serotonin, norepinephrine, epinephrine. (10 marks)
- 2 Describe** how some neurotransmitters also work as hormones and give an example. (2 marks)

Analytical processes

- 3 Differentiate** between dopamine and serotonin. (1 mark)

- 4 Consider** two effects of having too much norepinephrine. (2 marks)

Knowledge utilisation

- 5 Investigate** brain research to see if there is something that can cause an increase in the production of serotonin and hence has potential to be a treatment for depression. (3 marks)
- 6** Select two neurotransmitters. **Predict** what might happen if someone had increased levels of these. **Discuss** how this could influence their daily life. (4 marks)

Lesson 3.3

Changes to neurotransmitter function

Key ideas

- Parkinson's disease is a neurodegenerative disease where the *substantia nigra* of the basal ganglia does not produce sufficient levels of dopamine to control motor movement.
- Alzheimer's disease is a neurodegenerative disease where changes in brain tissue and decreased levels of acetylcholine result in a person suffering symptoms such as memory loss and confusion.



Learning intentions
and success criteria

Introducing changes to neurotransmitter function

Neurotransmitters that do not function normally can cause problems for the nervous system. For instance, acetylcholine affects many things including memory. Interference in the nervous system caused by neurotransmitter malfunction is thought to stem from both environmental and genetic factors. Anything from ongoing high levels of stress to simple things such as diet (like too much sugar or caffeine) can have an impact. However, some people are just born without the ability to synthesise certain neurotransmitters.

Impaired functioning of neurotransmitters can result from neurons not manufacturing enough of a particular neurotransmitter, the release of too much of a particular neurotransmitter, the deactivation of too much of a neurotransmitter by enzymes, or neurotransmitters being reabsorbed too quickly. Parkinson's disease and Alzheimer's disease have been associated with impaired functioning of neurotransmitters. Psychological disorders such as depression, schizophrenia and drug addiction can also be related to deficits in neurotransmitters (Burton et al., 2018).

Introducing Parkinson's disease

Parkinson's disease

a progressive neurological condition, known to affect the ability to control movement

Parkinson's disease is a progressive neurological condition of the central nervous system that affects more than 80,000 people in Australia. A variety of motor and non-motor symptoms are caused by the impairment of the neurotransmitter dopamine, specifically the degeneration of dopamine-releasing neurons in the *substantia nigra*. The *substantia nigra* is part of the basal ganglia, located in the midbrain, and is responsible for reward, addiction and, most importantly for Parkinson's disease, the coordination of movement. Dopamine is a neurotransmitter that helps control the brain's reward and pleasure centres, including the basal ganglia. Dopamine is needed to control messages as they pass between neurons in the *substantia nigra* and the striatum (responsible for balance and control of movement). Without enough dopamine, the neurons of the striatum fire uncontrollably, which essentially prevents someone with Parkinson's disease from adequately controlling their movements.

People with Parkinson's disease develop symptoms such as slowness of movement, rigidity and involuntary movement of the hands, arms, feet, legs, jaws or head. They might experience difficulty starting or stopping body movements such as walking. They can also experience non-motor symptoms including reduced facial expressions, pain, depression, dementia and difficulty sleeping.

Symptoms of Parkinson's disease only develop when the drop in dopamine levels is significant enough to affect functioning. This usually equals an approximate 80 per cent drop, accompanied by a 50 per cent drop in the *substantia nigra* neurons (Figure 1).

A drop in dopamine also influences acetylcholine, a neurotransmitter that also affects movement. The striatum requires a balance of dopamine and acetylcholine for effective motor function. The imbalance of these neurotransmitters contributes to the progression of Parkinson's disease and its symptoms.

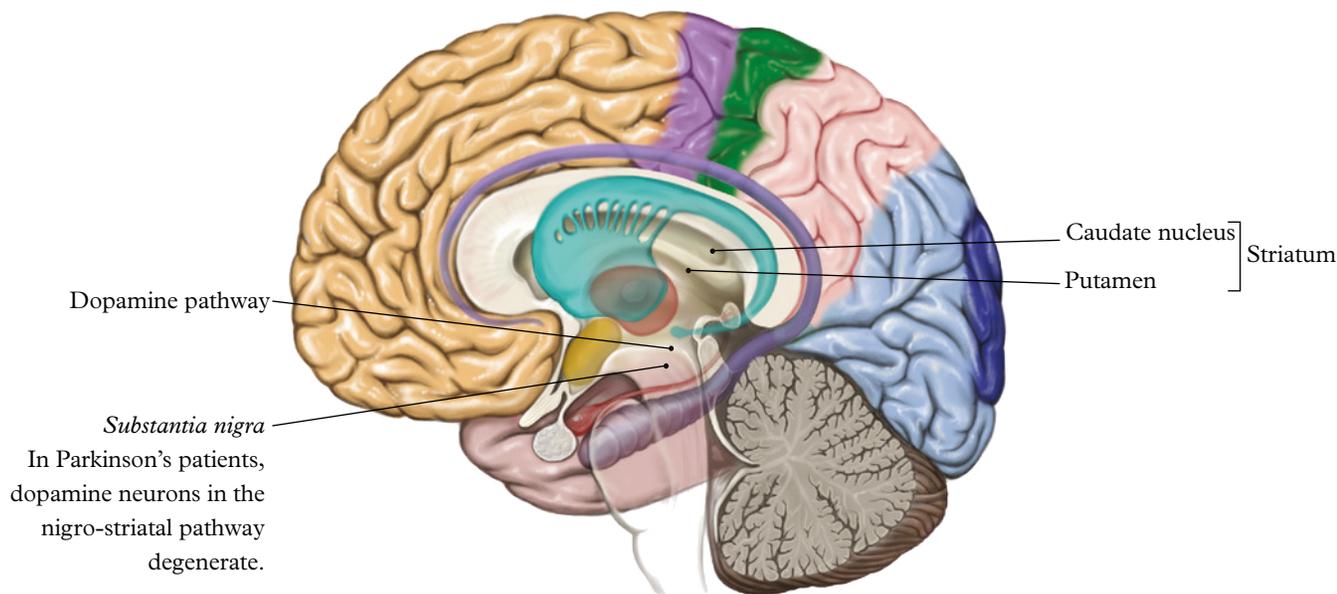


FIGURE 1 The *substantia nigra* is located in the midbrain and is affected by Parkinson's disease.

Causes of Parkinson's disease

Scientists are still searching for the reason why dopamine levels drop in people with Parkinson's disease; however, it appears to be activated by a combination of factors including those outlined in Table 1.

TABLE 1 Suspected causes of Parkinson's disease

| Cause | Description |
|-----------------------|--|
| Genetics | <ul style="list-style-type: none"> Protein mutations have been linked to the disease where this blocks the disposal of abnormal cells. |
| Environmental factors | <ul style="list-style-type: none"> The pesticide Rotenone (which is used in Australia to control pests on fruit and vegetables) has been found to cause Parkinson's disease in rats. MPTP, a common contaminant found in street drugs, can cause Parkinson's disease in users. |
| Diet | <ul style="list-style-type: none"> Vitamin B (folic acid) deficiency has been linked with the development of Parkinson's disease. |

Treatments for Parkinson's disease

Treatment of Parkinson's disease includes drugs that are converted to dopamine in the brain, which then restores depleted levels. Other treatments involve drugs that block the action of chemicals that affect dopamine. One such drug inhibits the action of the enzyme monoamine oxidase B (MAO-B), which would otherwise act to break down dopamine in the brain. Surgical treatments such as deep brain stimulation may be used when medications are no longer effective. This involves implanting electrodes in specific brain areas to reduce the movement-related symptoms of Parkinson's disease, such as tremor, rigidity and slowness of movement.

Challenge

Caffeine and Parkinson's disease

Consumption of caffeine has been found to reduce Parkinson's disease symptoms. A trial in Japan found that sufferers of the disease who were administered a pill equivalent to three cups of coffee a day over six weeks showed a decrease in their tremors and an increase in mobility. **Consider** why caffeine consumption may lead to a decrease in Parkinson's disease symptoms.

Real-world psychology

A new treatment for Parkinson's disease

Scientists at Rutgers and Stanford universities have created a new technology that could someday help treat Parkinson's disease and other devastating brain-related conditions that affect millions of people.

The technology – a major innovation – involves converting adult tissue-derived stem cells into human neurons on 3D “scaffolds”, or tiny islands, of fibres, said Prabhav V. Moghe, a distinguished professor in the departments of Biomedical Engineering and Chemical and Biochemical Engineering at Rutgers University.

“If you can transplant cells in a way that mimics how these cells are already configured in the brain, then you're one step closer to getting the brain to communicate with the cells that you're now transplanting,” said Moghe ... “In this work, we've done that by providing cues for neurons to rapidly network in 3D.”

Moghe said a 3D scaffold, developed by the scientists, consists of tiny polymer fibres. Hundreds of neurons attach to the fibres and branch out, sending their signals. Scaffolds are about 100 micrometres wide – roughly the width of a human hair. ▶

“We take a whole bunch of these islands and then we inject them into the brain of the mouse,” he said. “These neurons that are transplanted into the brain actually survived quite miraculously well. In fact, they survived so much better than the gold standard in the field.”

Indeed, the scaffold technology results in a 100-fold increase in cell survival over other methods, Moghe said. And that may eventually help people suffering from Parkinson’s disease, multiple sclerosis, amyotrophic lateral sclerosis (ALS), or Lou Gehrig’s disease, Alzheimer’s disease, spinal cord and traumatic brain injuries, and concussions, he said.

The next step would be to further improve the scaffold biomaterials, allowing scientists to increase

the number of implanted neurons in the brain. “The more neurons we can transplant, the more therapeutic benefits you can bring to the disease,” Moghe said. “We want to try to stuff as many neurons as we can in as little space as we can.”

The idea is to “create a very dense circuitry of neurons that is not only highly functioning but also better controlled,” he said, adding that testing of mice with Parkinson’s disease is underway to see if they improve or recover from the illness.

Eventually, with continued progress, the researchers could perform studies in people. Moghe estimated that it would take 10 to 20 years to test the technology in humans.

Source: B. Bates, *Rutgers Today*, 4 April 2016

Apply your understanding

- Identify** an application of the new treatment. (1 mark)
- Describe** the advancements in technology that may one day help treat Parkinson’s disease. (1 mark)
- Identify** the research direction required to further support this technology to be used in humans. (1 mark)

Introducing Alzheimer’s disease

Alzheimer’s disease

a condition that progressively destroys neurons in the brain, causing memory loss

Alzheimer’s disease is a neurodegenerative disease that occurs mostly in older people and involves gradual, severe memory loss, confusion, impaired attention, disordered thinking and depression (Kalat, 2008). The prevalence of this disease increases with age, affecting 1 in 10 Australians over 65 years of age and 3 in 10 Australians over 85 years (Health Direct, 2024). It involves both anterograde and retrograde amnesia because the disease affects both the hippocampus and the prefrontal cortex. The earliest symptom is usually impaired declarative memory, where the patient has difficulty remembering events from the day before, forgets names and has difficulty finding the right word when speaking. Next, the patient might repeat stories or questions, and eventually will fail to recognise familiar people and family members.

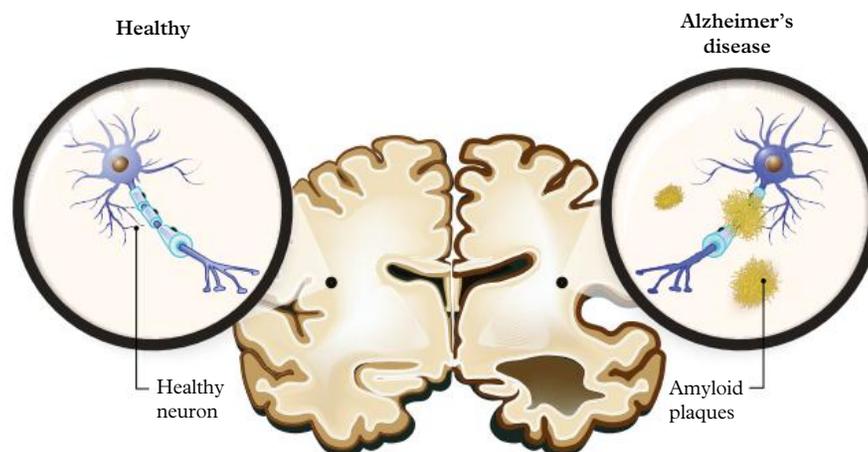


FIGURE 2 A healthy neuron compared with a neuron with amyloid plaques typically found in Alzheimer’s patients

Changes in brain tissue in people with Alzheimer's disease include tangled neurons and protein deposits disrupting the functioning of cells in the cortex. Alzheimer's patients also have abnormally low levels of several neurotransmitters, most importantly acetylcholine, which plays a central role in memory functioning. Neuroimaging researchers have found connections between the extent of temporal lobe damage, particularly to the hippocampus and axons connecting it to the cortex, and the degree of cognitive impairment in Alzheimer's patients. This helps explain why Alzheimer's disease has such a debilitating effect on explicit memory, including difficulty in remembering what happened moments earlier.

Causes of Alzheimer's disease can be both genetic and neurological – and both can contribute to memory loss and cognitive decline.

Causes of Alzheimer's disease

Amyloid plaques (proteins that form among axon terminals and interfere with communication between neurons) typify Alzheimer's disease. In addition, patients' brains have neurofibrillary tangles (an abnormal build-up of protein inside the neurons) and these are associated with the death of brain cells. Alzheimer's patients also have lower levels of important memory neurotransmitters, especially acetylcholine.

One of the first brain structures to be affected by Alzheimer's disease is the hippocampus. When the cells are lost here, it causes the brain to atrophy (deteriorate) and the damage to the temporal lobes means that the hippocampus becomes isolated. This is probably why there is early memory loss (Hyman et al., 1984). Plaques and tangles in the frontal lobes cause more memory problems and difficulty with attention and motor coordination. In the occipital lobes, the disrupted link between the primary visual cortex and the visual association areas in the parietal and temporal lobes can cause visual problems for the patient. The nature of the brain damage caused by Alzheimer's disease means that declarative memory, in particular, is impaired.

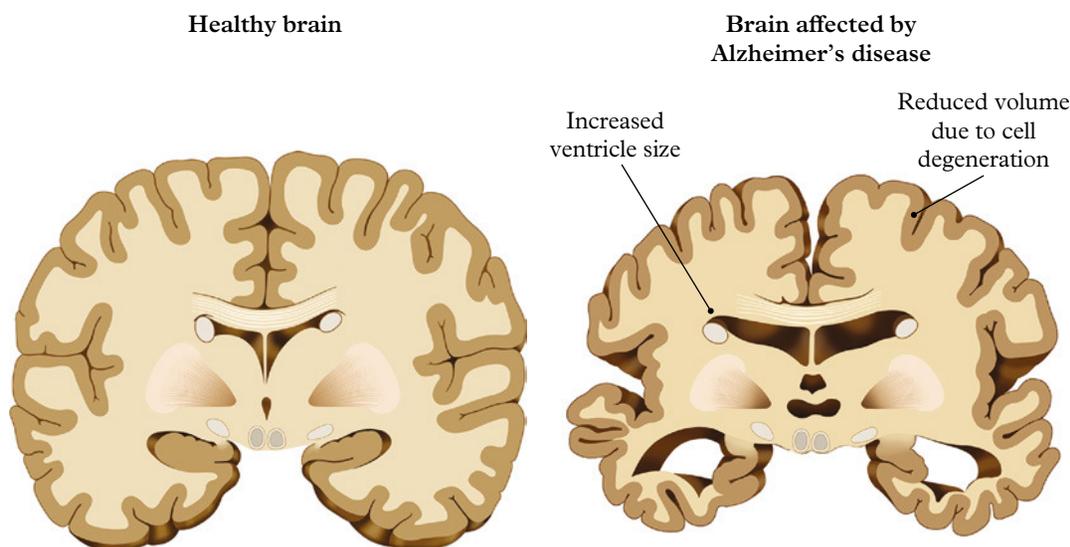


FIGURE 3 The brain on the right indicates the cell loss caused by Alzheimer's disease, seen in the decreased size of the cortex compared to the healthy brain on the left.

Neurotransmitters send signals across synapses and play an important role in maintaining synaptic and cognitive functions. When the appropriate signal is given by a neuron, neurotransmitters are released into the synapse and establish connections through the synaptic cleft when they bind to their appropriate receptors on the postsynaptic neuron(s). Impairment to neurotransmitter (specifically acetylcholine) functioning

interrupts these messages and causes symptoms such as those experienced by people with Alzheimer's disease.

A decrease in the concentration of acetylcholine in the central nervous system is the hallmark of both progressive dementia, and Alzheimer's disease. Acetylcholine is found in cells called cholinergic neurons, which are involved in cognitive processes and motor functions. Cholinergic neurons release acetylcholine, which latches onto neighbouring neuron receptors, allowing signals to be passed from cell to cell. When acetylcholine functioning is impaired, or levels are depleted, the neural pathways used in memory and learning start to deteriorate. These pathways are predominantly found in the hippocampus and the frontal and temporal lobes.

Treatments for Alzheimer's disease

Medications are designed to replace depleted levels of acetylcholine, or to prevent acetylcholine from being broken down, and in doing so they help rebuild the communication between the neural pathways involved in memory. One such drug is acetylcholinesterase inhibitors, which prevent enzymes from breaking down acetylcholine, meaning more of it is available at the sites where neurons transmit messages. Another treatment involves glutamate blockers, which prevent excess glutamate from destroying neurons. This treatment is typically used with moderate to severe disease, whereas the cholinergic treatments may be prescribed for people with mild to moderate disease. While there is no cure for Alzheimer's disease, treating the symptoms can ease the suffering for the individual, as well as their family.

Check your learning 3.3



Check your learning 3.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the neurotransmitter impaired in Parkinson's disease. (1 mark)
- 2 **Describe** the symptoms of Parkinson's disease. (3 marks)
- 3 **Identify** the neurotransmitter impaired in Alzheimer's disease. (1 mark)
- 4 **Describe** the symptoms of Alzheimer's disease. (3 marks)
- 5 **Explain** why it is important for neurotransmitters to function as intended. (2 marks)

Analytical processes

- 6 **Compare** neurotransmission in Alzheimer's disease and Parkinson's disease. (2 marks)

Knowledge utilisation

- 7 **Evaluate** current treatments available for both Alzheimer's disease and Parkinson's disease. (4 marks)

Lesson 3.4

Review: Neurotransmission and neurotransmitters

Summary

- 3.1**
- Neuron structure consists of dendrites, cell body, axon, myelin sheath and axon terminals.
 - Neurons communicate with each other via a process called synaptic transmission. Neural pathways allow different parts of the nervous system to communicate with each other.
 - Neurotransmitters are chemicals that help communicate across synapses between neurons. They can either excite (e.g. glutamate) or inhibit (e.g. gamma-amino butyric acid) a neuron from firing its own action potential.
 - An action potential transmits an electrical signal along a neuron's axon to communicate with other neurons, muscles or glands.
- 3.2**
- There are many different types of neurotransmitters that act as chemical messengers in synaptic transmission and have distinct physical and psychological functions.
 - Acetylcholine is involved in muscle contractions, learning, memory and REM sleep.
 - Epinephrine is involved in the stress response.
 - Norepinephrine is involved in stress responses, alertness, arousal, emotional regulation and attention.
 - Dopamine is involved in thoughts, feelings, motivation and behaviours.
 - Serotonin is involved in the regulation of mood, sleep, eating, arousal and pain.
- 3.3**
- Parkinson's disease is a neurodegenerative disease where the *substantia nigra* of the basal ganglia does not produce sufficient levels of dopamine to control motor movement.
 - Alzheimer's disease is a neurodegenerative disease where changes in brain tissue and decreased levels of acetylcholine result in a person suffering symptoms such as memory loss and confusion.

Review questions 3.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- What are the components of a neuron?
 - Cell body, axon, GABA and acetylcholine
 - Cell body, axon, dendrites and terminal buttons
 - Cell body, synapse, myelin sheath and axon terminals
 - Cell body, neurotransmitter, synapse and axon terminals
- What are most axons coated with?
 - GABA
 - Myelin
 - Adrenalin
 - Noradrenalin
- Which part of the neuron releases the neurotransmitters into the synaptic cleft?
 - Axon
 - Cell body
 - Dendrites
 - Axon terminals
- What is the direction of transmission of the neural impulse across a synapse?
 - Postsynaptic neuron to presynaptic neuron
 - Presynaptic neuron to postsynaptic neuron
 - Either presynaptic neuron to postsynaptic neuron or postsynaptic neuron to presynaptic neuron, at random
 - Either presynaptic neuron to postsynaptic neuron or postsynaptic neuron to presynaptic neuron, depending on whether the neurotransmitter is excitatory or inhibitory

- 5 Synaptic transmission can be best described as
- the formation of neurons.
 - the path of an electrical impulse along a neuron.
 - the space between the presynaptic neuron and the postsynaptic neuron.
 - the process by which one neuron can transmit a message to another neuron.
- 6 What is the name given to the information carried along a neuron, which consists of brief changes in the electrical charge of the axon?
- The action potential
 - The axon potential
 - Axon transmission
 - Synaptic transmission
- 7 Which of the following are all neurotransmitters?
- GABA, dopamine and nitrogen
 - GABA, glutamate and dopamine
 - GABA, glutamate and synapses
 - Dopamine, glutamate and potassium
- 8 Parkinson's disease is associated with a reduction of dopamine-producing cells in which area of the brain?
- Striatum
 - Amygdala
 - Terminal button
 - Substantia nigra*
- 9 Which statement is true?
- Changes to levels of dopamine and melatonin play key roles in Parkinson's disease.
 - Changes to levels of dopamine and serotonin play key roles in Parkinson's disease.
 - Changes to levels of dopamine and acetylcholine play key roles in Parkinson's disease.
 - Changes to levels of serotonin and acetylcholine play key roles in Parkinson's disease.
- 10 Which of the following best characterises Parkinson's disease?
- Memory loss
 - Immune system breakdown
 - Deterioration in the myelin sheath
 - Deterioration of dopamine-releasing neurons
- 11 Which of the following best characterises Alzheimer's disease?
- Immune system impairment
 - Deterioration of Wernicke's area
 - Amyloid plaques, memory loss and impaired acetylcholine functioning
 - Slowed movement, rigidity and involuntary movement of the hands, arms, feet, legs, jaws or head
- 12 Which of the following best describes an excitatory synapse?
- It is less likely to result in an action potential.
 - It causes the target cell to become inhibited.
 - It inhibits the target cell and causes an action potential.
 - It is more likely to cause the target cell to fire, resulting in an action potential.
- 13 What is acetylcholine involved in?
- Regulation of mood, sleep, eating, arousal and pain
 - Muscle contractions, learning, memory and REM sleep
 - Muscle contractions, learning, memory, attention and arousal levels
 - Regulation of attention, and the reward pathways and pleasure centres of the brain
- 14 What is dopamine involved in?
- Regulation of mood, sleep, eating, arousal and pain
 - Muscle contractions, learning, memory and REM sleep
 - Regulation of attention, and the reward pathways and pleasure centres of the brain
 - Blood flow and energy supply while enhancing alertness to respond to stress or danger
- 15 How do some medications designed to treat Alzheimer's disease work?
- They replace levels of serotonin in the brain.
 - They prevent dopamine from being broken down in the brain.
 - They cure Alzheimer's disease by restoring memory functioning.
 - They prevent acetylcholine from breaking down and replace depleted acetylcholine.

Review questions 3.4B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 16 Describe** a neurotransmitter and give an example. (2 marks)
- 17 Identify** an excitatory neurotransmitter. (1 mark)
- 18 Identify** the brain structures affected by Alzheimer's disease. (2 marks)
- 19 Summarise** the main symptoms of, and possible treatments for, Alzheimer's disease. (4 marks)
- 20 Explain** the role of dopamine and give an example of how it can influence everyday behaviour. (2 marks)
- 21 Explain** what Parkinson's disease is and how it is affected by the presence or absence of neurotransmitters. (2 marks)
- 22 Explain** how Alzheimer's disease is affected by the presence or absence of neurotransmitters. (2 marks)
- 23 Explain** how neurotransmitters influence the transmission of messages between neurons. (2 marks)
- 24 Describe** the process of synaptic transmission. (1 mark)

- 25 Explain** why myelin is important in the transmission of information. (2 marks)

Analytical processes

- 26 Differentiate** between the effects of glutamate and GABA. (1 mark)
- 27 Consider** the role of neurotransmitters in neurotransmission. (1 mark)

Knowledge utilisation

- 28 Discuss** the possible treatments for Parkinson's disease. (3 marks)
- 29 Explain** why the lock and key process is important for biological functioning. **Justify** your response using an example. (3 marks)
- 30** The neurotransmitter acetylcholine facilitates muscle movement. **Predict** what might occur if neurons producing acetylcholine are damaged. (1 mark)
- 31 Discuss** the impacts of low or high levels of serotonin on a person's physical and psychological functioning. (3 marks)

Data drill

Relationship between serotonin levels and anxiety diagnoses

An estimated 19 per cent of Australians in 2021 reported that at some point in their life they had been diagnosed with depression, anxiety or another serious psychological disorder. Anxiety can be diagnosed as an affective disorder as it is characterised by feelings of prolonged fear and worry. Lower serotonin levels in the brain have been linked to anxiety disorders. Table 1 shows data gathered from a sample of people ranging in age from 15 to 25, some of whom have been diagnosed with an anxiety disorder and some who haven't.

TABLE 1 Blood serotonin levels in sample

| Serotonin blood levels (nanograms/millilitre) | |
|---|-------------------------------------|
| Diagnosed with an anxiety disorder | No diagnosis of an anxiety disorder |
| 154 | 120 |
| 121 | 156 |
| 145 | 206 |
| 178 | 256 |
| 167 | 221 |
| 200 | 159 |
| 104 | 145 |
| Mean = 152.7 | Mean = |
| SD = 32.96 | SD = 48.26 |

p -value (one-tailed t -test) = 0.118

Apply understanding

- 1 **Calculate** the mean serotonin blood level for the group of subjects without an anxiety disorder diagnosis. (2 marks)
- 2 **Determine** the range of the serotonin blood levels for the group with an anxiety disorder diagnosis. (1 mark)

Analyse data

- 3 **Contrast** the uncertainty of the results for the two groups. Provide evidence to support your answer. (2 marks)

Interpret evidence

- 4 **Draw a conclusion** about whether there is a difference in blood serotonin levels between the two groups tested. Provide evidence from the dataset to support your answer. (2 marks)



Module 3 checklist: Neurotransmission and neurotransmitters

Unit 3

Topic 1 review

Multiple choice

(1 mark each)

- 1 The central nervous system consists of
 - A the brain and brain stem.
 - B the brain and spinal cord.
 - C the brain and peripheral nerves.
 - B the nerves in the centre that make the brain and essential organs work.
- 2 Which task is most likely to use Wernicke's area of the brain?
 - A Painting a picture
 - B Recognising a picture
 - C Putting a jigsaw puzzle together
 - D Understanding English subtitles in a foreign film
- 3 Which is a function of the temporal lobe?
 - A Taste
 - B Hearing
 - C Receiving smell sensory information
 - D Receiving tactile sensory information
- 4 The process in which neurons transmit information from one to another is called
 - A myelination.
 - B proliferation.
 - C synaptic transmission.
 - D the lock and key process.
- 5 Which of the following lists shows the order in which neuron structures are involved, from receiving signals to transmitting signals?
 - A Axon, nucleus, myelin, dendrites
 - B Dendrites, cell body, axon, axon terminals
 - C Dendrites, axon terminals, cell body, axon
 - D Cell body, dendrites, axon, axon terminals
- 6 The lock and key process involved in neurotransmission is
 - A the process of neurons transmitting information from one to another.
 - B what occurs in the brain of someone who suffers from Parkinson's disease.
 - C when the dendrites of one neuron lock with the axon terminals of another neuron.
 - D when a neurotransmitter "fits" (i.e. has the appropriate molecular structure and electrical charge) and binds to the receptor on a postsynaptic neuron, resulting in its activation or inhibition.
- 7 Why would a person with Parkinson's disease have difficulty coordinating their movement?
 - A Too much serotonin
 - B Too much dopamine
 - C Not enough serotonin
 - D Not enough dopamine
- 8 Which of the following is an inhibitory neurotransmitter located in the brain?
 - A Serotonin
 - B Glutamate
 - C Dopamine
 - D Gamma-amino butyric acid
- 9 Alzheimer's disease can often be explained by a decrease in which neurotransmitter?
 - A GABA
 - B Dopamine
 - C Glutamate
 - D Acetylcholine
- 10 A person experienced damage to their limbic system resulting in a reduced ability to recognise the intensity of fearful expressions in other people. Where did this damage most likely occur?
 - A HPA axis
 - B Amygdala
 - C Prefrontal cortex
 - D Primary visual cortex

- 11 Which regions of the brain contribute to coordination, precision and accurate timing of voluntary muscle movement?
- A Cerebrum and forebrain
 - B Basal ganglia and cerebellum
 - C Amygdala and prefrontal cortex
 - D Frontal lobe and Geschwind's territory



- 12 A symptom of Alzheimer's disease is
- A tremor.
 - B disorientation.
 - C rigid muscles.
 - D impaired posture.
- 13 The cerebellum plays a critical role in
- A regulating emotional balance.
 - B controlling muscles responsible for speech articulation.
 - C comprehending language and forming meaningful sentences.
 - D coordinating muscle movements and maintaining posture and balance.
- 14 Which language-processing region of the brain has been damaged if a person has difficulty comprehending language but can still speak and form grammatical sentences?
- A Broca's area
 - B Wernicke's area
 - C Parkinson's territory
 - D Geschwind's territory
- 15 What two divisions make up the autonomic nervous system?
- A Brain and spinal cord
 - B Brain and somatic nervous system
 - C Sensory neurons and motor neurons
 - D Sympathetic nervous system and parasympathetic nervous system

- 16 The hand movements that musicians use when playing the guitar are most likely coordinated by which brain area?
- A Thalamus
 - B Cerebellum
 - C Prefrontal cortex
 - D Primary motor cortex
- 17 Which ion is primarily responsible for initiating the release of neurotransmitters at the synaptic cleft?
- A Sodium (Na^+)
 - B Potassium (K^+)
 - C Calcium (Ca^{2+})
 - D Chloride (Cl^-)

Short response

- 18 **Identify** the area that is likely to be damaged if a patient is unable to move their right hand. (1 mark)
- 19 **Identify** which branch of the nervous system the spinal cord belongs to and **describe** a polysynaptic spinal reflex referring to the role of interneurons in the process. (2 marks)
- 20 **Identify** the two brain areas implicated in the formation of implicit memories. (2 marks)



- 21 **Describe** the brain function that is distributed across the regions of the basal ganglia and the cerebellum. (1 mark)
- 22 **Describe** neurotransmission, with reference to action potentials and synaptic transmission. (2 marks)

23 Differentiate between sensory and motor neurons. (1 mark)

24 Describe the functions of the brain regions involved in the storage of explicit memory. (3 marks)



25 Differentiate between excitatory and inhibitory neurotransmitters, with specific reference to glutamate and gamma-aminobutyric acid (GABA). (2 marks)

26 Describe the role of acetylcholine in memory formation and how its deficiency is related to Alzheimer's disease. (2 marks)

27 Explain the importance of the limbic system and prefrontal cortex for the experience of emotions. (2 marks)

28 Chronic alcoholism is often associated with a disturbed gait and balance, typically due to alcohol damage to neural systems.

a Identify the brain area most likely affected by chronic alcoholism. (1 mark)

b Explain the interactions that occur in the brain to coordinate voluntary movement. (3 marks)

29 Discuss the impact of interference in neurotransmitter function on the symptoms of Parkinson's disease. (3 marks)

TOTAL MARKS

/42 marks

Processes of seeing and hearing

Introduction

What do cookies smell like? What about sunscreen? And what memories did thinking about those smells bring to mind? Perhaps cookies remind you of Christmas, while sunscreen reminds you of summer holidays at the beach. Smell is a powerful and primal sense, closely linked to memory and emotion. This is because unlike our other senses, the olfactory bulb, which is responsible for processing smell, bypasses the thalamus and connects directly to the hippocampus and amygdala, brain regions involved in memory and emotional processing (Herz, 2016; Wilson & Stevenson, 2006). This ancient system is vital for animals that rely on smell for survival, such as for tracking food, detecting predators and identifying mates. Humans, however, have evolved to depend far more on vision and hearing. Vision allows us to perceive a wide spectrum of colours, judge distances and process intricate details. Similarly, humans are one of the few species capable of creating, understanding and interpreting complex auditory patterns, such as language and music (Patel & Demorest, 2013).

As you will learn in this and the next module, seeing and hearing are far more complex than simply receiving stimuli. Our experiences, emotions and motivations play a big role in how we see and hear things. In this module we will explore sensation and perception with a focus on vision and hearing.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to the process of seeing and hearing before you start.

Subject matter

Science understanding

→ Describe the processes of seeing and hearing, with reference to:

- reception by accessory structures
- transduction by sensory receptors and receptive fields
- transmission to the CNS via the optic/acoustic nerves
- preliminary processing in the thalamus
- organisation and interpretation by the primary visual/auditory cortex.

Science as a human endeavour

- Consider that senses apart from seeing and hearing involve different modes of reception from the environment and different transmission pathways, e.g. the sense of smell is received chemically and is the only sense not transmitted by the thalamus.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify errors, and extraneous or confounding variables that are likely to influence results; and implement strategies to minimise systematic and random error, e.g.
 - type of participant selection and allocation
 - single-blind and double-blind procedures
 - counterbalancing
 - standardised instructions and procedures
- select, synthesise and use evidence to
 - explain findings
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- judge the reliability and validity of the experimental process
 - reliability of observers (selection, training)
 - reliability of psychological tests/measures
 - internal validity and external validity
 - validity of psychological tests/measures
- acknowledge sources of information with standard scientific referencing conventions.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 4.1

Sensation and perception



Learning intentions
and success criteria

Key ideas

- There are five human senses, which enable us to survive and thrive.
- Sensation is the process of detecting stimulus energy. It occurs in three sequential stages: reception, transduction and transmission.
- The minimum level of stimulus energy required for perception is called the absolute threshold.
- Perception is the process whereby our brains create meaning out of the received sensory information. The three stages of perception are selection, organisation and interpretation.

Introducing sensation and perception

We interact with our environment through our five primary senses – vision, hearing, touch, taste and smell. These senses allow us to detect and respond to the world around us, playing an essential role not only in surviving (e.g. detecting danger) but also in thriving (e.g. appreciating music and complex flavours). This interaction, for any of our senses, involves two interconnected processes: sensation and perception.

Sensation

sensation

detection of energy by specialised receptors in sense organs

stimulus

physical energy from the environment

reception

stimulus energy is received by the sense organ

absolute threshold

the minimum level of energy required for a stimulus outside our body to be detected by our internal senses

transduction

receptor cells convert stimulus energy into electrochemical nerve impulses

Sensation refers to the process of detecting **stimuli** – physical energy from the environment. Sensation involves three stages: reception, transduction and transmission.

Reception

Reception is the process through which sensory organs, such as the eyes, receive and detect external stimuli. Each of our senses have their own sensory organs and receptors that specialise in receiving the respective types of energy (Table 1).

For detection to occur, the stimulus energy must reach the sense organ at a level sufficient (the threshold) to activate the sense receptors. For example, you can hear your friend whispering if they are next to you, but not if they are on the other side of the room because the sound wave does not reach you with sufficient energy for the receptors in your ears to detect it. Researchers define **absolute threshold** as the minimum amount of stimulus energy needed to perceive a stimulus, in ideal conditions, 50 per cent of the time (Gustav Fechner, 1860, as cited in McBurney & White, 2009). Table 1 provides examples of the absolute threshold for each of our senses.

Modern researchers argue that detecting a stimulus is not that straightforward. For instance, signal detection theory suggests that stimulus detection involves both sensory processes and decision-making processes (Macmillan & Creelman, 2005). Factors such as attention, fatigue and motivation influence whether or not a stimulus is perceived. We will learn more about the influence of psychological factors on perception in the next module.

TABLE 1 Overview of our five major senses including examples of absolute thresholds. While these thresholds are scientifically established, they can vary due to environmental factors (e.g. noise, light) and psychological factors (e.g. fatigue, stress, motivation). For instance, someone who has experienced a break-in may become more sensitive to sounds at night, lowering their absolute threshold for hearing.

| Sense | Stimulus energy | Sense organ | Sensory receptors | Brain regions involved in initial processing | Absolute threshold example |
|---------|--|-------------|---|---|--|
| Vision | Light waves (our eyes can only detect the visible portion of the electromagnetic spectrum) | Eyes | Rods and cones in the retina at the back of the eye | Occipital lobe (primary visual cortex) | The flame of a candle 50 km away on a clear, dark night |
| Hearing | Sound waves (humans detect vibrations between 20 Hz and 20 kHz) | Ears | Hair cells in the cochlea | Temporal lobe (primary auditory cortex) | The ticking of a watch 6 m away |
| Touch | Mechanical energy (pressure), thermal energy (temperature) | Skin | Mechanoreceptors (pressure), thermoreceptors (temperature) and free nerve ending (pain) | Parietal lobe (somatosensory cortex) | The wing of a fly falling on the cheek from a height of 1 cm |
| Taste | Chemical molecules in food | Tongue | Gustatory receptors in taste buds | Frontal and temporal lobes (gustatory cortex) | One teaspoon of sugar dissolved in 10 L of water |
| Smell | Chemical molecules | Nose | Olfactory cilia | Frontal lobe (olfactory bulb) | One drop of perfume in a large house |

Transduction and transmission

Transduction is the process by which receptors change the energy of the stimulus into an electrochemical signal (nerve impulse). Once the stimulus energy has been converted into an electrochemical nerve impulse, it is then sent to the central nervous system for processing through a process called **transmission**.



FIGURE 1 A candle flame is relatively small in size, but your eyes can detect it from 50 kilometres away on a clear, dark night.

Perception

Perception is an active process whereby our brains create meaning out of the received sensory information. Several brain regions specialise in processing sensory information (Figure 2). Like sensation, it involves three stages: selection, organisation and interpretation.

- **Selection** – filtering out unimportant information to focus on relevant stimuli. We can't pay attention to all the millions of stimuli that we receive at the same time, so we pick out the ones that are important to us and pay attention to those. The **thalamus** is a structure in the brain that acts as a relay station, processing information from all senses (except smell). The thalamus helps to direct attention by filtering out irrelevant stimuli, before relaying the information to appropriate regions of the primary sensory cortices for further processing. For example, visual information is relayed to the primary visual cortex in the occipital lobes, while auditory information is relayed to the primary auditory cortex in the temporal lobes for processing.
- **Organisation** – grouping sensory information to form a coherent pattern
- **Interpretation** – assigning meaning to the sensory input based on our prior knowledge and expectations, motives and emotion.

transmission

nerve impulses are sent to the central nervous system

perception

the brain's process of making meaning of raw sensory stimuli

selection

the process of selecting important and filtering out unimportant information to focus on relevant stimuli

thalamus

a structure in the brain located between the cerebral cortex and the midbrain, just above the brain stem; responsible for relaying motor and sensory signals to the cerebral cortex

organisation

grouping sensory information received in the brain to make sense of it

interpretation

giving meaning to stimulus in the brain based on our past experiences, motives, values and context

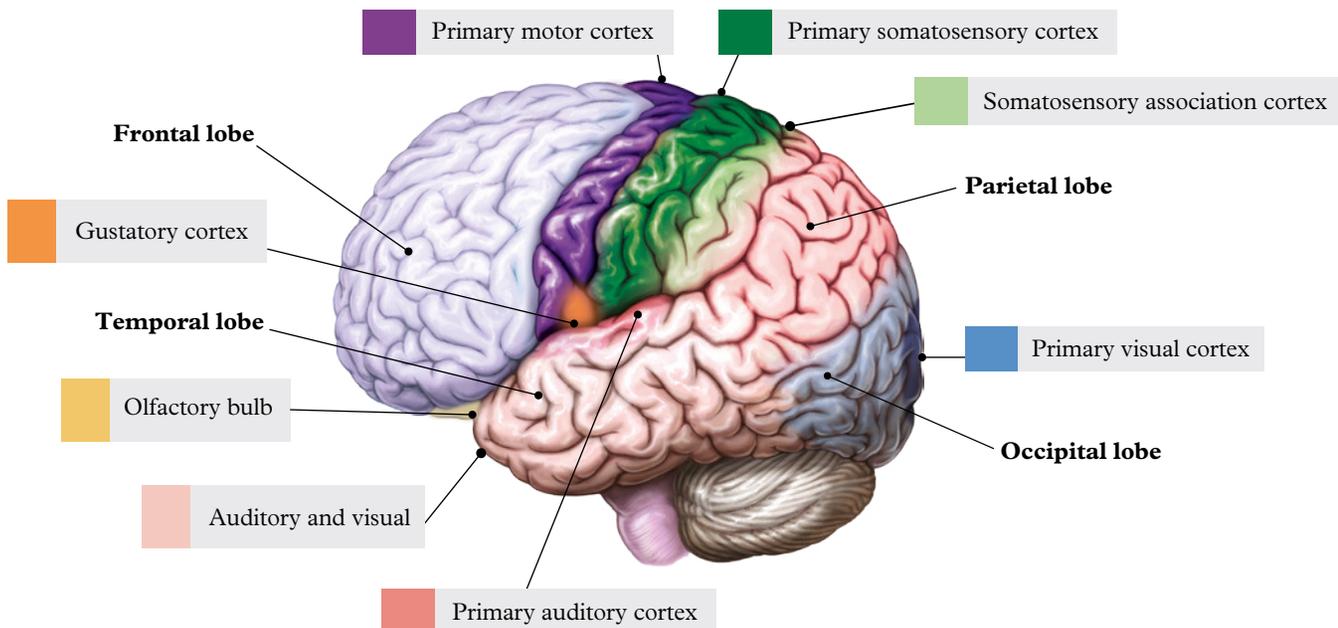


FIGURE 2 Specialised regions in the brain process sensory information.

Sensation and perception are considered adaptive processes. From an evolutionary perspective, the ability to see, hear, touch, smell and taste has developed over thousands of years and through millions of changes – leaving our senses perfectly suited to our environment and helping us survive and reproduce (Tooby & Cosmides, 1992).

Just as frogs have an inbuilt “bug-detecting” function in their visual system, which is designed to activate when a tasty insect is in view, humans have specialised areas in the brain that allow the perception of faces and facial expression. This can be seen in infants, who have an innate or inborn tendency to show greater interest in objects that look like a human face (Adolphs et al., 1996).

Real-world psychology

Sensory adaptation

On a scorching summer day in Australia, stepping into the ocean for a swim can feel shockingly cold at first. However, after a few minutes, the icy sensation fades, and the water begins to feel comfortable. This phenomenon is an example of sensory adaptation, where prolonged exposure to a stimulus causes a gradual decline in sensitivity.

Sensory adaptation occurs during the stages of sensation and perception. Initially, in the reception stage, cold receptors in the skin detect the sharp change in temperature as you enter the water. In the transduction stage, these receptors convert the physical sensation of cold into electrical impulses, which are transmitted to the brain. The brain then selects the most critical sensory input, such as the feeling of temperature, while filtering out less

relevant stimuli, such as the sound of waves. Over time, during the organisation and interpretation stages, the brain adjusts to the consistent temperature, reducing the intensity of the cold sensation.

Sensory adaptation allows humans to focus on changing or more important stimuli, like a rip current or a sudden rise in wave height, which might indicate danger. However, it can also have downsides. For example, in industries where workers are exposed to prolonged loud noises, sensory adaptation may reduce sensitivity to sound, delaying awareness of potential hearing damage.

This natural adjustment demonstrates how sensory systems enhance survival by managing environmental stimuli efficiently.

Apply your understanding

- Identify** the stage of sensation at which temperature receptors in the skin detect the cold water. (1 mark)
- Explain** why the cold sensation fades after prolonged exposure. (2 marks)
- Describe** one benefit and one potential drawback of sensory adaptation in real-world contexts. (2 marks)
- Identify** the part of the brain where preliminary processing of stimuli occurs. (1 mark)

Skill drill**Strategies to minimise bias and errors****Science inquiry skill: Planning investigations (Lesson 1.4), Processing and analysing data (Lesson 1.7)**

The Pepsi Challenge, launched in 1975 during the “Cola Wars”, was a marketing campaign featuring a single-blind taste test in which participants sampled two unmarked cups, one containing Pepsi and the other Coca-Cola, and indicated their preference. Pepsi claimed the test results showed a preference for Pepsi. However, critics such as Malcolm Gladwell (2005) have argued that the “sip test” method is flawed. Tasters often favour the sweeter beverage for a single sip, though their preference may differ when consuming a full can. The labelling of cups (e.g. “M” for Pepsi and “Q” for Coke) may also have biased the results by appealing to letter preferences.

Furthermore, prior branding or participant expectations could have influenced results when the drinks were revealed.

Practise your skills

- Identify** three potential sources of bias that could have influenced the results. (3 marks)
- Distinguish** between random and systematic error. Use examples from the scenario to support your answer. (3 marks)
- An independent lab wants to conduct a more scientific study of the Coke versus Pepsi challenge. They propose to use a double-blind methodology with counterbalancing. **Discuss** how these strategies would improve the validity of the findings. (4 marks)

Check your learning 4.1

Check your learning 4.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- Identify** the absolute threshold for vision. (1 mark)
- Identify** the three stages of sensation. (3 marks)
- Describe** what absolute threshold is. (1 mark)
- Describe** the role of the thalamus in sensation and perception. (2 marks)

Analytical processes

- Contrast** the brain regions involved in processing taste and smell. (1 mark)
- Distinguish** between sensation and perception. Use examples to support your answer. (3 marks)

Knowledge utilisation

- Predict** what might happen if a person’s sensory receptors for touch were damaged. (2 marks)

Lesson 4.2

Seeing

Key ideas

- Light (the visible part of the electromagnetic spectrum) is the physical energy that enables human vision.
- Vision depends on the three stages of sensation:
 - reception, when light enters the eye
 - transduction, when photoreceptors in the retina convert light into an electrochemical signal
 - transmission, when visual information from the retina is sent along the optic nerve to the thalamus and primary visual cortex for further processing.
- Vision also depends on the three stages of perception:
 - selection of relevant information, performed by the thalamus, filtering out irrelevant information
 - organisation of visual information, when the brain uses perception principles to make sense of stimuli
 - interpretation of visual information, when the brain coordinates between multiple brain regions, including the temporal lobe (to identify *what*) and the parietal lobe (to identify *where*).



Learning intentions
and success criteria

Sensing and perceiving visual stimuli

We do not consciously process visual stimuli. Right now, you are not telling your eyes to read the words on the page or to notice the colour of the images. Your brain is processing the visual stimuli (this text) unconsciously. Interestingly, when we see something, the image (or visual stimulus) that appears on our retinas (back of the eye) is upside down, back to front, blurred, crisscrossed by a network of veins, and patched by holes. Yet when this image has been sent to the brain, it is processed so that we see a crystal-clear picture and it is positioned correctly. The process itself – from receiving an image to ultimately interpreting what we see – is complex and has been studied extensively from a number of psychological perspectives. As with the other senses, vision involves six stages: reception, transduction and transmission (sensation), followed by selection, organisation and interpretation (perception). In this module, we'll look at how each of these stages works in the context of vision.

light

the visible part of the electromagnetic spectrum

amplitude

maximum displacement of a wave from equilibrium (resting position)

wavelength

the distance from peak to peak or trough to trough

Light

The physical energy that our eyes detect is **light**, a form of electromagnetic radiation that travels in waves. Humans can only perceive a small portion of the electromagnetic spectrum, known as the visible spectrum. Light waves, between wavelengths of 360 and 760 nanometres, form the visible spectrum (1 nanometre = 1 billionth of a metre).

The **amplitude** of a light wave determines the brightness of what we see: the higher the amplitude, the brighter the light would appear. On the other hand, **wavelength** affects our perception of colour. For instance, shorter wavelengths correspond to blue or violet light, while longer wavelengths appear red.

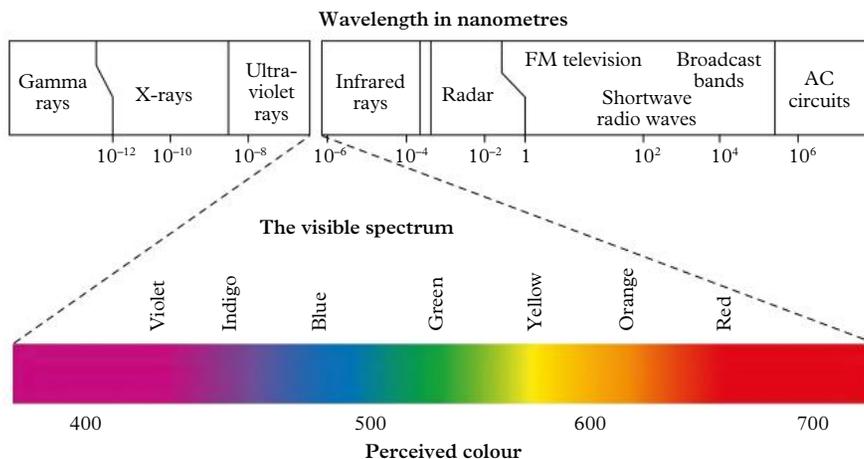


FIGURE 1 The visible spectrum is part of the electromagnetic spectrum. The wavelengths are shown in nanometres. The human eye can see a limited part of the electromagnetic spectrum.

Challenge

Animal vision

In 2009, researchers used isolated patches of peripheral primate retina and recorded neural activity *ex vivo* (outside the living body) using a multielectrode array (MEA). This method allowed them to simultaneously record information from hundreds of retinal ganglion cells without the need for invasive procedures on live animals (Gauthier et al., 2009).

This approach is common in retinal research because the retina can remain functional for several hours after being removed and kept in a nutrient-rich solution, allowing precise and ethical study of visual processing. **Consider** the use of animals, in regards to ethics, in discovering this information.

photoreceptor

a specialised cell located in the retina that detects and transduces light energy

rod

a photoreceptor providing peripheral vision in black and white; works in dim light

cone

a photoreceptor providing clear vision in colour; works in bright light

visual acuity

the clarity or sharpness of vision

Reception

Light enters the eye through the cornea (Figure 2), a tough transparent tissue that covers and protects the eye. It then passes through the pupil – the hole in the middle of the coloured part of the eye (the iris) – and the lens. The lens can adjust its shape to focus (bend) the incoming light onto the retina, which is located at the back of the eye. The retina contains specialised **photoreceptors**, which are light-sensitive cells called rods and cones (Kolb, 2003).

- **Rods** are sensitive to black, white and shades of grey. They function well in low-light conditions, such as night, but the trade-off is that they provide limited detail. Rods outnumber cones by 20:1, and they are located primarily in the peripheral retina, helping us with peripheral (side) vision.
- **Cones** are concentrated in the central retina and are responsible for colour vision. They help us see fine details (high **visual acuity**) and operate best in bright light.

FIGURE 2 The eye. The eye is a fantastic organ – it is very complex in construction, but we only need to know about a few of its structures.

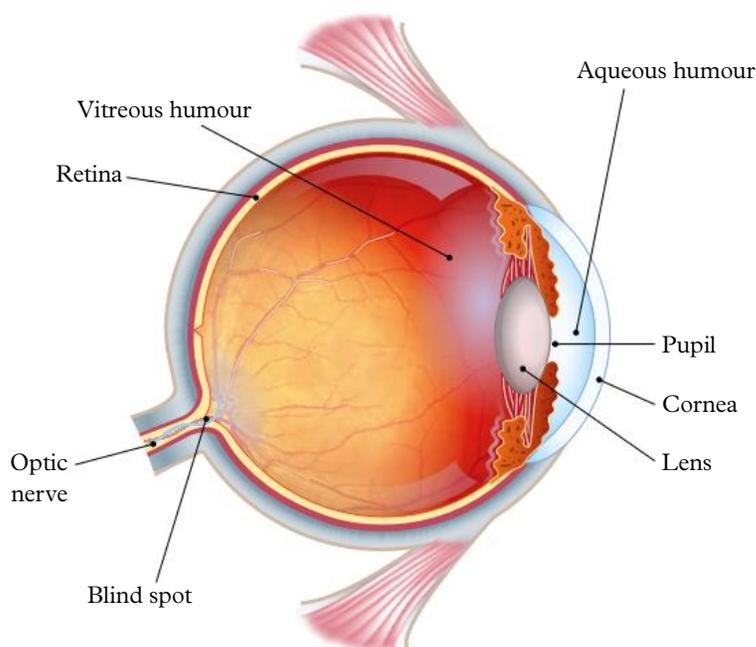




FIGURE 3 This boy can see clearly when swimming because the goggles allow the cornea to function properly. We are unable to see clearly underwater because the cornea of the eye is designed to refract or bend light travelling through air, not through water. We correct this by wearing swimming goggles or a diving mask; the layer of air between the water and the cornea allows us to see more clearly.

Transduction

Transduction in vision is the process by which light energy is converted into electrochemical nerve impulses that can be transmitted to the brain for processing. Transduction occurs in the retina. The process begins at the back of the retina, where light energy strikes the photoreceptors (rods and cones). Photoreceptors contain photopigments (light-sensitive molecules) that convert the light energy into **electrochemical signals**.

These electrical signals move forward through the layers of the retina. Bipolar cells act as an intermediary, synapsing onto several rods and/or cones on one end and ganglion cells on the other. Each ganglion cell is connected to a specific region of the retina known as its **receptive field**, which determines the portion of visual space that the cell responds to. Smaller receptive fields, like those in the fovea, allow for greater visual acuity and detail, while larger receptive fields in the periphery detect general shapes and motion. Ganglion cells' axons bundle together to form the **optic nerve**.

electrochemical signal

an electrical or chemical signal used for cell communication

receptive field

the specific area of sensory space (such as a region of the retina for vision) that a sensory receptor or neuron responds to

optic nerve

a bundle of ganglion axons that transmits visual information from the retina to the brain

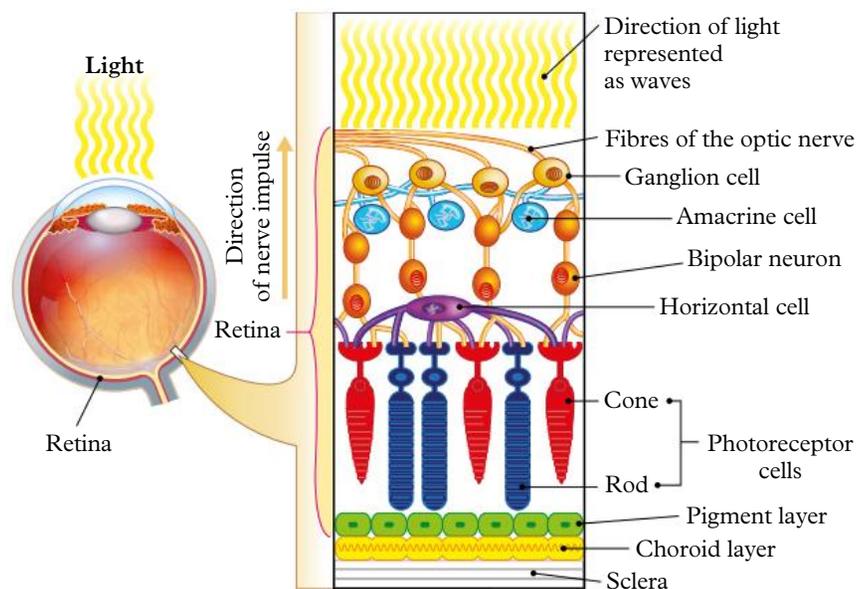


FIGURE 4 Structure of the retina

Transmission

During transmission, visual information travels from the retina along the optic nerves, one from each eye, to the optic chiasm then the thalamus and occipital lobes for processing. At the optic chiasm, half of the fibres from each retina cross over to the opposite side of the brain. This arrangement ensures that visual information from the left visual field of both eyes is processed by the right hemisphere of the brain, and information from the right visual field is processed by the left hemisphere.

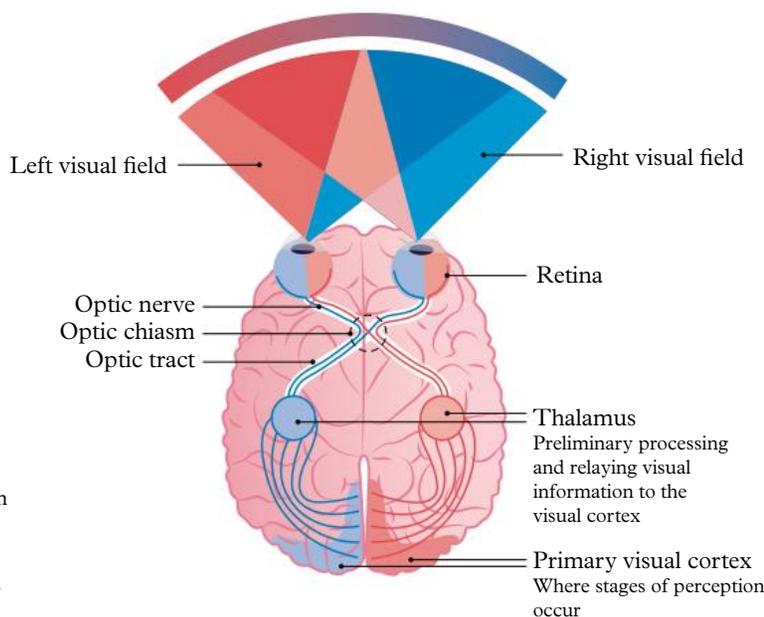


FIGURE 5 Visual information from each eye is transmitted along the optic nerve via the optic chiasm and thalamus to the primary visual cortex in each occipital lobe.

Selection

Preliminary processing of visual information occurs in the thalamus (Lesson 4.1), where irrelevant stimuli are filtered out. The information is then directed to the primary visual cortex, where the image is broken up by specialised cells called **feature detectors**. These cells respond to visual elements of an image such as lines of a certain length, angle or direction of movement. Feature detector cells are found in the optic nerve and in the primary visual cortex.

feature detector

a specialised neuron found in the optic nerve and primary visual cortex that individually responds to visual elements of an image

Skill drill

Referencing journal articles

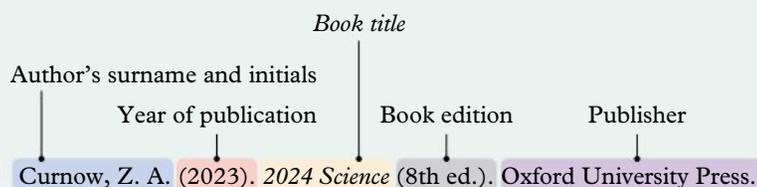
Science inquiry skill: Communicating scientifically (Lesson 1.9)

In Psychology, most of your research should focus on journal articles. Understanding referencing and being able to reference research are important parts

of psychology. Psychology uses a system called APA (American Psychological Association) referencing. This has a standard structure for books and articles.

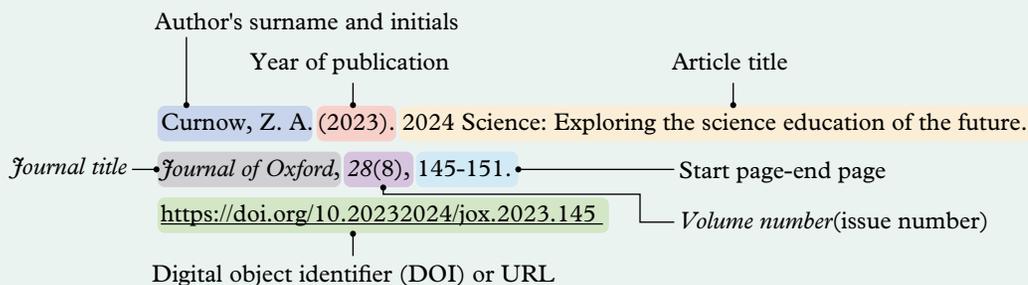
Books

For books, the following format is used:



Journal articles

For journal articles, the following format is used:



Practise your skills

Practise referencing journal articles for the research question: Is a cat's vision innate or acquired? Cats play an important role in the field of understanding vision. In the 1960s, scientists started a series of research investigations to understand how brains process visual inputs from the eye. Cats, which have relatively sharp vision, were their major subjects. In 1981, Hubel and Wiesel won a Nobel Prize for their research on cats' vision. Blakemore and Cooper

are also key researchers in this area; their findings suggest that vision in cats is learnt.

- 1 **Investigate** one resource by Hubel and Wiesel that investigates cat vision.
 - a **Identify** the date of publication. (1 mark)
 - b **Identify** whether the publication is an example of a journal article, book or news article. (1 mark)
 - c **Identify** the publisher. (1 mark)
 - d **Write** the reference in APA style. (1 mark)

Organisation and interpretation

Study tip

Keeping track of all your sources and research from the start will make it easier to write a rounded discussion. Using a logbook to keep a list of your references, the date of publication, methodology and results is a great way to have an overview of your learning

primary visual cortex

located at the back of the occipital lobe; processes information from the eyes

Organisation and interpretation are stages of visual perception that occur in the brain after sensory information has been transmitted to the **primary visual cortex**. In the organisation stage, the brain arranges and assembles visual information into a meaningful pattern using visual perception principles (e.g. perceptual constancies, Gestalt principles and depth cues; see Lesson 5.2). Once the image is re-assembled using these principles, it travels along two pathways simultaneously: to the temporal lobe, to identify the object; and to the parietal lobe, to judge where the object is in space (in relation to our visual field and ourselves).

Interpretation is the stage whereby the visual stimulus is given meaning. The temporal lobes identify the stimulus by comparing incoming information with information already stored in memory. Past experiences, motives, values and context help us understand what we are looking at by contributing to our perceptual set (discussed in Module 5). While information is sent to the temporal lobes, it also travels to the parietal lobes, which assist in judging where the object is in space (in relation to our visual field and us).

Patients who have damage or tumours in parts of the temporal lobe that are responsible for identifying a visual stimulus may be unable to recognise an object or a familiar face (this is called prosopagnosia). Patients who have damage to the parietal lobe will be able to recognise an object, but they may constantly bump into furniture or misjudge picking up their knife and fork.



FIGURE 6 When people are whale watching, they process the stimulus (humpback whale) when light enters the eye via the cornea. They are able to identify the stimulus as a whale when they reach the interpretation stage. This happens so quickly we are unaware it is happening.

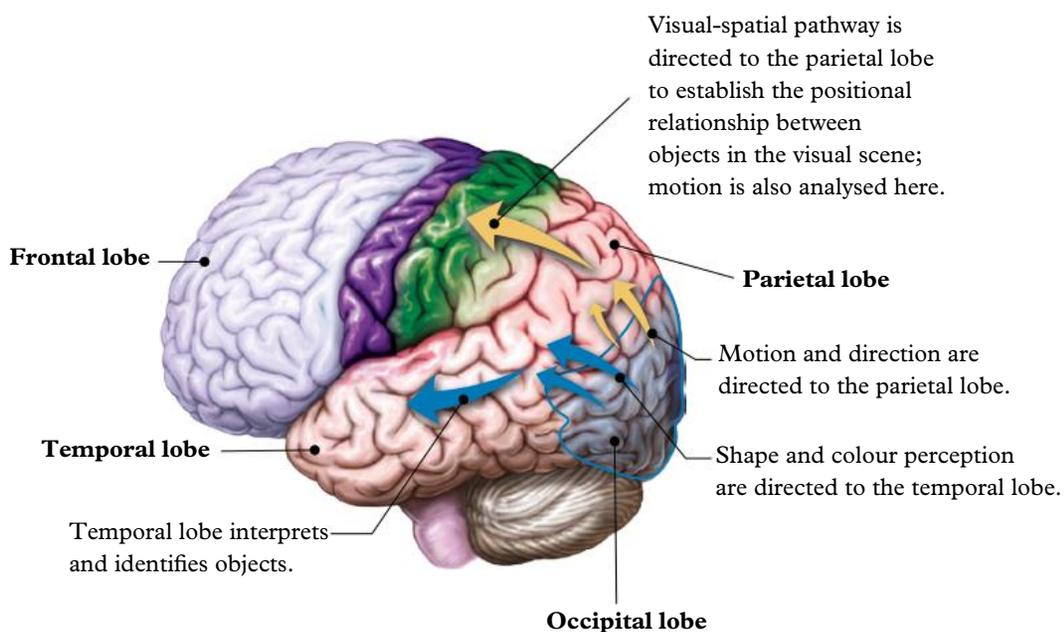


FIGURE 7 The brain makes sense of what we see.

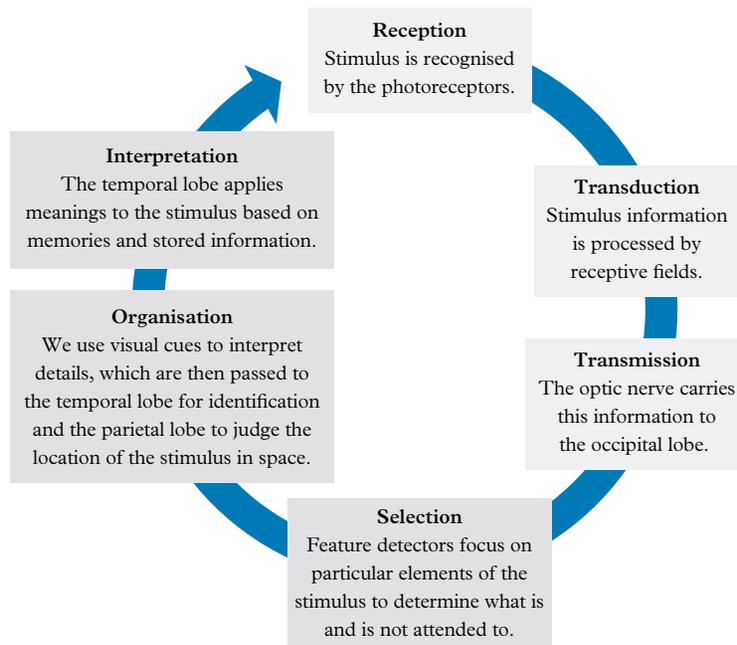


FIGURE 8 The first three steps show the process of sensation, while the remaining steps show the process of perception.

Check your learning 4.2



Check your learning 4.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- Describe** the following stages of seeing in your own words
 - reception (1 mark)
 - transduction (1 mark)
 - transmission (1 mark)
 - selection (1 mark)
 - organisation (1 mark)
 - interpretation. (1 mark)
- Describe** what is meant by receptive field. (2 marks)
- Describe** the role of feature detectors in visual perception. (2 marks)

Analytical processes

- You have soccer practice after school during winter and your coach wants you to play until it's almost dark. **Determine** which photoreceptor would be better suited to low-light conditions. (1 mark)
- Grandma is busy knitting you a pair of woollen socks. She is sitting in her lounge with her spectacles on and a bright light next to her. She needs to focus on what she's doing. **Determine** which photoreceptors would be best suited to activities that require clear vision in bright light. (1 mark)

Knowledge utilisation

- Predict** how psychological factors such as stress or emotion could influence visual perception. (2 marks)

Lesson 4.3

Hearing

Key ideas

- Sound is the physical energy that enables human hearing.
- Hearing depends on the three stages of sensation:
 - reception, which occurs when sound enters the ear
 - transduction, which occurs when specialised receptors (hair cells) in the cochlea convert vibrations into an electrochemical signal
 - transmission, which occurs when auditory information from the cochlea is sent along the auditory nerve to the thalamus and primary auditory cortex for further processing.
- Hearing also depends on the three stages of perception:
 - selection, when relevant information is selected by the thalamus and irrelevant information is filtered out
 - organisation, when the brain organises auditory information into meaningful patterns
 - interpretation, when auditory information, such as recognising music, occurs when the brain compares incoming auditory signals with stored memories.



Learning intentions and success criteria

Sound

Sound is a form of physical energy that is created by the vibration of objects and transmitted as a wave through a medium (e.g. air or water). Key characteristics of a sound wave (Figure 1) include amplitude, wavelength and frequency.

Amplitude

The amplitude of a sound wave refers to the maximum displacement of particles in the medium (such as air, water or a solid) from their rest position (equilibrium). This is caused by the transference of energy to the medium, such as the force applied by plucking a guitar string. The greater the applied force, the larger the amplitude of the wave, which results in a louder perceived sound (higher volume).

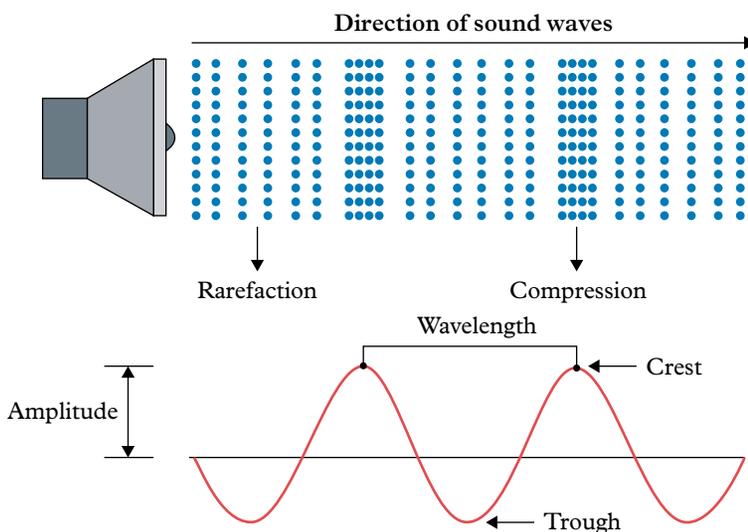


FIGURE 1 Sound is a longitudinal wave consisting of alternating compressions and rarefactions (top image). The graph is a representation of the wave in a different form where the compressions correspond to peaks, and rarefactions to troughs.

Study tip

Remember, the stages of sensation and perception are the same for all our senses. To simplify your study, learn definitions for the stages given in Lesson 4.1, and then summarise key differences such as the sensory organs (i.e. eyes vs ears), sensory receptors (i.e. photoreceptors vs hair cells) and regions of the brain that process the information (i.e. primary visual cortex vs primary auditory cortex).

Wavelength

Wavelength is the distance between two consecutive peaks or troughs in a wave. It is inversely related to frequency; higher frequencies have shorter wavelengths, while lower frequencies have longer ones.

Frequency

Frequency is a measure of the number of wave cycles per second. It is measured in hertz (Hz). Humans can detect a frequency range of approximately 20 Hz to 20,000 Hz (Figure 2), with our sensitivity to pitch decreasing as we age (Figure 3; Wasano et al., 2021).

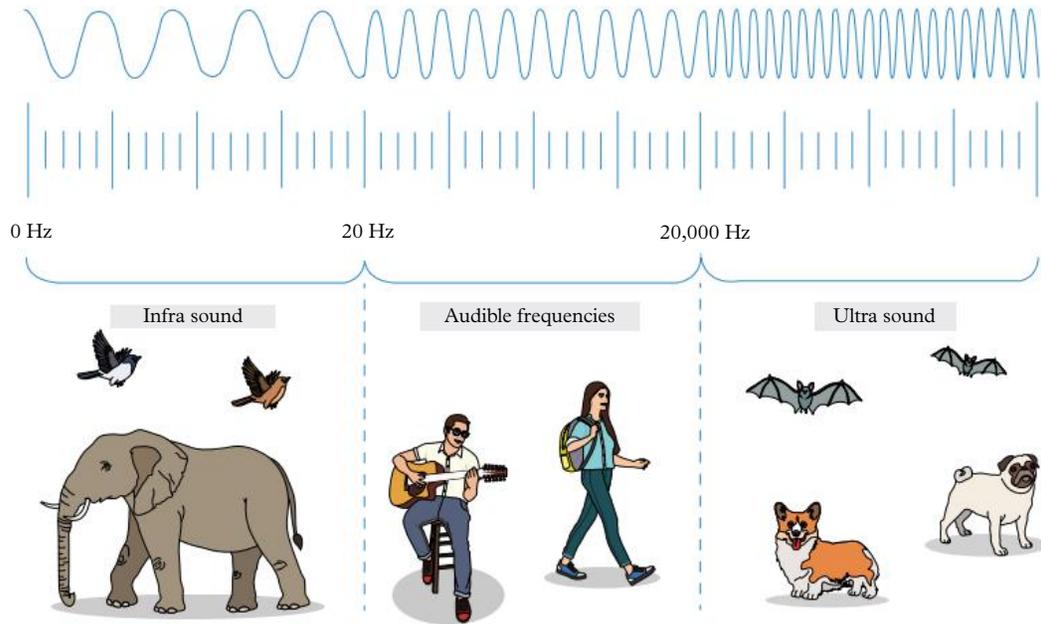


FIGURE 2 Humans can detect frequencies in the range of 20 Hz to 20,000 Hz. Other animals, like bats and dogs, can detect much higher, ultrasonic sounds, while elephants detect lower frequencies.

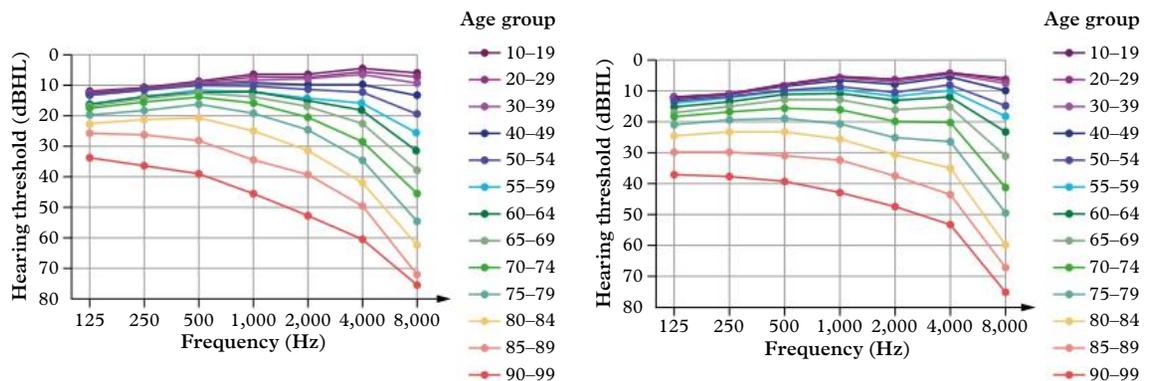


FIGURE 3 Our sensitivity (ability to detect) pitch changes with age. The diagram shows the change in mean hearing thresholds for (A) Japanese men and (B) Japanese women.

Reception

Our ears are the sensory organs that transform vibrations in the air into electrochemical signals that our brain can interpret and make meaning from. The ear (Figure 4) has three main sections: outer ear (to collect and magnify sounds), middle ear (which converts air vibration into movement of tiny bones) and inner ear (where transduction occurs).

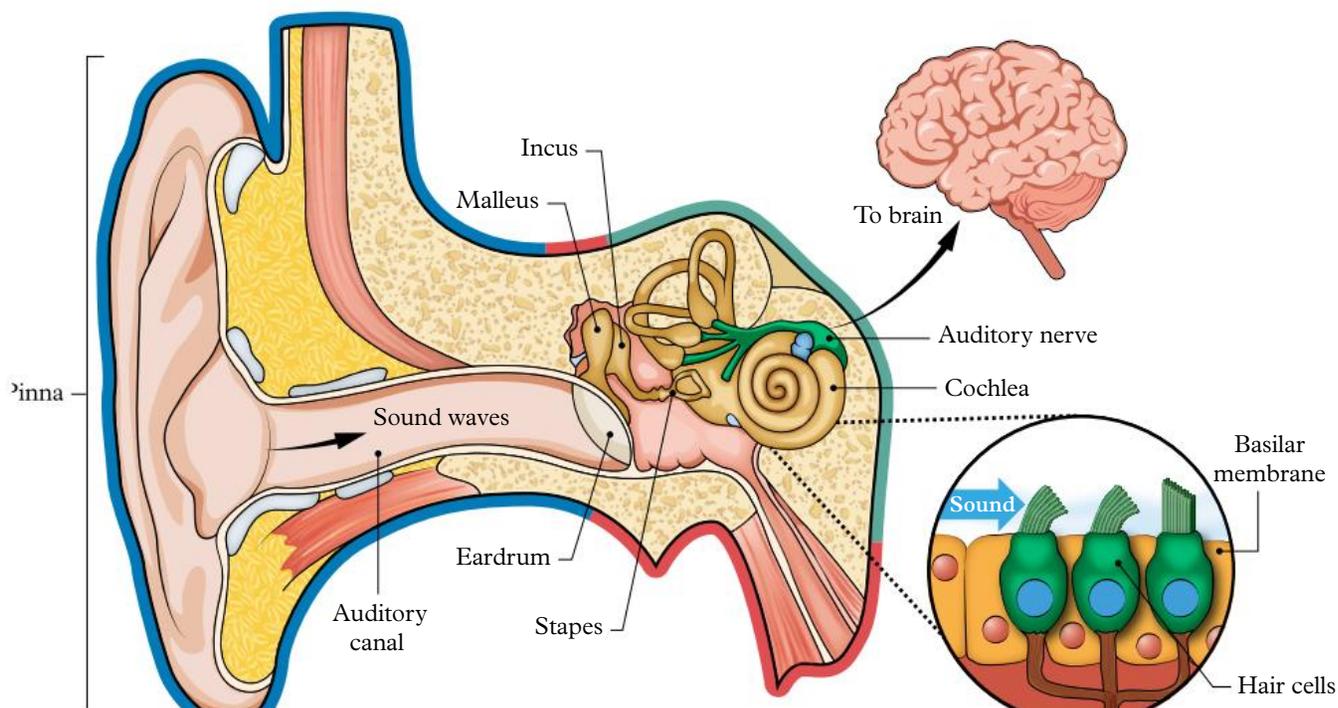


FIGURE 4 The structure of the human ear

Sound waves are collected by the pinna (the outer, visible part of the ear) and travel through the auditory canal to the eardrum. The eardrum vibrates in response to sound waves, and these vibrations are amplified by three small bones in the middle ear: the malleus (hammer), incus (anvil) and stapes (stirrup). The vibrations pass into the cochlea, a fluid-filled, spiral-shaped structure in the inner ear. The cochlea contains the basilar membrane, lined with hair cells (sensory receptors for hearing).

Transduction

Transduction, the conversion of sound waves into electrochemical signals, occurs in the cochlea. The movement of fluid in the cochlea, caused by the mechanical vibration of the small bones in the middle ear, bends the tiny hair cells along the basilar membrane. When the hair cells bend, they generate electrical signals that are sent to the brain via the auditory nerve.

The way these hair cells respond depends on the frequency, or pitch, of the sound (Moore, 2003, and Yost, 2009, as cited in Weiten, 2013):

- Low-frequency vibrations are detected by the rate at which the entire basilar membrane vibrates, a process known as frequency coding.
- High-frequency sounds cause specific areas of the basilar membrane to vibrate more intensely than others, a process known as place coding.
- For complex sounds (e.g. musical chords or speech), the brain uses a combination of frequency and place coding to accurately interpret the pitch and tone.

Hair cells have a limited capacity to regenerate, making them particularly vulnerable to damage from loud sounds or ageing, which can lead to hearing loss (Figure 3).

Study tip

For a more detailed explanation of how we perceive pitch, see Lesson 5.3.

Transmission and selection

auditory nerve

a bundle of axons that transmits auditory information from the cochlea to the other regions in the brain

Auditory information is transmitted along the **auditory nerve**, from the cochlea to the thalamus, via the brain stem. After preliminary processing, the thalamus directs auditory information to the primary auditory cortex in the temporal lobes. Within the auditory cortex, specialised neurons that function similarly to the feature detectors found in the visual cortex, respond to specific sound attributes, such as frequency modulation and amplitude changes (Nelken, 2002).

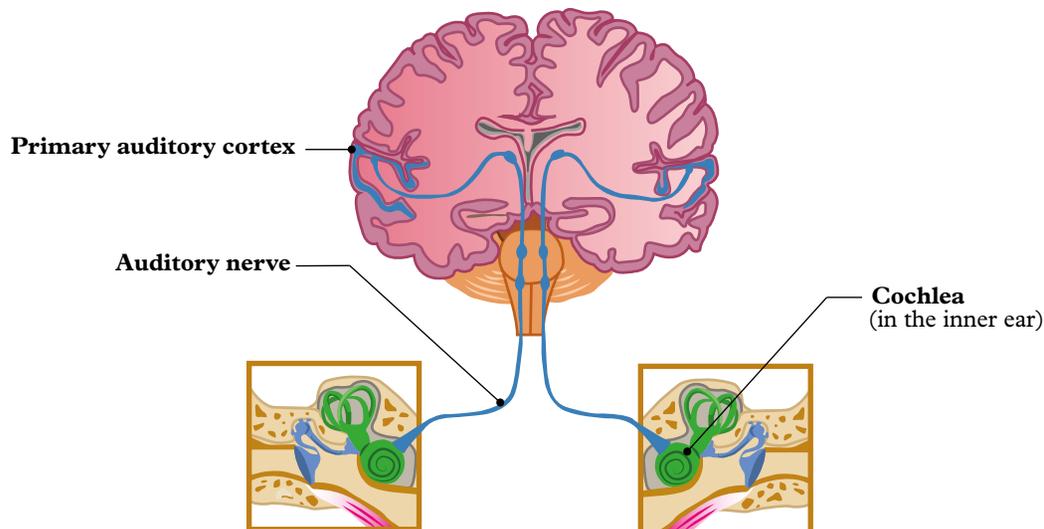


FIGURE 5 Auditory information is transmitted from the cochlea in the ears, through the brain stem and thalamus, to the primary auditory cortex in the temporal lobes.

Organisation and interpretation

The brain organises auditory information into meaningful patterns. It determines the source of a sound using cues like differences in the timing and intensity of sound reaching each ear (binaural cues). For example, we can identify the direction of a car horn even without seeing the vehicle. The temporal lobes also help us to interpret sounds, such as understanding speech, and recognising music and familiar sounds, by comparing incoming auditory signals with stored memories. The Mondegreen effect (Wright, 1954) is a hearing illusion where a person mishears or misinterprets words or phrases in, for example, a favourite song. This illusion highlights how the brain organises and interprets auditory information, and doesn't just detect vibrations.

Check your learning 4.3



Check your learning 4.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- Identify** which part(s) of the ear are involved in the stages of hearing
 - reception (1 mark)
 - transduction (1 mark)
 - interpretation. (1 mark)
- Identify** the sensory receptor in the ear. (1 mark)

Analytical processes

- Distinguish** between which aspects of sound the amplitude and frequency of a wave correspond to. (1 mark)
- Compare** the roles of the thalamus and the auditory cortex in processing sound. (2 marks)

Knowledge utilisation

- Discuss** the effect of damage to hair cells on a person's ability to hear. (3 marks)

Lesson 4.4

Review: Processes of seeing and hearing

Summary

4.1

- There are five human senses, which enable us to survive and thrive.
- Sensation is the process of detecting stimulus energy. It occurs in three sequential stages: reception, transduction and transmission.
- The minimum level of stimulus energy required for perception is called the absolute threshold.
- Perception is the process whereby our brains create meaning out of the received sensory information. The three stages of perception are selection, organisation and interpretation.

4.2

- Light (the visible part of the electromagnetic spectrum) is the physical energy that enables human vision.
- Vision depends on the three stages of sensation:
 - reception, when light enters the eye
 - transduction, when photoreceptors in the retina convert light into an electrochemical signal
 - transmission, when visual information from the retina is sent along the optic nerve to the thalamus and primary visual cortex for further processing.
- Vision also depends on the three stages of perception:
 - selection of relevant information, performed by the thalamus, filtering out irrelevant information
 - organisation of visual information, when the brain uses perception principles to make sense of stimuli
 - interpretation of visual information, when the brain coordinates between multiple brain regions, including the temporal lobe (to identify *what*) and the parietal lobe (to identify *where*).

4.3

- Sound is the physical energy that enables human hearing.
- Hearing depends on the three stages of sensation:
 - reception, which occurs when sound enters the ear
 - transduction, which occurs when specialised receptors (hair cells) in the cochlea convert vibrations into an electrochemical signal
 - transmission, which occurs when auditory information from the cochlea is sent along the auditory nerve to the thalamus and primary auditory cortex for further processing.
- Hearing also depends on the three stages of perception:
 - selection, when relevant information is selected by the thalamus and irrelevant information is filtered out
 - organisation, when the brain organises auditory information into meaningful patterns
 - interpretation, when auditory information, such as recognising music, occurs when the brain compares incoming auditory signals with stored memories.

Review questions 4.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 What part of the brain processes sensations such as pressure and temperature?
 - A Frontal lobe
 - B Parietal lobe
 - C Occipital lobe
 - D Temporal lobe
- 2 What does the absolute threshold refer to?
 - A The lowest intensity of stimulus energy that can be detected
 - B The greatest intensity of stimulus energy that can be detected
 - C The lowest intensity of stimulus energy that can be detected 50 per cent of the time
 - D The lowest intensity of stimulus energy that can be detected 100 per cent of the time
- 3 What is the correct sequence of stages in sensation and perception?
 - A Reception, transmission, transduction; selection, interpretation, organisation
 - B Reception, selection, transmission; transduction, organisation, interpretation
 - C Reception, selection, organisation; transmission, transduction, interpretation
 - D Reception, transduction, transmission; selection, organisation, interpretation
- 4 Which statement about visual receptors is correct?
 - A Rods and cones both distinguish colours.
 - B Rods and cones both distinguish black and white.
 - C Rods can respond in bright light but not in low levels of light.
 - D Cones can respond in bright light but not in low levels of light.
- 5 What is the role of the retina in vision?
 - A It regulates the amount of light entering the eye.
 - B It focuses light onto the lens to create a clear image.
 - C It converts light into electrochemical signals for the brain.
 - D It transmits visual information directly to the occipital lobe.
- 6 Cones are most responsive to electromagnetic energy of which colour?
 - A Violet/blue
 - B Blue/green
 - C Green/yellow
 - D Orange/red
- 7 Where are feature detector cells found?
 - A In the cornea and retina
 - B In the retina and primary visual cortex
 - C In the optic nerve and primary visual cortex
 - D In the cornea, retina, optic nerve and primary visual cortex
- 8 Which statement about depth cues is correct?
 - A They are principles used during the organisation stage of visual perception.
 - B They are principles used during the interpretation stage of visual perception.
 - C They are principles used during the organisation stage of auditory perception.
 - D They are principles used during the interpretation stage of auditory perception.
- 9 Which are the sensory organs of vision and hearing?
 - A Eyes and ears
 - B Retina and cochlea
 - C Photoreceptors and hair cells
 - D Primary visual cortex and primary auditory cortex
- 10 Which is the correct statement?
 - A The pupil helps to focus light onto the retina.
 - B Light initially enters the eye through the retina.
 - C The actual image on our retina is upside down and back to front.
 - D The auditory nerve contains light-sensitive cells called photoreceptors.
- 11 In relation to vision, sensation involves which of the following processes?
 - A Transduction, reception and selection
 - B Transmission, reception and transduction
 - C Interpretation, organisation and reception
 - D Selection, organisation and interpretation
- 12 Which accessory structure in hearing amplifies sound vibrations?
 - A Pinna
 - B Cochlea
 - C Eardrum
 - D Middle ear bones (malleus, incus, stapes)

- 13 Which nerve transmits visual information to the brain?
A Optic nerve **B** Auditory nerve
C Olfactory nerve **D** Vestibular nerve
- 14 How does the amplitude of a wave influence our perception of sound?
A Amplitude corresponds to pitch.
B Amplitude corresponds to colour.
C Amplitude corresponds to volume.
D Amplitude corresponds to brightness.
- 15 What is the correct definition of a receptive field in the context of sensory perception?
A The entire sensory organ that detects environmental stimuli, such as the eye or ear
B The region of the brain that processes sensory signals detected by a specific neuron
C The area of the retina that transmits signals directly to the optic nerve for visual interpretation
D The precise area within sensory space where a stimulus must occur to activate a particular sensory receptor or neuron

Review questions 4.4B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 16 **Identify** the role of the retina in vision. (1 mark)
- 17 **Identify** the part of the brain that relays sensory information to the appropriate cortex. (1 mark)
- 18 **Describe** how amplitude and wavelength of light affect perception. (1 mark)
- 19 Copy and complete the following table to **summarise** the stimulus energy and location of receptors involved in sensation. (6 marks)

| Sense | Stimulus energy | Main organ | Location of receptors |
|---------|-----------------|------------|-----------------------|
| Seeing | | | |
| Hearing | | | |

- 20 **Describe** the function of feature detector cells in visual and auditory perception. (2 marks)
- 21 **Identify** the stage(s) of sensation that involve photoreceptors. (2 marks)
- 22 **Describe** how hair cells respond to differences in frequency or pitch with reference to low frequency, high frequency and complex sounds. (3 marks)

Analytical processes

- 23 The components of visual and auditory sensation and perception are shown.

| Vision | Hearing |
|----------------|----------------|
| Rods and cones | Ear |
| Ganglion axons | Temporal lobe |
| Lens | Auditory nerve |
| Eye | Hair cells |
| Light waves | Sound waves |
| Retina | Eardrum |
| Occipital lobe | Cochlea |

- a** Match the components for visual sensation and perception with their auditory processing equivalents. (7 marks)
- b** **Organise** the components in the Vision column in the correct order of visual sensation and perception. (1 mark)
- c** **Organise** the components in the Hearing column in the correct order of auditory sensation and perception. (1 mark)

- 24 **Distinguish** between perception and sensation. (1 mark)
- 25 **Compare** the role of the ganglion cells in transduction and transmission. (2 marks)
- 26 **Identify** the two neural pathways involved in the visual organisation process and **compare** their roles. (4 marks)
- 27 Jake was looking at a tree in the distance. Jake's friend told him that his eyes were actually seeing the tree upside down, but that his visual system was correcting this image for him. **Determine** the process that Jake's friend was referring to. (1 mark)
- 28 Shoko recently got her driver's learner permit and has been practising driving to and from school in daylight hours. Recently, she has also begun to drive to her netball game, which is at 8 pm on a weeknight. Shoko has discovered that it is harder to see while driving at night. Based on your understanding of photoreceptors in visual perception, **explain** why Shoko is finding it harder to see at night. (2 marks)

Knowledge utilisation

29 Predict how damage to the temporal lobe would affect a person's visual and auditory perception.

Justify your response with reference to the organisation stages. (4 marks)

30 Visual perception involves the integration and coordination of several systems in the brain. Each lobe plays a different part in perception.

a Identify the role the frontal lobe contributes to visual perception. (1 mark)

b Infer the role the hippocampus plays in visual perception. (1 mark)

c Predict what would happen to someone's vision if their right occipital lobe were damaged. (2 marks)

Data drill

Subliminal advertising and consumer behaviour

The concept of subliminal advertising gained widespread attention when James Vicary claimed to have increased sales of Coca-Cola and popcorn in a movie theatre by flashing subliminal messages on the screen. Although Vicary's findings were later exposed as a hoax, the idea of influencing consumer behaviour without conscious awareness remained intriguing.

Karremans and colleagues (2006) examined whether subliminal priming – a process in which stimuli are presented below the threshold of conscious perception – can influence consumer behaviour. Participants were exposed to a subliminal message promoting Lipton Ice, after which participants chose between Lipton Ice or Spa Rood, a brand of mineral water, if they were offered a drink.

Their intention to also drink Lipton Ice, Spa Rood or Coca Cola was also measured.

It was hypothesised that subliminal priming would influence participants' drink choices, but only if they were thirsty.

Design and method

- Independent groups experimental design
- Participants: 105 Dutch students, 30% male, 70% female
- Independent variables:
 - Level of thirst (thirsty vs non-thirsty). Level of thirst was manipulated by giving participants a salty treat.
 - Subliminal message. Participants completing a perception task on a computer were flashed

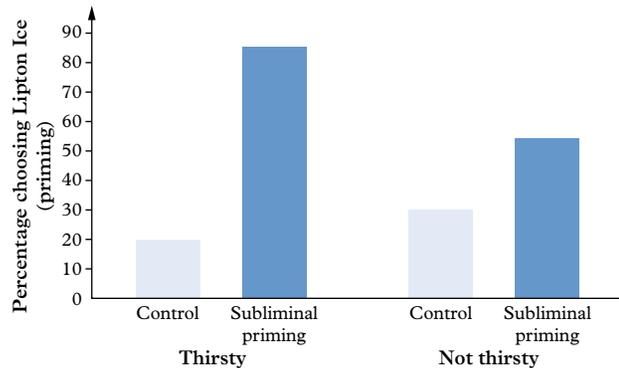


FIGURE 1 Percentage of participants who chose Lipton Ice. Statistical analysis on differences between drink choices in thirsty condition $p < 0.001$, and not-thirsty condition $p < 0.07$.

25 times with either “Lipton Ice” or “Npeic Tol” for 23 milliseconds (beyond conscious awareness).

- Dependent variable: Proportion of participants who chose to drink Lipton Ice

Apply understanding

- 1 Identify** which group was least affected by subliminal priming. (1 mark)
- 2 Determine** the number of thirsty participants in the control condition that chose Lipton Ice. (1 mark)

Analyse data

- 3 Identify** the relationship between subliminal priming and drink choice with reference to the trends within and between thirst conditions. (4 marks)

Interpret evidence

- 4 Draw a conclusion** about the effect of subliminal priming on drink choice. (4 marks)



Module 4 checklist: Processes of seeing and hearing

MODULE

5

Influences on sensation and perception

Introduction

What if I told you that colour doesn't exist? Two people can look at the same image and "see" it entirely differently. Remember the viral internet sensation of *The Dress*: was it blue and black, or white and gold? This phenomenon captivated millions because it revealed a simple truth – we don't see the world as it is, but rather as the by-product of our biology, culture and experiences. Similarly, sound exists only as vibrations in the air until our auditory system transforms them into the rich tapestry of music and voices.

In the previous module, we explored sensation and perception. Sensation is the process by which we collect raw data about our physical environment – it is shaped by our biology. For example, a person with colour blindness perceives the same light waves differently, and someone with hearing loss won't hear certain frequencies. Perception, on the other hand, is the cognitive process by which our brain organises, interprets and assigns meaning to physical stimuli. Perception is influenced by psychological factors, such as emotion, motivation and past experience including culture and language.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to the influences on sensation and perception before you start.

Subject matter

Science understanding

- Explain psychological aspects of sensation and perception including:
 - perceptual set with respect to past experience, context, motivation and emotional state
 - visual perception principles, e.g. Gestalt principles, depth cues, and visual constancies
 - loudness, pitch and timbre.
- Describe the effect of cultural influences on visual (de Bruine, Vredeveldt & van Koppen 2018) and auditory (Patel & Demorest 2013) perception.

Science as a human endeavour

- Appreciate that seminal research into the effect of cultural influences on perception (e.g. Hudson 1960; Deregowski 1972) has continued to be modified and replicated by later researchers (de Bruïne, Vredevelde & van Koppen 2018; Morrison & Demorest 2009).
- Consider the effect of expectation on perception, e.g. the role of frequency in developing perceptual sets in Bugelski & Alampay 1961.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and operationalise variables to be manipulated, measured and controlled
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - explain findings
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 5.1

Psychological influences on perception

Key ideas

- Bottom-up processing builds perception from raw sensory data, relying on the environment without prior knowledge.
- Top-down processing uses prior experience, expectations and context to assign meaning and significance to stimuli.
- Perceptual set, shaped by past experiences, context, motivation and emotions, acts as a mental framework that influences how we interpret sensory information, helping us focus on relevant stimuli but also sometimes leading to biased or misinterpreted perceptions.



Learning intentions and success criteria

Top-down and bottom-up processing

Perception operates through two complementary and parallel processes: bottom-up processing and top-down processing.

Bottom-up processing (Figure 1) builds perceptions from raw sensory data, constructing a whole stimulus by combining its individual parts. This process is stimulus-driven, meaning it relies on sensory information from the environment without influence from prior knowledge or expectations. Bottom-up processing typically starts in the **primary sensory cortex**, where raw sensory data is processed, and then moves to the **association cortex** for higher-level integration (Koch, 1993).

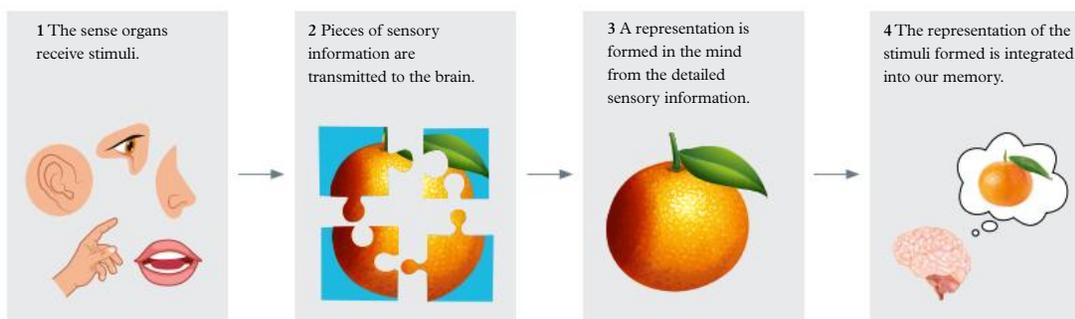


FIGURE 1 Bottom-up processing

In contrast, using **top-down processing** (Figure 2), our perceptions of stimuli are influenced by our prior knowledge, expectations and context. Top-down processing involves integrating information from our memory, to assign meaning and significance (McClelland & Plaut, 1993).

bottom-up processing

perceptions are built from incoming sensory data, constructing a whole stimulus by combining its individual parts

primary sensory cortex

specialised region of the brain where raw sensory data is processed

association cortex

specialised region of the brain where multiple streams of sensory data are integrated

top-down processing

perceptions of stimuli are influenced by our prior knowledge, expectations and context

Study tip

Recall that perception includes organisation, where sensory data is arranged into stable, recognisable forms, and interpretation, where meaning is assigned by drawing on past experiences and memory. For instance, organisation may help us perceive the shape of an object, while interpretation identifies what the object is and its significance.

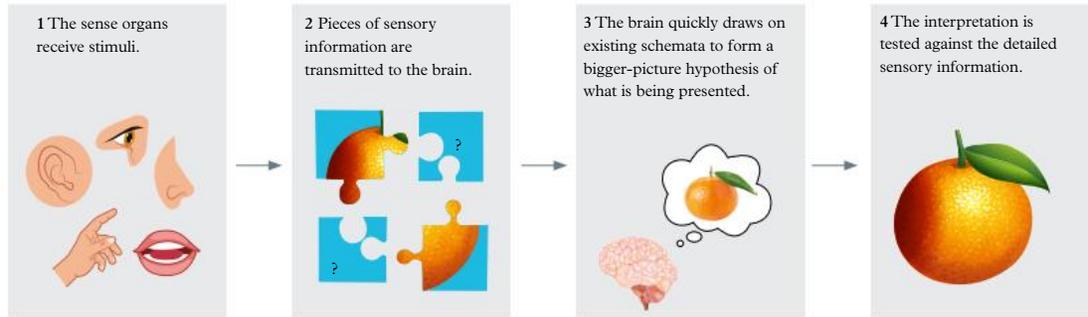


FIGURE 2 Top-down processing

For example, using bottom-up processing of the image shown in Figure 3 would interpret the image as it is, a collection of curved black lines on a white background. Using top-down processing, we would use our prior experience and knowledge to identify the intersecting circles as a symbol for the Olympics.

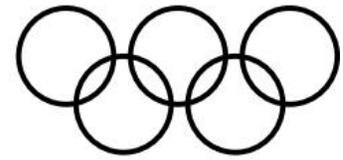


FIGURE 3 Perception of a stimulus involves both bottom-up and top-down processing.

Perceptual set

Our experiences play a significant role in shaping how we perceive the world around us. Experiences create perceptual expectations, which act as a top-down influence on perception.

Perceptual set refers to the mental framework that influences how we interpret sensory information, making certain interpretations more likely based on our past experiences, context, emotion and motivation. Perceptual set helps us focus on relevant information but can also lead to bias or misinterpretation.

Past experience

Knowledge gained from our experiences, including education, culture and language, can affect perception. For example, red beverages might be perceived as sweeter, based on an individual's experience of beverages in the past. Past experience can be especially influential if the experience holds significant personal meaning.

Context

The environment in which a perceived stimulus is observed, context, can have an immediate effect on our expectations. Bruner and Minturn (1955) presented participants with an ambiguous image, which could be interpreted as a "B" or "13", following either a sequence of letters or numbers. Most participants' interpretation matched the prior stimuli.

Motivation

Motivation, the drive to achieve what we desire or need at any given moment, directs our attention and influences the stimuli we attend to. This, in turn, influences our perception, as we are more likely to perceive stimuli related to that goal. For example, a hungry person is more likely to notice the smell of food.

Emotion

Emotions can bias perception by heightening sensitivity to stimuli that align with our emotional state or expectations. For example, in film and television, music significantly influences viewers' emotional responses. Studies have shown that when participants viewed film scenes, they perceived those without music as neutral while scenes accompanied by emotionally expressive music led viewers to perceive characters' emotions in line with the music's tone (Tan et al., 2007).

perceptual set

a predisposition to interpret stimuli in a particular way, according to expectations influenced by past experience, context, emotion and motivation

Perceptual set can influence both visual and auditory perceptions. Specific examples for each are given in Lessons 5.2 and 5.3 respectively.

Real-world psychology

Emotion, attention and colour in marketing

People make subconscious judgments about products within 90 seconds of seeing them, with colour influencing up to 90 per cent of these decisions (Singh, 2006). This connection between colour and perception may have evolutionary roots (Hupka et al., 1997). For example, red is linked to readiness and danger, which could stem from its association with ripe fruit, signalling readiness to eat, or blood, indicating potential threats. These associations make red particularly effective in marketing, as it captures attention and conveys urgency or importance. This is why red is commonly used in sale signs and warning symbols.

Marketers carefully select colours to direct attention, evoke emotional responses and develop brand identity (Jin et al., 2019). Apple's minimalist white design, chosen by Steve Jobs, conveys simplicity, innovation and purity, appealing to modern consumers seeking streamlined, functional products. Similarly, Cadbury's use of royal purple signifies luxury and sophistication, rooted in historical associations with royalty.

Among all colours, blue consistently emerges as a global favourite. A 2015 survey across 10 countries revealed that people from diverse cultural and demographic backgrounds selected blue as their preferred colour (Jordan, 2015). This universal

appeal is likely tied to its connection with natural elements such as clear skies and clean water, which evoke feelings of calmness and reliability. Research suggests that these associations help explain why blue is often used in branding to inspire trust and serenity, particularly in industries like finance and healthcare.

Apply your understanding

- 1 **Identify** the extent to which colour can influence consumer decisions. (1 mark)
- 2 **Explain** how emotion influences visual perception. Provide an example from the scenario. (2 marks)
- 3 **Evaluate** the validity of the claim: People prefer blue. (4 marks)



FIGURE 4 Many brands of bottled water use blue labelling, as blue is associated with clean water.

Check your learning 5.1



Check your learning 5.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** which processing theory states that our perceptions of stimuli are influenced by prior knowledge. (1 mark)
- 2 **Describe** how perceptual set influences interpretation of sensory stimuli. (1 mark)

Analytical processes

- 3 **Distinguish** between the perceptual stages of organisation and interpretation. (1 mark)

- 4 A person sees a shadow in the shape of an animal in a poorly lit room and thinks it might be a dog. **Compare** bottom-up and top-down processing with reference to the scenario. (3 marks)

Knowledge utilisation

- 5 A person enters a room with a faint smell of smoke. They interpret the smell as coming from a fireplace rather than a fire hazard. **Explain** how perceptual set explains the person's interpretation of the smell. (3 marks)

Lesson 5.2

Psychological influences on visual perception

Key ideas

- Our brains can maintain a constant perception of an object's size, shape and colour, despite changes to the size of the image on our retina, changing perspective or changes to lighting conditions respectively.
- Gestalt principles of visual perception are used to organise and interpret visual stimuli and include figure-ground organisation, closure, continuity, similarity, proximity and symmetry.
- Depth perception is the ability to judge three-dimensional space and distance based on binocular (using both eyes) or monocular (using one eye) cues.
- Binocular depth cues include retinal disparity, where we contrast the slightly different images because of the distance between our eyes, and convergence, where our eyes will turn inwards to watch an object approaching.
- Monocular depth cues use one eye to judge depth and distance. The eye does this via accommodation where the eye changes the curvature of the lens to focus an image on the retina via pictorial depth cues.
- Pictorial depth cues include linear perspective, interposition, texture gradient, relative size and height in the visual field.



Learning intentions and success criteria

Gestalt principles of visual perception

used to organise and interpret perceptual stimuli; includes figure-ground organisation, closure, continuity, similarity, proximity and symmetry

figure-ground organisation

a Gestalt principle of perceptual organisation wherein images are organised into the central object of attention (figure) and a background (ground)

Gestalt principles

Gestalt psychology, developed in the early twentieth century, is based on the principle that “the whole is greater than the sum of its parts”. **Gestalt principles of visual perception** are applied during the organisation stage of perception to convert the incoming sensory information into meaningful shapes and patterns.

Figure-ground organisation

The first Gestalt principle of visual perception that develops in infants is **figure-ground organisation**. This principle describes how we organise a visual scene by distinguishing a central object of focus (the figure) from its surrounding background (the ground). A distinct border or contour, typically owned by the figure, or high contrast between the figure and ground helps create this separation. For example, children's drawings often use a black line around a figure, emphasising the separation of figure and ground. Rubin's vase (Figure 1)



FIGURE 1 Rubin's vase is a special case of figure-ground organisation.

demonstrates how the figure and ground can alternate depending on perception – viewers may see either a vase or two faces.

Camouflage exploits the figure–ground principle by blending the contour or reducing contrast to make distinguishing the figure from the ground more difficult. Camouflage is a strategy seen in nature; for example, with leopards, tigers and giraffes. Soldiers in the army use camouflage uniforms to blend into their surroundings and avoid detection (Figure 2).



FIGURE 2 Can you see the soldier in camouflage? The contour is broken up and enables the figure to blend in with the background.

camouflage
exploitation of the figure–ground principle whereby the contour of the figure blends with the background, making it more difficult to see

Closure

The principle of **closure** refers to the brain's tendency to fill in gaps in incomplete images, allowing us to perceive them as whole. Many company logos use such incomplete figures in their designs (Figure 3).



FIGURE 3 The Gestalt principles of figure–ground and closure are used when we perceive the World Wildlife Fund logo as a giant panda.

closure
a Gestalt principle that refers to the brain's tendency to perceive incomplete images as a whole

Continuity

Similarly, the principle of **continuity** refers to the brain's natural tendency to organise visual elements that appear to sit on a straight or curved path as continuous. For example, in Figure 4, you likely perceive the image of the dots as two lines: one that forms a straight path and one that forms a curved path. Without using the Gestalt principle of continuity, we would simply see a collection of dots.

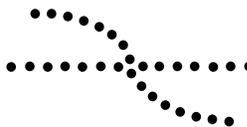


FIGURE 4 The Gestalt principle of continuity refers to the tendency of the brain to follow continuous paths.

continuity
a Gestalt principle that refers to the brain's tendency to perceive elements that appear to sit on a straight or curved line as a continuous path

Similarity

Similarity is when the individual parts of a stimulus pattern are similar (for example, size, shape or colour). We tend to group them together as a meaningful “whole” – a single unit. In Figure 5, we tend to perceive rows of “X” and “O” in Group A, and columns of “X” and “O” in Group B.

| A | | | | | B | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X | X | X | X | X | X | O | X | O | X |
| O | O | O | O | O | X | O | X | O | X |
| X | X | X | X | X | X | O | X | O | X |
| O | O | O | O | O | X | O | X | O | X |

FIGURE 5 We tend to perceive rows of “X” and “O” in Group A, and columns of “X” and “O” in Group B.

similarity
a characteristic that is alike between those in the relationship

Proximity

Proximity is when the individual parts of a stimulus pattern are close to each other. We tend to group them together as a meaningful “whole” – a single unit. We can choose how to perceive a group of shapes, such as those in Figure 6 (as rows or columns), but we tend to perceive the ones in group A as rows and group B as columns.

| A | | | | | B | | | | |
|---|---|---|---|---|---|---|---|---|---|
| X | X | X | X | X | X | X | X | X | X |
| X | X | X | X | X | X | X | X | X | X |
| X | X | X | X | X | X | X | X | X | X |
| X | X | X | X | X | X | X | X | X | X |
| X | X | X | X | X | X | X | X | X | X |

FIGURE 6 We tend to perceive group A as rows and group B as columns.

proximity
the individual parts are close together

symmetry

a balanced arrangement of parts around a central axis

Symmetry

The principle of **symmetry** is related to proximity. Symmetry relies on the balanced arrangement of parts around a central axis, and these symmetrical elements are often perceived as unified because they are visually close to each other and align in a structured way (Figure 7).

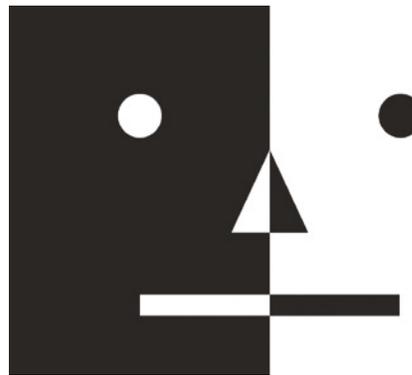


FIGURE 7 Symmetrical elements are often perceived as unified because they are visually close to each other.

perceptual constancies

the tendency to maintain a stable perception of a stimulus, although the properties of the image on the retina may change

Perceptual constancies

Perceptual constancies enable us to maintain a stable perception of a stimulus, although the image on the retina changes. The more familiar we are with the observed object, the more likely it is that we will maintain perceptual constancy of it. Perceptual constancies are usually learnt early in childhood (Table 1).

TABLE 1 Perceptual constancies

| Factor | Description | Example |
|-------------------------|---|--|
| Size constancy | The ability to maintain a constant perception of an object's size, even though the size of the image on the retina changes as the object moves closer or farther away | When we look at a friend from a distance of 5 metres, he produces a retinal image twice the size of the one he produces when he is 10 metres away. But because we are familiar with his height, we don't change our perception of him – instead, we use the size of the image as a cue to provide information about how far away he is (Figure 8). |
| Shape constancy | The ability to perceive an object's shape as remaining the same, even when its retinal image changes due to a change in perspective | Watching a door open: although the shape on the retina changes from a rectangle to a trapezium, we still perceive the door as rectangular. |
| Colour constancy | The ability to perceive an object as maintaining its colour under varying illumination conditions | The brain adjusts colour perception to maintain consistency under different lighting (Figure 9; Foster, 2011). |

size constancy

the constant perception of an object's size, even though the size of the image on the retina alters as the object moves nearer to or further from us

shape constancy

the constant perception of an object's known shape despite the changing perspective from which it is observed

colour constancy

the ability to perceive colours as relatively constant even under varying lighting conditions



FIGURE 8 The young man casts a larger image on the retina as he moves closer to us, but we know he remains the same size; we use this information to establish his distance from us.

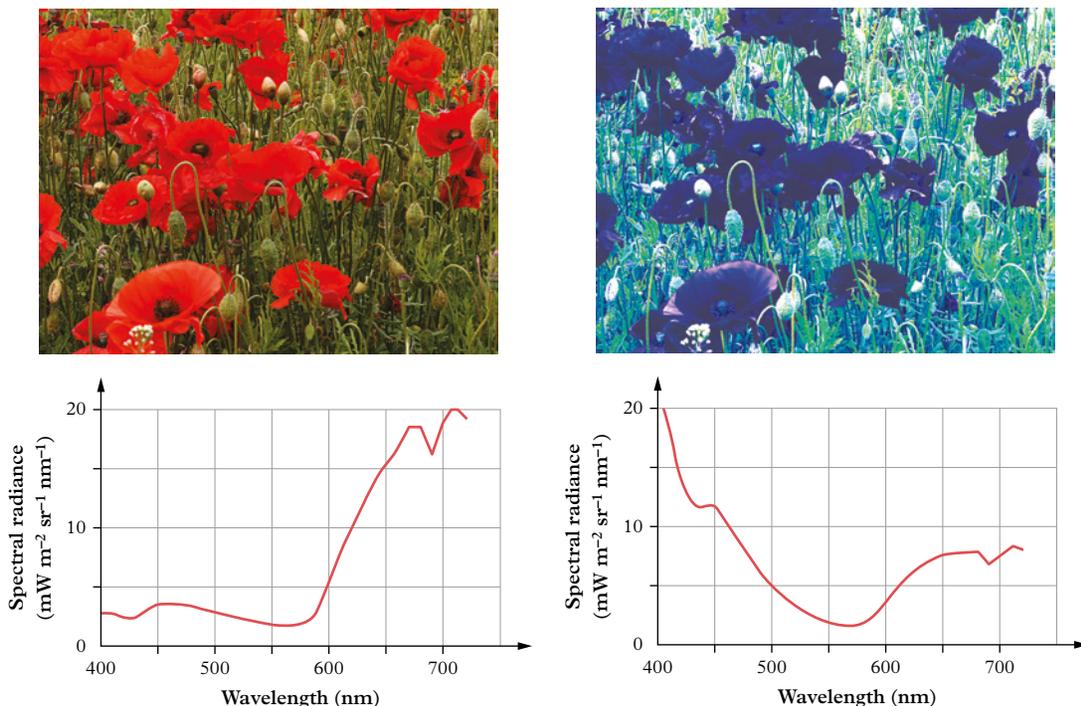


FIGURE 9 Our brains maintain the colour of the flowers as red to accommodate changes in lighting conditions. However, analysis of the colours (raw data) shows they are completely different.

Depth perception

Another aspect of organisation is depth perception. **Depth perception** is the ability to accurately judge three-dimensional space and distance by using cues in the environment. Depth cues are vital, because we exist in a three-dimensional world but can only use two-dimensional images on our retinas to judge depth and distance. There are two types of depth cues: binocular depth cues and monocular depth cues.

depth perception
the ability to accurately judge three-dimensional space and distance, using cues in the environment

Binocular depth cues

Binocular depth cues use information from both eyes to estimate depth. Two types of binocular depth cues are retinal disparity and convergence.

binocular depth cue
using information from both eyes to estimate depth

Retinal disparity

Retinal disparity occurs because our eyes are set about 6 to 7 centimetres apart (pupillary distance). When an object is within about 20 metres of a viewer (with the strongest depth cue occurring within 7 metres), each eye receives a slightly different image on the retina as a result of the different angles from each eye to the object being observed. The brain compares the differences (or disparities) in the images to perceive depth. The larger the disparity, the closer the object is to the viewer.

retinal disparity
the binocular depth cue that arises as the brain compares the two slightly different images obtained because of the distance between the two eyes

The process of retinal disparity is artificially recreated in “magic eye” pictures from two flat, two-dimensional patterns viewed from about 20 centimetres. Each eye observes a slightly different view of the same scene, and the brain fuses the two images together in the same way it would when observing a real (three-dimensional) scene.

Study tip

Breaking down the words can help you understand and remember their meaning:

- **Bi-** means “two”, and **mono-** means “one”.
- **Ocular** refers to the eyes.

convergence

a binocular cue for depth perception; the automatic turning of the eyes inwards as we watch an object approaching

Convergence

Convergence is a binocular depth cue that occurs when your eyes rotate to maintain focus on an object as its distance changes. Convergence is illustrated in the following example: as an object comes closer to us, our eyes turn inwards to keep the object centred on the retina. Again, this cue operates for objects within about 7 centimetres. The brain reads the amount of turning from the tension of the muscles that move the eyes and uses this to make judgments of distance. The more our eyes turn, the closer the object is to the viewer (Figure 10). This is demonstrated in the next challenge.



FIGURE 10 This person is experiencing convergence as she focuses on the pencil moving towards her face.

Challenge

Retinal disparity

Retinal disparity can be demonstrated with the following simple test. Hold a pen at arm's length and look past it at the other side of the room. Close one eye and then the other and watch how far the pen "jumps" from side to side. Now bring the pen closer – about 40 centimetres from your eyes – and repeat the process. **Summarise** your findings.

Monocular depth cues

monocular depth cue

using information from one eye to estimate depth

accommodation

the process by which the ciliary muscles of the eye change the curvature of the lens to focus an image on the retina

pictorial depth cue

a monocular depth cue used by artists to create a three-dimensional perception of something that exists on a two-dimensional surface

linear perspective

a monocular depth cue in which parallel lines appear to converge as they retreat into the distance

Monocular depth cues use information from one eye alone to judge depth. Two types of monocular depth cues enable us to judge depth and distance using one eye: accommodation and pictorial cues.

Accommodation

Accommodation involves the eye's lens (located behind the iris) changing shape so that it can focus light rays onto the retina. Small muscles called ciliary muscles control whether the lens bulges (for closer objects) or flattens (for more distant objects). At the same time, the tension in the ciliary muscles is received by the brain to confirm the location of the object being viewed; the greater the tension, the closer the object.

Pick up a pen and close one of your eyes. Move the pen as close to you as you can while maintaining focus. You should be able to focus on an object between 8 and 10 centimetres away (depending on your eyesight). Keep focusing on the pen until you feel the tension within your eye. That's your ciliary muscles at work keeping your brain informed.

Pictorial depth cues

Pictorial depth cues are used by artists to create a three-dimensional perception of something that exists on a two-dimensional surface.

- **Linear perspective** (first described by Leonardo da Vinci) is one of the most basic skills an artist uses to create apparent depth. Parallel lines are made to converge as they extend along the page to an imaginary point (where in theory they meet) at the horizon (Figure 11).

- **Interposition** (overlap) is based on the partial blocking or obscuring of one object by another. The obscured object appears to be further away than the object obscuring (overlapping) it. This is an effective cue for determining which objects are closer than others, but it is not as effective for judging distance.
- **Texture gradient** is used to make surfaces in a picture appear to recede into the distance. Artists draw less and less detail as a surface is more and more distant, the same way we see it in real life. This is illustrated by the photo of the Marcoola Boardwalk on the Sunshine Coast, Queensland (Figure 12). In the foreground, we can see every detail of the wood and the railing, but as the boardwalk gets further away it becomes much less detailed.
- **Relative size** is based on our tendency to perceive the object producing the largest retinal image as being the nearest, and the object producing the smallest retinal image as being the farthest. For this cue, it is necessary to know the real size of the objects so that accurate comparisons can be made. Think about watching a game of rugby from behind your team's goal – you realise that the players at the opposite goal are far away; you don't think they are tiny!
- **Height in the visual field** shows depth by portraying objects farther away as being closer to the horizon. In a picture, objects in the sky – such as aeroplanes, clouds and birds – will be perceived as farther away as they become lower in the visual field (closer to the horizon). On the other hand, objects on the ground – such as trees, houses and people – will be perceived as farther away as they become higher in the visual field (closer to the horizon).



FIGURE 11 Linear perspective shows parallel lines converging in the distance.

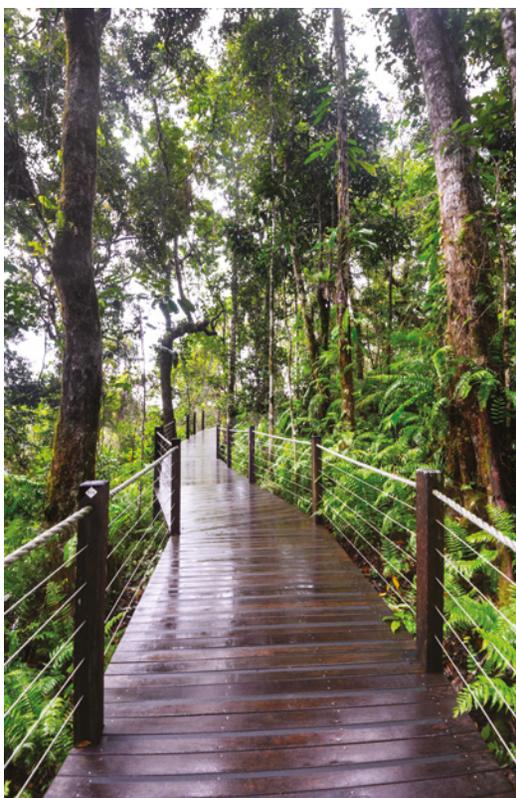


FIGURE 12 The Marcoola boardwalk on the Sunshine Coast – the interposition caused by the trees overlapping, the linear perspective from the boardwalk rails and the relative size of the trees allow people to judge depth.

interposition
a monocular depth cue in which objects further from the observer are partially obscured by those in the foreground

texture gradient
a monocular depth cue in which texture in the foreground is seen in finer detail than texture further away

relative size
a monocular depth cue based on our tendency to perceive the object producing the largest retinal image as being the nearest, and the object producing the smallest retinal image as being the farthest away

height in the visual field
a monocular depth cue that shows depth by portraying objects further away as being closer to the horizon

Perceptual set

Recall from Lesson 5.1 that perceptual set can influence our interpretation of visual stimuli based on our expectations derived from past experiences, context, our motivation and emotions. These expectations direct our attention to relevant aspects of the sensory information; see the examples in Table 2.

TABLE 2 Factors that influence visual perception

| Factor | Description | Example |
|------------------|---|--|
| Past experiences | Knowledge gained from our past experiences, including education, culture and language, can affect visual perception. | Hansen and colleagues (2006) altered the colours of objects away from their natural hues and asked participants to adjust the images to grey. The adjustments participants made revealed that their past experiences with the natural colours of the objects (e.g. bananas are yellow) influenced their perception. |
| Context | The environment in which a perceived stimulus is observed; context sometimes has an immediate effect on our expectations. | A study by Bugelski and Alampay (1961) showed participants ambiguous images (e.g. “rat-man”) and found that context, prior exposure to image sets, influenced their interpretation of the same ambiguous stimulus (Figure 13).  FIGURE 13 Can you see the rat and the man? Participants exposed to animal-related images perceived the ambiguous image as a rat, while those exposed to human faces perceived a man. |
| Motivation | The drive or desire to achieve a particular outcome directs attention and influences which stimuli we attend to, and can also influence how we perceive the stimulus. | For example, on a long drive, if you’re running low on petrol, a sign reading “FOOD AHEAD” might be interpreted as “FUEL AHEAD”. Gilchrist and Nesberg (1952) found that participants who were hungry or thirsty perceived food and drink items as brighter. Similarly, Proffitt and colleagues (2003) found that unmotivated participants perceived hills as steeper than they actually were. |
| Emotion | We could interpret someone’s facial expression as laughing or crying, depending on how we are feeling ourselves. | Emotional states influence perception (Niedenthal et al., 1997). Participants induced to feel happy or sad recognised words related to their emotional state faster. |

Challenge

The farmyard

Researchers found that when they presented a picture of a farmyard to a group of subjects and then asked them to describe it from memory, the subjects were able to do so quite well. However, when shown the picture in Figure 14, the subjects were surprised by the giant octopus outside the barn – it is out of context, so they concentrated on this and failed to pay attention to the other items in the picture.



FIGURE 14 The farmyard illustration

Consider a scenario where this may be important.

Real-world psychology

Solving a puzzle: Past experiences decide what we see

Until the 1980s, many believed vision relied solely on the eye and visual cortex, with little consideration given to interpretation and perception. Research has since revealed that visual perception involves multiple brain areas working together to interpret stimuli through the eyes.

Prior experiences or fears significantly influence how stimuli are interpreted. For instance, a person with a spider phobia might mistake black cotton on the floor for a threat. Here, the visual system hasn't failed; rather, prior knowledge and fear shape the interpretation.

A 2018 study by Gonzalez-Garcia and colleagues demonstrated that visual perception heavily depends on prior experiences. Using fMRI imaging, the researchers showed participants blurred Mooney images (low information, two-tone images typically of a face; Figure 15). When images were clear, participants identified objects easily, but when unclear, they relied on past experiences, leading to both correct and false identifications.

The study found that two brain networks, the default-mode network (DMN) and frontoparietal network (FPN), are involved in image recognition, highlighting that visual perception relies more on cognitive processes than biological mechanisms.

Psychological and social factors, such as cultural expectations and prior experiences, strongly influence visual interpretation.

Apply your understanding

- Identify** two brain networks involved in visual perception as revealed by the Gonzalez-Garcia and colleagues (2018) study. (2 marks)
- Determine** the type of neuroimaging used in the study. (1 mark)
- Explain** the role of prior experiences in visual perception using an example from the text. (2 marks)
- Evaluate** the claim that visual perception relies more on cognitive processes than on biological mechanisms. Use evidence from the text to support your response. (4 marks)



FIGURE 15 An example of a Mooney face

Check your learning 5.2



Check your learning 5.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- Identify** the two types of binocular depth cues. (2 marks)
- Describe** the effects of motivation and emotion on visual perception. (2 marks)
- Describe** the overall Gestalt principle of visual perception. (1 mark)
- Identify** which perceptual set would be used in the following scenarios:
 - Joe is really happy because he has been sailing. Joe looks across at another boat and sees a child. Joe decides the child is laughing. (1 mark)
 - Rachel is walking down her childhood street. Ahead, she sees the words “Harry’s cafe”; however, when she gets closer, she realises it says “Hair styles”. (1 mark)
- Explain** why we find it difficult to see animals when they are camouflaged in their environment. (2 marks)

Analytical processes

- Distinguish** between size constancy and shape constancy. (1 mark)
- Contrast** monocular and binocular depth cues. (1 mark)

◀ Knowledge utilisation

- 8 **Create** your own examples to demonstrate each of the six Gestalt principles of visual perception. (6 marks)
- 9 **Construct** a picture using the following pictorial depth cues. Label your picture with the pictorial cues.
- a Linear perspective (1 mark)
 - b Interposition (1 mark)
 - c Texture gradient (1 mark)
 - d Relative size (1 mark)
 - e Height in the visual field (1 mark)

Lesson 5.3

Psychological influences on auditory perception

Key ideas

- Characteristics of a sound wave influence perception. Loudness is determined by the amplitude of the wave (higher amplitude equals a louder sound) and pitch is determined by frequency (higher frequency equals a higher pitch).
- The brain interprets pitch by identifying which hair cells along the basilar membrane in the cochlea are activated.
- Timbre refers to the unique quality or character of a sound that allows us to distinguish between different sources of sound, even if they have the same loudness and pitch.
- Perceptual sets influence our interpretation of auditory stimuli.



Learning intentions and success criteria

Organising auditory information

Recall from Lesson 4.3 that our auditory perception of sounds is related to characteristics of sound waves, such as amplitude and frequency (Figure 1), and the way our brains interpret the sounds. Amplitude corresponds to loudness; greater amplitude produces louder sounds. Frequency, measured in Hertz (Hz), determines the pitch of the sound. Higher frequencies produce higher-pitched sounds, while lower frequencies create lower-pitched sounds. These properties of sound waves interact to produce the complex auditory experiences of loudness, pitch and timbre.

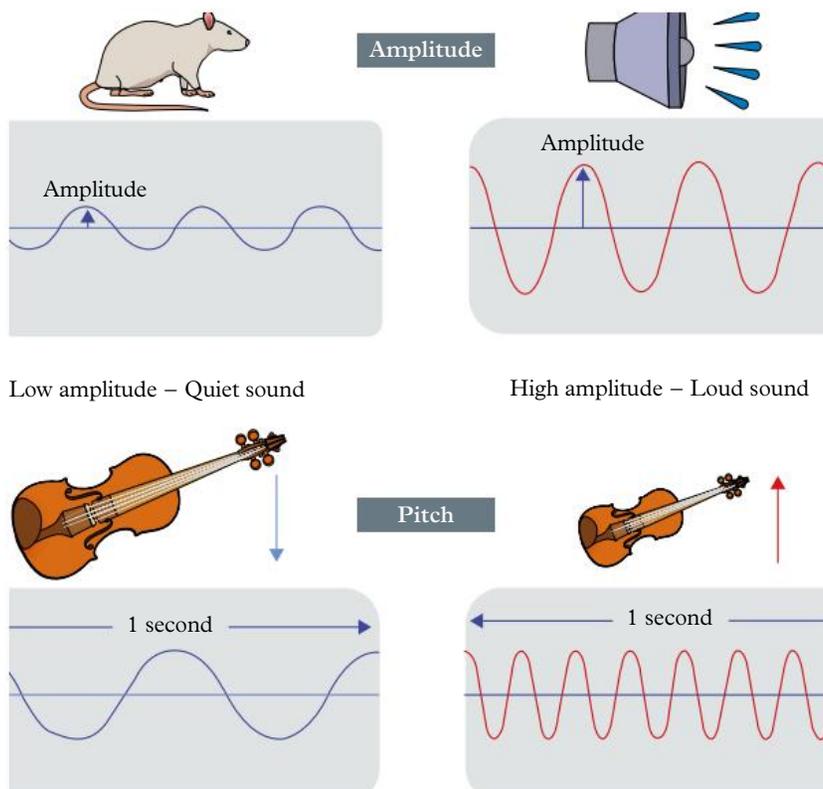


FIGURE 1 Sound waves with higher amplitude are louder. Higher frequencies are perceived as higher in pitch (tone).

Loudness

Loudness is our perception of a sound's volume or intensity, which is directly related to the amplitude of the sound wave. Higher amplitude sound waves cause larger vibrations of the eardrum, and these stronger vibrations are perceived as louder sounds. Conversely, lower amplitude waves produce smaller eardrum vibrations, which are perceived as softer sounds.

Sound is measured in decibels (dB). A whisper is around 30 dB, conversational speech is about 60 dB and a rock concert might be 110 dB or greater. Prolonged exposure to loud sounds (greater than 80 dB) can damage hair cells and lead to hearing loss.

This ability to detect sound is vital for survival and communication. For example, loud or distinct sounds can warn us of danger. Similarly, a mother can hear her crying baby even in a noisy environment, ensuring she can respond quickly to the child's needs. Humans are most sensitive to mid-range frequencies (around 1,000 to 4,000 Hz) and can detect these sounds at lower volumes, while very high or low frequencies need to be louder to be noticed (Figure 2; Yan et al., 2018).

Psychological factors influence our perception of sound. For example, in a noisy environment, a soft sound like a ticking clock may go unnoticed, but in a quiet room, the same sound may seem louder due to the absence of competing noise. It might feel even louder if we are trying to concentrate on something important, like studying for a test.

loudness

the intensity or volume of sound, determined by the amplitude of the wave

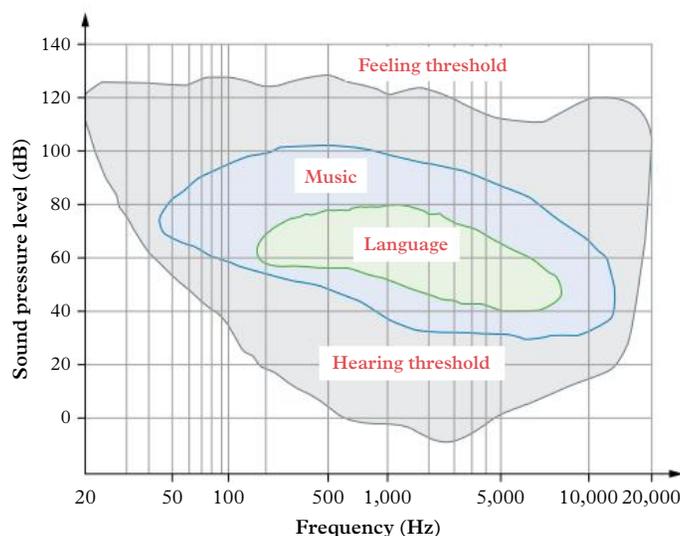


FIGURE 2 The volume needed to detect sounds changes with frequency (adapted from Yan et al., 2018).

Skill drill**Analysing frequency and sound pressure data****Science inquiry skill: Processing and analysing data (Lesson 1.7)**

The volume needed to detect sounds changes with frequency. Analyse the data presented in Figure 2 to answer the questions.

Practise your skills

- 1 Identify** the operationalised independent and dependent variables in the study conducted by Yan and colleagues (2018). (2 marks)
- 2 Determine** the frequency range for language. (1 mark)
- 3 Identify** the minimum volume required to hear sound at 500 Hz. (1 mark)
- 4 Identify** the trend, pattern or relationship between sound complexity and sound pressure level. Use data as supporting evidence. (2 marks)

Pitch

pitch

the perceived highness or lowness of a sound is determined by the frequency of the wave

Pitch describes the perceived highness or lowness of a sound and is determined by the frequency of the wave. Higher frequencies produce higher-pitched sounds, while lower frequencies result in lower-pitched sounds. For example, a flute produces high-pitched notes (~2,000 Hz), while a tuba creates lower-pitched sounds (~50 Hz). In music, pitch is the basis of melody and harmony. Music scales are arranged by frequency. For example, in a C major scale (C, D, E, F, G, A, B, C), each sequential step in the scale corresponds to a higher frequency and therefore a higher pitch. In speech, pitch shows emotion, identifies who is speaking, and gives meaning to words in tonal languages like Mandarin. For example, the word “ma” in Mandarin can mean mother, hemp, horse or to scold depending on the pitch or intonation applied. Two main theories, place theory and frequency theory, aim to describe how the auditory system interprets pitch (Oxenham, 2018).

Place theory

place theory

a theory that says pitch perception is determined by where on the cochlea's basilar membrane a sound wave causes vibrations

Place theory (place coding), first proposed by Hermann von Helmholtz, suggests that different frequencies stimulate specific areas along the basilar membrane in the cochlea. The basilar membrane is a structure that varies in stiffness and thickness along its length. Higher frequency sounds cause the stiff, narrow base of the basilar membrane to vibrate, while lower frequency sounds stimulate the wider, more flexible tip. These vibrations move hair cells at those specific places and generate action potentials in the auditory nerve. The brain interprets pitch by identifying which hair cells were activated.

Frequency theory

frequency theory

a theory that says pitch perception is determined through the timing of neural firing rates, which are synchronised with the cochlea's basilar membrane

Frequency theory, introduced by William Rutherford (1886), proposes that pitch is perceived based on the rate at which the entire basilar membrane vibrates in response to sound waves. These vibrations trigger the hair cells within the cochlea to fire action potentials at a frequency matching the sound wave. For instance, a sound wave of 100 Hz would cause the auditory nerve fibres to fire 100 times per second, signalling the brain to perceive a pitch corresponding to 100 Hz.

However, frequency theory faces limitations with higher frequencies. Nerve cells cannot fire action potentials fast enough to match frequencies above approximately 1,000 Hz due to their refractory period.

Modern research recognises that both place and frequency theories are valid and complementary (Moore, 2003, and Yost, 2009, as cited in Weiten, 2013). Place theory primarily explains how we perceive higher-frequency sounds, as specific locations along the basilar membrane respond to different high-pitched tones. In contrast, frequency theory is more effective at explaining the perception of low-frequency sounds, where the rate of vibration across the basilar membrane correlates with pitch.

Timbre

Timbre (pronounced “tam-buh”) refers to the unique quality or character of a sound that allows us to distinguish between different sources of sound, even if they have the same loudness and pitch. Timbre is influenced by the complexity of a sound wave. For example, the same musical note played on a flute and a guitar will have different timbres, which allows us to identify the instrument (Figure 3). Similarly, the distinct timbre of a person’s voice helps us recognise who is calling before they introduce themselves.

timbre
the unique quality or character of a sound that allows us to distinguish between different sources of sound

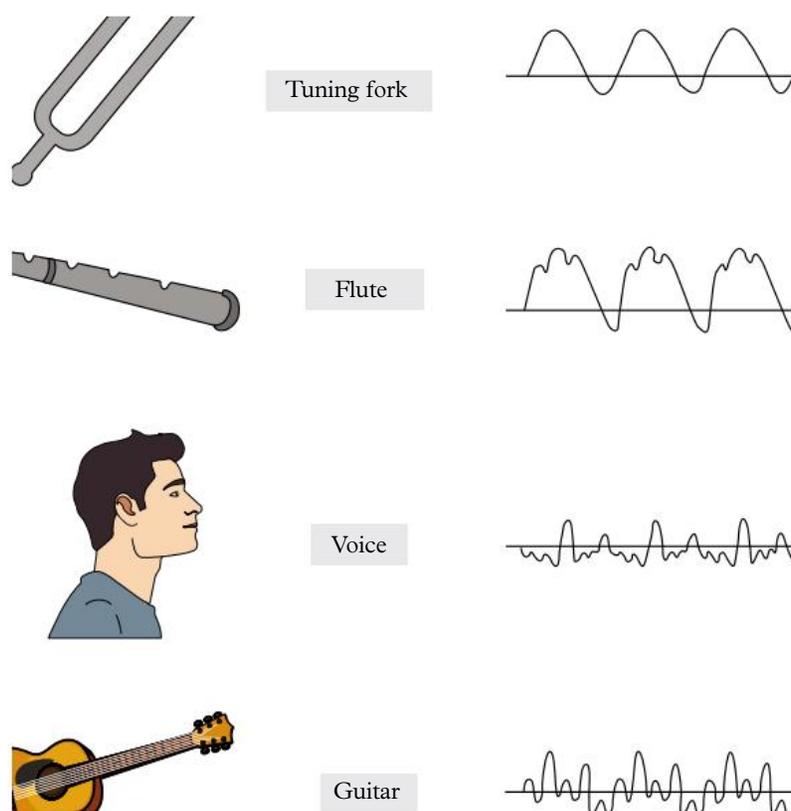


FIGURE 3 Timbre refers to the unique quality or character of sound.

Interpretation of auditory information

Perceptual set (discussed in Lessons 5.1 and 5.2) also influences how we perceive auditory information. These factors are summarised in Table 1.

TABLE 1 Factors that influence auditory perception

| Factor | Description | Example |
|------------------|---|---|
| Past experiences | The influence of prior knowledge or learning, such as education or culture, can influence our perception of stimuli. | Phonemic restoration is an auditory illusion in which listeners “hear” parts of words that are not really there. This phenomenon was demonstrated by Samuel (1981) who conducted a study where participants “fill in” missing parts of speech based on their knowledge (past experience) of language. Similarly, culture influences the type of sounds we find pleasing and our upbringing influences the type of music we enjoy. |
| Context | The surrounding environment or circumstances in which an auditory stimulus is encountered provides cues that can alter our perception. | The McGurk effect demonstrates how mismatching visual cues can alter our perception of the same sound (McGurk & MacDonald, 1976). For example, hearing “bar” as “far” if played with a mismatched visual where the person’s lip movements look like “far”. |
| Motivation | The drive or desire to achieve a particular outcome directs attention and influences which stimuli we attend to, and can also influence how we perceive the stimulus. | The “cocktail party effect” is our ability to focus on a specific conversation or sound in a noisy environment, such as at a crowded party. Moray (1959) demonstrated that people can detect personally relevant information (such as their name) even in unattended auditory channels. |
| Emotion | Emotional state can affect the way stimuli are perceived (e.g. heightening our sensitivity to certain sounds or altering how we perceive sounds). | Emotional states modulated auditory perception in a study by Schirmer and colleagues (2005), where participants in a sad mood were more likely to interpret ambiguous tones of voice as conveying sadness. Other examples are interpreting a neutral tone as angry if we’re frustrated or irritable, or being hypervigilant if we’re feeling anxious and interpreting neutral sounds as threatening. |

Check your learning 5.3



Check your learning 5.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Identify** the unit of measure for sound volume. (1 mark)
- 2 Identify** the characteristics of sound waves that correspond to amplitude and frequency. (2 marks)
- 3 Identify** three key psychological aspects of perception that influence how we perceive sound. (3 marks)

Analytical processes

- 4 Compare** place theory and frequency theory. (2 marks)
- 5 Distinguish** between high pitch and high volume. (1 mark)

Knowledge utilisation

- 6** A friend claims all musical notes sound the same on different instruments. **Evaluate** their claim using the concept of timbre. (3 marks)

Lesson 5.4

Cultural influences on perception

Key ideas

- Culture describes the normative rules, traditions, and social behaviours and language shared by a particular group of people, which influence visual and auditory perception.
- Examples of how culture influences visual perception include the impact of language on colour perception, the impact of familiarity with depth cues on depth perception, and susceptibility to illusions.
- Culture shapes the ability to distinguish language-related sound, and music enculturation shapes preferences and sensitivity to culturally specific patterns in rhythm, melody and pitch.



Learning intentions and success criteria

Culture

While the biological mechanisms underlying sensory reception, such as detecting light or sound waves, are the same for all humans with normally developed sensory structures, the process of perception – which involves selection, organisation and interpretation – of stimuli differs. Cross-cultural research has allowed psychologists to understand that our individual and cultural experiences can influence our interpretation of what we see, because of what we have seen before. In this lesson, we'll be focusing on how perceptual set, specifically past experience due to culture, influences how we perceive stimuli.

Culture can be broadly defined as the normative rules, traditions and social behaviours shared by a particular group of people. Culture influences our behaviours. For example, when you meet someone, you shake their hand because that is typical behaviour in Australia; in many European countries, it is customary to kiss each other on both cheeks to say hello or goodbye; and in Japan, people often bow to each other as a sign of respect. Culture can also influence our perception. For example, when you see certain symbols or signs in your daily life, your interpretation of their meanings is based on the culture you grew up in.



FIGURE 1 In many European countries, greeting people with a kiss on the cheek is a cultural norm.

culture

the normative rules, traditions and social behaviours shared by a particular group of people

Cultural influences on visual perception

While language and culture are distinct, they are intertwined, as culture typically dictates the language(s) we learn growing up. Studies show that language influences visual perception, affecting both how we perceive and describe colours. Languages with more specific colour terms enable speakers to differentiate between subtle colour variations more easily. For example, Russian speakers, who have distinct terms for light blue (*goluboy*) and dark blue (*siniy*), can distinguish between these shades faster and more accurately than English

Study tip

You will learn more about cross-cultural psychology in Unit 4.

speakers, who use the single term “blue” for both (Winawer et al., 2007). Similarly, the Berinmo speakers from Papua New Guinea, whose language has fewer terms for colour, struggle to differentiate between certain colours that English speakers easily distinguish (Roberson et al., 2000).

Studies have found that culture can also influence perception of depth cues. For example, research using an image similar to Figure 2 demonstrated that South African Bantu participants did not interpret depth cues such as relative size and height in two-dimensional images in the same way as individuals from Western cultures (Hudson, 1960; Deregowski, 1972). Rather than perceiving the hunter to be targeting the closer zebra and viewing the rhinoceros as being farther away, the Bantu participants often perceived the hunter to be aiming at a small rhinoceros. These results are thought to be due to the different cultures having different levels of exposure to pictorial materials that use depth cues.

Cultural background not only shapes how individuals perceive visual information but also influences how they respond. Nisbett and Masuda (2003) reviewed cross-cultural research demonstrating differences in visual perception between Eastern cultures, which value interdependence and contextual relationships, and Western cultures, which value individualism. Participants from Eastern cultures were more field-focused, processing objects in relation to their background and paying attention to environmental relationships. In contrast, Western participants were more object-focused, perceiving objects independently of their surroundings and prioritising individual object attributes.

Similarly, more recent findings by de Bruine and colleagues (2018) showed that sub-Saharan African asylum seekers scored significantly lower than Western Europeans on depth perception and visuospatial tests involving pictorial materials. These differences remained even after controlling for education, suggesting that cultural background played a role in how participants processed visual information. Interestingly, both groups performed equally well in recognising objects they had previously seen, but the African participants were more likely to respond “Yes” to all items – a response style known as acquiescence. This tendency may reflect cultural norms around politeness or deference to authority, which must be considered when interpreting behaviour in applied settings such as legal or immigration contexts.

Study tip

Two dimensions (2D) refers to flat images with only height and width, like drawings, while three dimensions (3D) include depth, giving the perception of having volume. Depth cues allow us to interpret the additional dimension from 2D images.

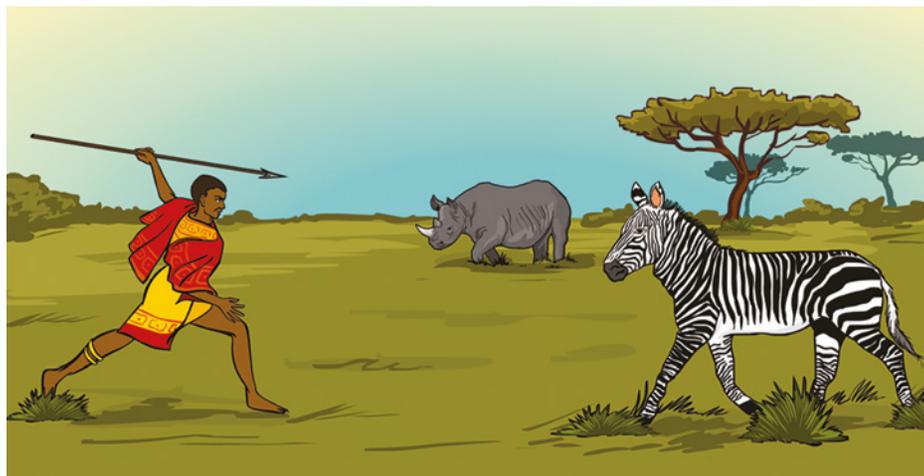


FIGURE 2 Modified version of the “Hunter” image used by Hudson (1960). Applying the depth cue of “height in the visual field” allows us to judge that the hunter is about to spear the zebra, rather than the rhinoceros, which is in the distance.

Visual illusions

Visual illusions are perceptual phenomena where the brain misinterprets visual stimuli, leading to an image that differs from objective reality. Psychologists study visual illusions to understand the mechanisms of visual perception, including how perceptual sets influence interpretation. For example, the Müller-Lyer illusion (Figure 3) occurs when two lines of equal length appear different because of inward- or outward-facing arrowheads. Researchers have found that participants from Western cultures, who are accustomed to carpentered environments with straight edges and right angles, were more susceptible to the illusion (Segall et al., 1966). In contrast, participants from non-carpentered environments (e.g. with round huts made from natural materials) were less affected, likely due to their differing environmental visual experiences.

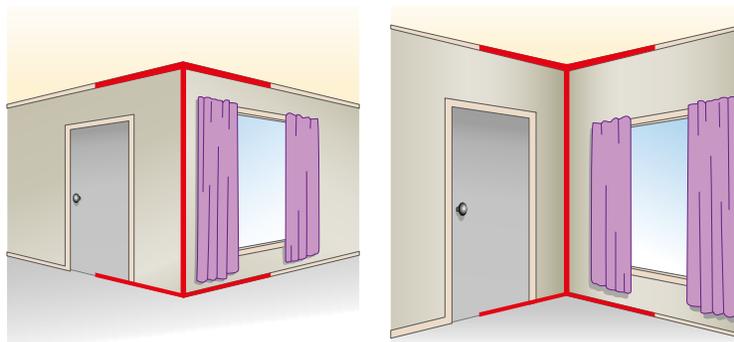


FIGURE 3 Which room has the higher walls? The Müller-Lyer illusion is affected by our depth judgments.

visual illusion
perceptual phenomenon where the brain misinterprets visual stimuli, leading to an image that differs from objective reality

Cultural influences on auditory perception

Infants begin life with remarkable flexibility in their auditory perception; however, this openness is progressively refined by their cultural environment. Infants are born with the ability to discriminate between phonemes – the smallest units of sound in language – across all languages. However, by the end of their first year, this ability narrows as they become attuned to the sounds of their native language (Kuhl et al., 1992). Werker and Tees (2002) demonstrated that while 6- to 8-month-old infants could distinguish non-native phonemes, such as Hindi contrasts unfamiliar to English speakers, this ability significantly declined by 10 to 12 months.

A similar process occurs in music. While music was once thought to be a universal language, studies show that musical perception is shaped by culture in much the same way as language (Morrison & Demorest, 2009). While infants may begin with shared biological predispositions, these are quickly shaped by exposure to specific musical systems, leading to culturally distinctive ways of processing music (Patel & Demorest, 2013). For example, infants as young as 6 months demonstrate general sensitivity to rhythmic and melodic patterns, but by 12 months they begin to show preferences for the music of their own culture (Hannon et al., 2005).

Music enculturation continues across the lifespan, gradually narrowing sensitivity to the pitch systems, rhythms and tonal structures that are most common in one's cultural context (Patel & Demorest, 2013). Cultural differences in music perception become especially evident in expectations for musical structure, preferences for harmony, and the ability to detect pitch variations. For example, Japanese children outperform Canadian children in identifying pitch changes in familiar melodies, likely due to the use of formal pitch labelling in Japanese music education (Trehub et al., 2008). Similarly, multilingual children often show

Study tip

Phonemes are the smallest units of sound in a language that can distinguish one word from another. For example, in English, the words *bat* and *pat* differ by only one phoneme: /b/ and /p/. Phonemes vary across languages and can include tone.

music enculturation
the process through which individuals acquire the skills, preferences and understanding of music specific to their cultural environment

Study tip

Recall that pitch is a frequency-based perception that refers to the “high-ness” or “low-ness” of a sound. In music, pitch structures refer to scales composed of notes that correspond to increasing frequency (e.g. Do-Re-Mi).

enhanced sensitivity to pitch and tuning in music, a skill thought to stem from the auditory discrimination demands of managing multiple languages (Milovanov et al., 2008).

Cultural differences in music perception emerge in sensitivity to pitch, rhythm, harmony and expectations of musical structure. Japanese children outperform Canadian children in detecting pitch changes in familiar melodies. This difference is likely due to the incorporation of formal pitch labelling in Japanese school music programs (Trehub et al., 2008). Similarly, children who speak multiple languages exhibit greater sensitivity to pitch changes and mistunings in music. This is thought to stem from the phonemic awareness required to differentiate sounds in different languages (Milovanov et al., 2008). These trends continue into adulthood. For example, neuroimaging studies showed that musicians detect unexpected changes in culturally familiar music but not in unfamiliar music systems (Neuhaus et al., 2006).

Enculturation also shapes music memory and general preference. Neuroimaging evidence demonstrates that listeners exhibit better memory for music aligned with their cultural background and have an increased cognitive effort when processing unfamiliar music. This is attributed to the long-term exposure and established auditory schemas, which develop as we age.

Check your learning 5.4

Check your learning 5.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the perceptual set factor that culture contributes to perception. (1 mark)
- 2 **Define** “culture”. (1 mark)
- 3 **Describe** music enculturation. (1 mark)
- 4 **Explain** why African participants struggled to interpret depth cues in images compared to Western participants, using the findings from Hudson’s study. (2 marks)

Analytical processes

- 5 **Compare** how language influences visual and auditory perception. Include examples to support your answer. (4 marks)

Knowledge utilisation

- 6 A group of researchers claims that cultural background has a significant impact on susceptibility to visual illusions. **Evaluate** this claim using the Müller-Lyer illusion as an example. (4 marks)
- 7 **Discuss** the importance of understanding the differences in cultural influence on perception. (3 marks)

Lesson 5.5

Review: Influences on sensation and perception

Summary

- 5.1**
- Bottom-up processing builds perception from raw sensory data, relying on the environment without prior knowledge.
 - Top-down processing uses prior experience, expectations and context to assign meaning and significance to stimuli.
 - Perceptual set, shaped by past experiences, context, motivation and emotions, acts as a mental framework that influences how we interpret sensory information, helping us focus on relevant stimuli but also sometimes leading to biased or misinterpreted perceptions.
- 5.2**
- Our brains can maintain a constant perception of an object's size, shape and colour, despite changes to the size of the image on our retina, changing perspective or changes to lighting conditions respectively.
 - Gestalt principles of visual perception are used to organise and interpret visual stimuli and include figure-ground organisation, closure, continuity, similarity, proximity and symmetry.
 - Depth perception is the ability to judge three-dimensional space and distance based on binocular (using both eyes) or monocular (using one eye) cues.
 - Binocular depth cues include retinal disparity, where we contrast the slightly different images because of the distance between our eyes, and convergence, where our eyes will turn inwards to watch an object approaching.
 - Monocular depth cues use one eye to judge depth and distance. The eye does this via accommodation where the eye changes the curvature of the lens to focus an image on the retina via pictorial depth cues.
 - Pictorial depth cues include linear perspective, interposition, texture gradient, relative size and height in the visual field.
- 5.3**
- Characteristics of a sound wave influence perception. Loudness is determined by the amplitude of the wave (higher amplitude equals a louder sound) and pitch is determined by frequency (higher frequency equals a higher pitch).
 - The brain interprets pitch by identifying which hair cells along the basilar membrane in the cochlea are activated.
 - Timbre refers to the unique quality or character of a sound that allows us to distinguish between different sources of sound, even if they have the same loudness and pitch.
 - Perceptual sets influence our interpretation of auditory stimuli.
- 5.4**
- Culture describes the normative rules, traditions, and social behaviours and language shared by a particular group of people, which influences visual and auditory perception.
 - Examples of how culture influences visual perception include the impact of language on colour perception, the impact of familiarity with depth cues on depth perception and susceptibility to illusions.
 - Culture shapes the ability to distinguish language-related sound, and music enculturation shapes preferences and sensitivity to culturally specific patterns in rhythm, melody and pitch.

Review questions 5.5A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 Which of the following statements about size constancy is correct?
 - A Size constancy refers to how one object compares in size to another.
 - B Size constancy refers to how our eyes take in more visual stimuli than we pay attention to.
 - C Size constancy refers to the fact that our pupils grow bigger or smaller as an object moves nearer to or farther from us.
 - D Size constancy means that even though an object moves nearer to or farther from us, our perception of its size remains constant.
- 2 Camouflage describes
 - A an army uniform.
 - B where the figure is distinct from the ground.
 - C an animal classification for those whose appearances match their environment.
 - D where the contour of the figure is broken so that it blends in with the ground, obscuring the figure.
- 3 Which type of processing is primarily driven by sensory input without prior knowledge?
 - A Top-down processing
 - B Bottom-up processing
 - C Perceptual constancy
 - D Gestalt principles
- 4 Which example illustrates the role of context in perception?
 - A A student smelling food when hungry
 - B A person recognising a familiar face in a crowd
 - C A movie scene feeling sadder with background music
 - D An ambiguous figure interpreted as a “B” after seeing letters
- 5 What is the best definition for music enculturation?
 - A The influence of formal music training on perception across cultures
 - B A phenomenon where individuals cannot recognise culturally unfamiliar music
 - C The process by which individuals lose the ability to perceive non-native tonal variations over time
 - D The lifelong process of becoming attuned to the musical patterns, rhythms and scales of one’s culture through exposure
- 6 What is the difference between the Gestalt principles of similarity and proximity?
 - A They are two different names for the same concept.
 - B Similarity is the part of a stimulus pattern that sits in rows, while proximity is the part that sits in columns.
 - C Similarity is when parts of a stimulus pattern are a similar distance from each other; proximity is when parts of a stimulus pattern are the same colour.
 - D Similarity is when parts of a stimulus pattern are physically similar so that we perceive them as a whole; proximity is when parts of a stimulus pattern are close together so that we perceive them as a whole.
- 7 Which is the monocular depth cue that involves parallel lines converging in the distance?
 - A Convergence
 - B Accommodation
 - C Linear perspective
 - D Height in visual field

Review questions 5.5B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

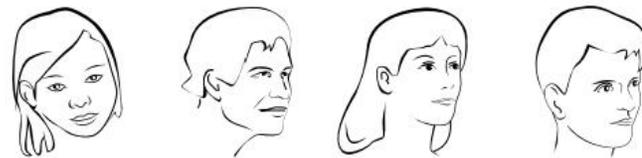
- 15 **Describe** the pictorial depth cue of texture gradient. (1 mark)
- 16 **Explain** how the monocular depth cue of accommodation works. (2 marks)
- 17 **Explain** why people from traditional hunter-gatherer societies may have difficulty interpreting three-dimensional images. (2 marks)
- 18 **Identify** the age at which cultural sensitivity starts to impact auditory perception. (1 mark)
- 19 **Describe** timbre. (1 mark)
- 20 **Explain** what is meant by the term “perceptual set”. (2 marks)
- 21 **Describe** an example of perceptual set for
 - a the sense of hearing (1 mark)
 - b the perception of flavour (1 mark)
- 22 **Explain** how vision can influence auditory perception. (2 marks)

Analytical processes

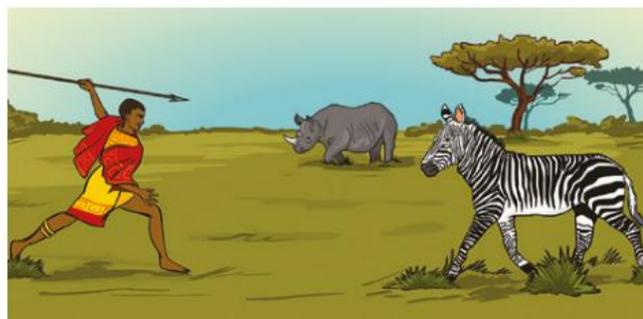
- 23 **Contrast** pitch and loudness. (1 mark)
- 24 **Distinguish** between closure and continuity. Include examples to support your answer. (2 marks)
- 25 **Compare** perceptual constancies and perceptual set. (2 marks)
- 26 **Compare** convergence and accommodation. (2 marks)
- 27 **Consider** possible social influences on how teenagers in Australia interpret certain visual stimuli and how this may differ from teenagers in other countries. (3 marks)

Knowledge utilisation

- 28 **Predict** whether people would be more likely to see a rat or a man in the rat-man illusion (Figure 13, Lesson 5.2) after viewing either the first row or the second row of the following image. **Justify** your response. (2 marks)



- 29 A patient has hearing loss primarily at high frequencies. **Determine** which theory (place or frequency) best explains this phenomenon and **justify** your answer. (3 marks)
- 30 Yuri and his cricket team were practising fielding by catching a ball that the coach hit high in the air. After a few team members had dropped catches, the coach insisted that all players hold their hands in front of their face and watch the approaching ball through the gaps between their fingers. Yuri was surprised that his success rate improved using this new technique. **Propose** why his performance improved. (3 marks)
- 31 Mark up the image to identify the monocular depth cues that help us perceive
 - a the hunter and zebra as closer than the rhinoceros (1 mark)
 - b the closest tree. (1 mark)



Data drill

Cross-cultural study on colour and emotion

Hupka et al. (1997) investigated the associations between specific colours and emotions across different cultures.

University students from various countries (Table 1) evaluated the degree to which certain colours (e.g. red, green, black) were linked to specific emotions such as anger, envy, fear and jealousy.

Their ratings were recorded on a 6-point Likert scale (1 = does not remind me of the emotion, 6 = strongly reminds me of the emotion).

The researchers analysed these ratings to identify patterns and cultural differences. An extract of the results, for the colour red, is shown in Table 2.

TABLE 1 Demographic information of participants

| | Male | Female | Total (n) | M | SD |
|---------|------|--------|-----------|-------|------|
| Germany | 35 | 85 | 120 | 26 | 6.42 |
| Mexico | 26 | 114 | 140 | 20.78 | 2.89 |
| Poland | 60 | 64 | 124 | 21 | 2.33 |
| Russia | 58 | 62 | 120 | 19 | 1.8 |
| USA | 41 | 116 | 157 | 18 | 2.13 |

TABLE 2 Mean rating, by country, of the associations of red with emotion. Standard deviation is given in brackets. Adapted from Hupka et al. (1997).

| | Germany | Mexico | Poland | Russia | United States | <i>p</i> -value | <i>r</i> -value |
|----------|-------------|-------------|-------------|-------------|---------------|-----------------|-----------------|
| Anger | 4.60 (1.69) | 4.00 (2.10) | 4.94 (1.29) | 4.67 (1.30) | 5.23 (1.29) | $p < 0.01$ | +0.26 |
| Fear | 3.47 (1.94) | 2.14 (1.93) | 3.77 (1.61) | 3.53 (1.87) | 4.54 (1.57) | $p < 0.01$ | +0.28 |
| Envy | 2.84 (1.85) | 3.41 (1.94) | 3.76 (1.62) | 2.60 (1.73) | 4.66 (1.36) | $p < 0.01$ | +0.41 |
| Jealousy | 4.40 (1.63) | 3.97 (2.12) | 4.22 (1.62) | 3.13 (2.01) | 4.63 (1.61) | $p < 0.01$ | +0.28 |

Apply understanding

- Identify** which country had the highest number of people participate in the study. (1 mark)
- Determine** which emotion had the lowest association with red. (2 marks)

Analyse data

- Organise** the mean ratings for Russia from lowest to highest. (2 marks)
- Describe** the association between the colour red and the emotion fear. (2 marks)

Interpret evidence

- Draw a conclusion** about the relationship between the colour red and the emotion envy. (2 marks)



Module 5 checklist: Influences on sensation and perception

Topic 2 review

Multiple choice

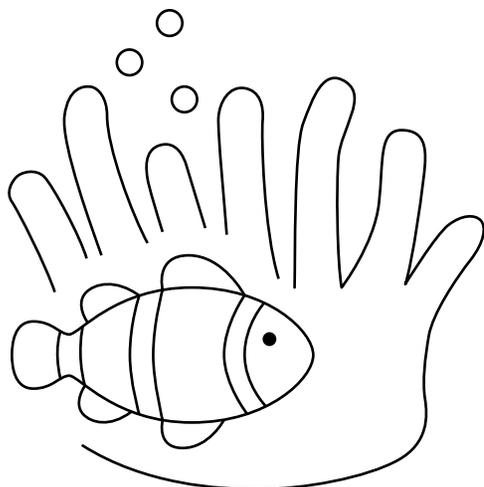
(1 mark each)

Use the following information for questions 1 to 3.

A teacher explains the process of visual perception to their class using the example of someone seeing a flower. The light waves from the flower travel into the person's eye and are converted into electrical signals that the brain interprets.

- 1 Which part of the eye receives incoming light energy?
 - A Lens
 - B Retina
 - C Cornea
 - D Optic nerve
- 2 Which process converts incoming energy into nerve signals?
 - A Selection
 - B Reception
 - C Transduction
 - D Transmission
- 3 A person is looking at a new type of flower they have never seen before. During which stage is the person able to recognise that they are looking at a type of "flower" based on the sensory information they have received?
 - A Selection
 - B Sensation
 - C Organisation
 - D Interpretation
- 4 As Ella was driving along the freeway, a huge truck came hurtling up behind her. It seemed to take ages for the long body to get past as it overtook Ella. Afterwards, it gradually disappeared up the road in front of her. Which of the following principles would Ella have applied to realise that the truck remained the same size, although its image on her retinas changed?
 - A Shape constancy and size constancy
 - B Brightness constancy and size constancy
 - C Size constancy and orientation constancy
 - D Brightness constancy and orientation constancy
- 5 A participant listens to tones of varying loudness and pitch in a soundproof room. The participant reports that they can only detect very faint tones half the time under ideal conditions. Which concept is being assessed in the scenario?
 - A Place coding
 - B Frequency theory
 - C Timbre perception
 - D Absolute threshold
- 6 A teacher places two bowls of jelly beans in front of students: one has red jelly beans and one has black jelly beans. The students perceive the red jelly beans as sweeter, regardless of taste. Which perceptual set influences this observation?
 - A Context
 - B Emotion
 - C Motivation
 - D Past experience
- 7 During a sports match, Kai injured one of his eyes. To aid its healing, he was instructed to wear a protective eye patch. As a result, Kai finds it more difficult to judge the distance of objects while playing basketball. What is the most likely cause of Kai's difficulty in perceiving distance?
 - A Retinal disparity
 - B Accommodation
 - C Gestalt principles
 - D Pictorial depth cues
- 8 Which is an example of perceptual set in auditory perception?
 - A Recognising the same tune at different volumes
 - B Interpreting a song differently when in a joyful mood
 - C Distinguishing two musical notes with similar pitches
 - D Hearing "bar" as "far" due to mismatched visual cues

- 9 Which pictorial cue is used to perceive the fish as closer to us than the coral?

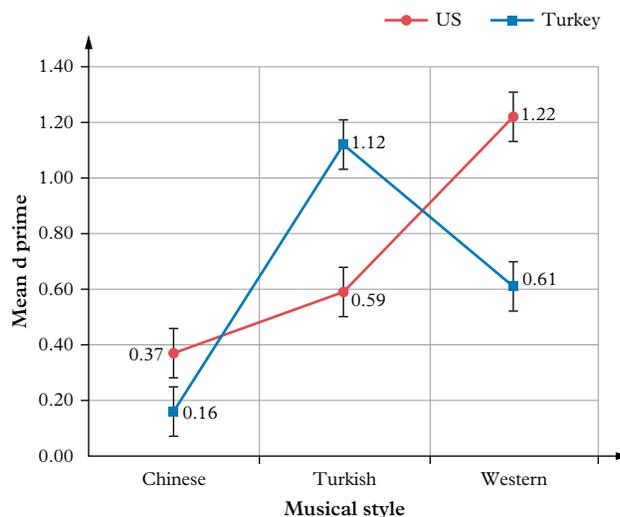


- A Interposition
 B Texture gradient
 C Linear perspective
 D Height in visual field
- 10 Lily was studying in her room late at night when the electricity in her house went out, leaving the space completely silent. With no other background noise, Lily sat in the dark, straining to hear any sounds around her. After a few minutes, she detected the faintest ticking of a distant clock in another room. Which statement best explains Lily's ability to perceive the ticking clock?
- A It demonstrates her ability to adapt to changes in her environment.
 B It demonstrates her reaching the absolute threshold for auditory perception.
 C It demonstrates the process of transduction of sound waves into audio waves.
 D It demonstrates the process of perception where she makes meaning of the auditory stimuli.
- 11 A psychology lecturer shows students a picture of a dark forest while playing suspenseful music. Students report that the image feels "threatening". Later, with calming music, they describe the same picture as "peaceful". Which statement best explains how the music influenced the students' interpretation of the picture?
- A The music increased retinal sensitivity to low light.
 B The music enhanced colour constancy for darker hues.
 C The music caused bottom-up processing to dominate perception.
 D The music heightened emotional sensitivity, altering perceptual set.

- 12 The split-brain experiment involves patients who have had the corpus callosum severed, a procedure that prevents the left and right hemispheres of the brain from communicating. In contralateral processing, sensory input from the left visual field is processed in the right hemisphere, and input from the right visual field is processed in the left hemisphere. A split-brain patient is shown an object in their left visual field but cannot name it. Why can't the patient verbally identify the object?
- A The thalamus is unable to relay sensory information.
 B The optic nerve is unable to transmit signals to the brain.
 C The left hemisphere is damaged and cannot process visual input.
 D The object is processed in the right hemisphere, which lacks language centres.

Use the following information for questions 13 to 15.

Researchers investigated music memory of adults born in the United States (Western) and Turkey. Participants were given unique examples from Western, Turkish and Chinese cultures. The graph illustrates the accuracy of music recall with culturally familiar and unfamiliar music. Use the results shown to answer the questions.

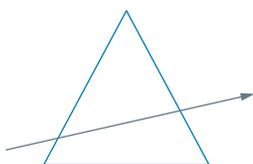


- 13 Which is the dependent variable in the study?
- A Accuracy of memory recall
 B Culture (Western or Turkish)
 C Culture (Chinese, Turkish, Western)
 D Music style (Chinese, Turkish, Western)

- 14 Which is the control condition in the study?
- A Accuracy
 - B Turkish music
 - C Chinese music
 - D Western music
- 15 With reference to the graph, what can you infer is the influence of culture on auditory perception?
- A Participants demonstrated better memory for Turkish music than for any other musical style, regardless of their cultural background.
 - B Participants demonstrated significantly better memory for culturally familiar than unfamiliar music, showing that culture influences music memory.
 - C Participants showed an equal memory performance across all musical styles, suggesting that music familiarity does not influence auditory perception.
 - D Participants demonstrated significantly better memory for culturally unfamiliar than familiar music, showing that culture does not influence music memory.

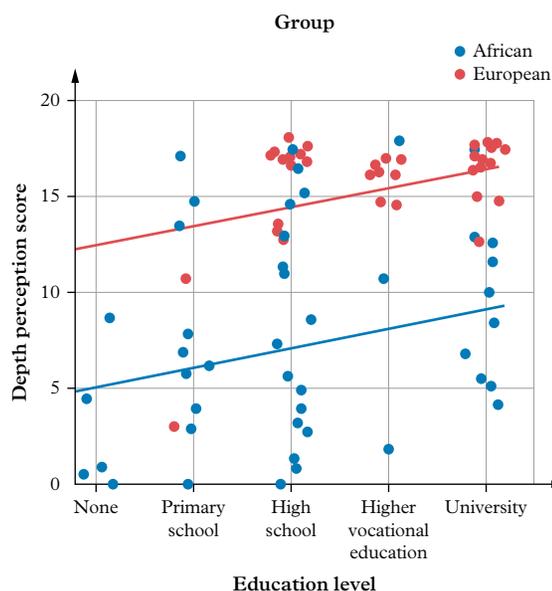
Short response

- 16 Identify the Gestalt principles illustrated in the figure. (1 mark)



- 17 Distinguish between size constancy and shape constancy. (1 mark)
- 18 Describe the role of the thalamus in perception of sensory information. (1 mark)
- 19 Contrast the sensory receptors for hearing and seeing. (2 marks)
- 20 Explain how pitch is perceived with reference to place coding and frequency theory. (4 marks)
- 21 The following questions relate to the cross-cultural study by Morrison and Demorest (2009).
- a Define “music enculturation”. (1 mark)
 - b Distinguish, with reference to culture, between bottom-up and top-down processing. (2 marks)
 - c Describe the effect of culture on auditory perception, using an example from the study. (3 marks)

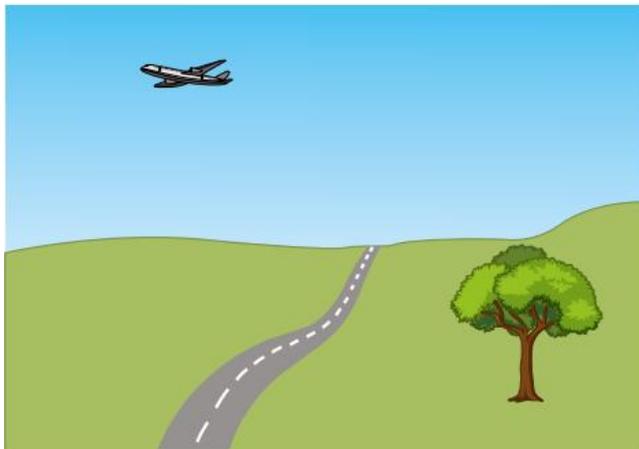
- 22 The following questions relate to the cross-cultural study by De Bruine and colleagues (2018). Participants viewed a hunting scene (adapted from the Hudson Depth Perception Test) that depicted a hunter aiming a spear at two animals positioned at different depths: an antelope in the foreground and an elephant in the background. They were asked to identify which animal the hunter was aiming at. Results are shown. The graph illustrates the relationship between participants’ depth perception test scores and level of education (African participants: $r = +0.25$; European participants, $r = +0.39$). The table shows the mean depth perception scores between African and European participants.



| Participants | <i>M</i> | <i>SD</i> | <i>p</i> |
|--------------|----------|-----------|----------|
| African | 7.25 | 5.51 | < 0.001 |
| European | 15.89 | 2.49 | |

- a Describe, with reference to the graph, the relationship between education and depth perception. (3 marks)
- b Describe, with reference to the table, the effect of cultural influences on visual perception. (2 marks)

23 Use the stimulus in the figure to answer the questions that follow.



- a **Identify** the lobe of the cerebral cortex where the visual information from the image would be processed. (1 mark)
- b **Explain** the pictorial depth cue texture gradient with reference to the image. (2 marks)
- c **Explain**, using height in visual field, how an artist should draw a second aeroplane of the same size to show that it is further away than the one shown in the picture. (2 marks)
- 24 A researcher presents participants with an ambiguous figure (Rubin's vase) under two conditions: after showing faces and after showing vases. Participants report seeing faces or vases depending on prior stimuli.



- a **Identify and describe** which Gestalt principle is used to create the illusion. (2 marks)
- b **Identify and describe** the stage of visual perception where participants can name the object. (2 marks)
- c **Explain** how perceptual set influenced participants' interpretations. (3 marks)

25 In a replication of Tan and colleagues (2007), researchers explored how music influences viewers' interpretations of film characters' emotions. The study focused on the effects of forward affective priming (music played before a scene) and backward affective priming (music played after a scene). A total of 177 undergraduate students participated. The independent variables were the placement of music (before or after scene) and type of emotion conveyed by the music (happiness, sadness, fear, anger). The dependent variables were participants' ratings of the perceived intensity of characters' emotions, film content and physiological reactions. Ratings were based on Likert-scales from 0 to 6 where higher scores indicate higher intensity, higher importance or better descriptions of character reactions respectively. The table shows the average ratings of perceived happiness and sadness ratings based on before and after scene conditions. All differences are significant at $p < 0.01$.

| Emotion | Music played before scene <i>Mean</i> | Music played after scene <i>Mean (SD)</i> |
|-----------|--|--|
| Happiness | 3.13 (1.9) | 2.65 (1.6) |
| Sadness | 2.87 (2.0) | 2.43 (1.8) |

- a **Identify** which group had the highest perceived level of happiness. (1 mark)
- b **Calculate** the confidence intervals for the happiness condition (Lesson 1.7). (3 marks)
- c Using the confidence intervals calculated in question b, **draw a conclusion** about whether emotive music affects perception of happiness. (4 marks)

TOTAL MARKS
/55 marks

6

Understanding memory

Introduction

Some people have exceptional memories and memory abilities. Kim Peek was a savant known for his ability to recall over 12,000 books despite having a below average IQ (Treffert & Christensen, 2005). Stephen Wiltshire draws incredibly detailed cityscapes from memory after only brief exposure (Sacks, 1995) and Jill Price vividly remembers everything that has happened to her, both pleasant events and traumatic ones that she would rather forget (Parker et al., 2006). On the other hand, Clive Wearing suffers from one of the most profound cases of amnesia, with a memory span of about 7 to 30 seconds (Baddeley et al., 2015). His memory is so short that by the end of a sentence, he has already forgotten what you are talking about.

By now you might be wondering, what exactly is memory and how does it work? Why is that we can remember some things but not others?

Memory is a distinct cognitive function that involves the encoding, storage and retrieval of information, ideas and experiences (Engelhardt & Levy, 2023; Squire, 2009a). Like many other cognitive processes, memory cannot be directly observed, which means that scientists must infer how it works through researching case studies, conducting experiments and using neuroimaging.

Over the past two centuries, several models have been proposed to describe memory structures and processes (Squire, 2009a). Unfortunately, no single model explains all human memory, nor do the models describe the physical reality of memory. Instead, they offer explanations of memory structures and functions which, when considered together, provide a more complete understanding of this complex and essential cognitive function.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to memory before you start.

Subject matter

Science understanding

- Compare three models of memory, specifically
 - the multi-store model, including sensory, short-term and long-term memory

- the working memory model, including the central executive, phonological loop, visuospatial sketchpad, and episodic buffer
 - the levels of processing (LOP) model, including the role of encoding in long-term memory.
- State the duration and capacity of sensory memory (including iconic and echoic), and short-term and long-term memory.

Science as a human endeavour

- Discuss cases of models of memory being contested, refined and/or replaced as a result of new evidence, e.g.
- how the working model of memory has greater explanatory power than previous models
 - developments in the concept of working memory from inception (Baddeley & Hitch 1974) to the present.
- Consider that investigations into memory can be limited in their ability to provide definitive answers as the evidence is open to interpretation.

Science inquiry

- Investigate
- levels of processing theory
 - evaluating the validity of depth of processing, e.g. Craik & Tulving (1975).

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and operationalise variables to be manipulated, measured and controlled
- design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data required to obtain valid and reliable evidence
- identify errors, and extraneous or confounding variables that are likely to influence results; and implement strategies to minimise systematic and random error, e.g.
- counterbalancing
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- extrapolate findings to determine unknown values, predict outcomes and evaluate claims
- use data and reasoning to discuss and evaluate the reliability and validity of evidence
- judge the reliability and validity of the experimental process
- internal validity and external validity

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Practicals

oxforddigital

These lessons are available on Oxford Digital.



Lesson 6.5 Evaluating the validity of depth of processing

Lesson 6.1

Memory processes



Learning intentions and success criteria

Key ideas

- Models of memory allow researchers to investigate memory by identifying common elements that can then be individually investigated.
- The standard model of memory uses a metaphor of a computer: an information-processing model describes the flow of information involving encoding, storage and retrieval.

encoding

the process of transforming information into a form that can be used and stored

storage

maintaining encoded information

retrieval

the process of retrieving stored information for use

memory trace

physical representation of memory in the brain

Study tip

You may already be familiar with the information processing model from Unit 1, Topic 2 (cognitive development) and Unit 2, Topic 1 (approach to intelligence).

Three processes of memory

The information processing model was developed around the same time as computers. Theorists drew parallels between the brain and how computers operate (Table 1). Similar to computers, psychologists identify three sequential memory processes: **encoding** (putting information in), **storage** (holding information) and **retrieval** (pulling information out).

Encoding involves the formation of a **memory trace**, the physical representation of memory in the brain. As you will learn in Lesson 6.3, encoding requires attention, and the quality of a memory trace depends on the depth of processing that occurs during encoding. Storage occurs when the encoded information is maintained over some time. Early research on memory included Karl Lashley's (1950) search for the engram, the physical location of memory in the brain. He did this by lesioning various parts of animals' brains. Despite his efforts to locate a specific memory trace, Lashley could not find "the" location of memory and concluded that it must be distributed throughout the brain. As you will learn in Module 7, contemporary research has confirmed that several brain structures are involved in the formation and storage of memory. Models of memory such as the multi-store model (Lesson 6.2) and the working model of memory (Lesson 6.3) involve metaphorical stores and help us understand that information storage occurs in an organised way that can help us retrieve information when we need it.

Retrieval involves accessing stored information when needed and forgetting happens when we are unable to retrieve stored information. You will learn more about why we forget and how to improve memory in Module 8.

TABLE 1 Memory involves three sequential processes that are analogous for information processing in computers. Information, or data, is entered through a keyboard (encoding), stored in the computer's hard drive (storage) and accessed when a document or file is opened (retrieval).

| Process | Encoding | Storage | Retrieval |
|----------------------------------|---|---|---|
| Definition | The process of transforming information into a form that can be used and stored | Maintaining encoded information | The process of retrieving stored information for use |
| Analogy with computer processing | Data entry  | Saving data to the hard drive  | Calling up saved data to the monitor  |

Check your learning 6.1



Check your learning 6.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the three memory processes. (3 marks)
- 2 **Identify** a key feature of encoding. (1 mark)
- 3 **Describe** what a memory trace is. (1 mark)

Analytical processes

- 4 **Distinguish** the process of encoding and storage. Provide examples to support your answer. (3 marks)

Lesson 6.2

The multi-store model of memory

Key ideas

- Atkinson and Shiffrin's multi-store model of memory proposes that there are three distinct memory stores: sensory, short-term memory and long-term memory.
- Sensory memory has a brief duration and an unlimited capacity. It relates to the five senses, including iconic memory for sight and echoic memory for sound.
- Short-term memory has a limited capacity (7 ± 2 pieces of information) and duration (20 seconds).
- Long-term memory is thought to have unlimited capacity and unlimited duration.



Learning intentions and success criteria

Introducing the multi-store model of memory

One of the earliest models of memory was the **multi-store model of memory** proposed by Atkinson and Shiffrin (1968). According to their model, memory isn't a single unitary structure, but is a system made up of three distinct stores that function simultaneously and interact with each other. **Controlled processes** such as coding procedures (e.g. chunking, mnemonics or schemas) and rehearsal (maintenance or elaborative) can alter the capacity and duration of the stores.

Environmental stimuli detected by our sensory system first enters the sensory memory store, where it is briefly held before it decays and is lost. The short-term memory store can temporarily hold selected inputs received from the sensory register and long-term memory store, before being lost due to decay or displacement. Information is transferred, or copied, from the short-term store to the long-term memory store where, as the name suggests, it can be maintained for a long time. This process is summarised in Figure 1.

Each store is capable of encoding, storing and making information available for retrieval; however, they differ in terms of how they encode, how much information (**capacity**) can be held and how long the information can be maintained (**duration**). The main features are summarised in Figure 1 and Table 1. We will review each of these stores and their characteristics in more detail in the following sections.

multi-store model of memory

a model that describes the structure (sensory memory, short-term memory and long-term memory) and controlled processes of memory

controlled process

a transient process under the control of a person that influences memory capacity and/or duration

Study tip

In psychology, models are simplified representations used to explain complex processes.

capacity

a characteristic of memory that refers to the amount of information that can be held in a memory store

duration

a characteristic of memory that refers to the length of time information can be maintained in a memory store

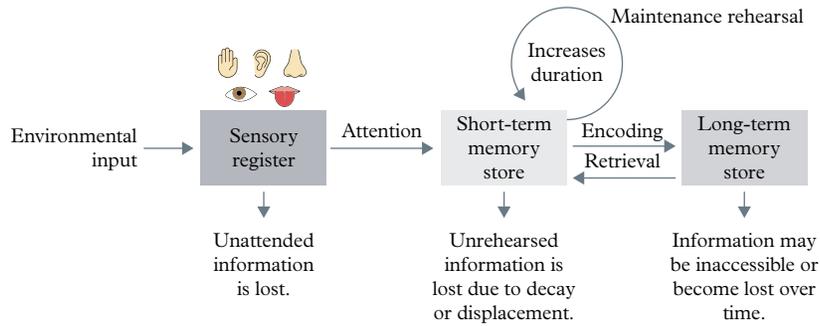


FIGURE 1 The Atkinson and Shiffrin multi-store model of memory

TABLE 1 Summary of the function, capacity and duration of each store of Atkinson and Shiffrin’s multi-store model of memory

| | Sensory registers | Short-term memory store | Long-term memory store |
|-----------------------------|--|--|----------------------------------|
| Function | Briefly preserves sensory information in its original form | Receives and holds information from sensory registers and long-term memory for processing and manipulation | Permanent storage of information |
| Main encoding format | Multiple – one for each main sensory input | Auditory | Semantic |
| Capacity | Unlimited | 7 ± 2 pieces of information | Unlimited |
| Duration | Iconic: 0.3 to 0.4 seconds Auditory: 3 to 4 seconds | 20 seconds | Relatively permanent |
| Controlled processes | Selective attention | Chunking and maintenance rehearsal | Encoding and retrieval |
| Forgetting | Memory trace decays rapidly | Trace decay and displacement | Interference |

Study tip

Tables are an excellent way to summarise large volumes of information. For instance, Table 1 summarises the content in this module.

Evaluating the multi-store model of memory

The multi-store model provides a clear and simplistic model for understanding the structure and processes of memory. Each of the structures and processes have been investigated and are well supported by empirical evidence. However, critics argue that this model is too simplistic, particularly the short-term memory store, and that the short- and long-term memory stores do not map onto anatomical brain regions.

Introducing sensory memory

sensory memory

a storage system that holds incoming sensory information for a very short time

Sensory memory is the first structure in the multi-store model of memory. It receives and temporarily holds all the sensory information from our external world. However, the amount of sensory information we receive would be too overwhelming for us to process and manage in our conscious awareness, therefore it is held briefly and is filtered based on our goals and what we choose to focus on.

Duration and capacity of sensory memory

Sensory memory has an unlimited capacity and a very brief duration. The brief duration (rapid decay) of sensory memory is necessary so that we can process new information. The rapid decay also allows us to perceive our world as smooth and ongoing, and to hear sounds just long enough to understand whole words and sentences. Just imagine what it



FIGURE 2 Sensory memory is of a brief duration, such as hearing music or smelling the ocean.

would be like if sensory memory were not brief – while you were listening to the end of your teacher’s lesson on psychology, you would still be hearing the first words she uttered – there would be chaos in your mind! If the information held in the sensory register is not attended to, then the memory trace will fade (or decay) and the information will be lost forever.

Control process for sensory memory

Due to the rapid decay of the large amount of information that enters the sensory register, the main control process at this stage is selective attention to guide the selection of information to transfer to short-term memory. **Selective attention** is the process of focusing on particular stimuli while ignoring others (see Sperling’s experiment as an example).

selective attention

the process of focusing on particular stimuli while ignoring others

Sensory modalities

Although the sensory memory store is shown as a single structure (Figure 1) it includes multiple registers, one for each of our senses: iconic memory (vision), echoic memory (hearing), haptic memory (touch), gustatory memory (taste) and olfactory memory (smell). Since our primary senses are vision and hearing, we will look at the related sensory registers in more detail (Table 2).

iconic memory

a sensory register for the fleeting storage of visual information; it lasts about 0.3 seconds and explains why we can see a moving picture from a series of still photos

Iconic memory

Iconic memory refers to our visual sensory memory. *Icon* is from the Greek word meaning “image”. Iconic memory lasts for about 0.3 to 0.4 seconds (Sperling, 1960). This explains why we can see moving pictures from a series of still shots projected onto a movie screen. We are still storing the image of one still shot when it is replaced by the next frame, so the illusion of movement is created. This is why movies run at 24 frames per second. Research on people with reading disorders, such as dyslexia, suggests that the duration of their iconic memory is too long and, therefore, the images of words and letters persist too long to enable them to process the next words in a reading passage (DiLollo et al., 1983).



FIGURE 3 Think about how your iconic memory reacts to a sparkler being waved in the air.

Echoic memory

Does this scenario sound familiar?

Person 1: Which class do you have after lunch?

Person 2: Sorry, what did you say – oh, Psychology.

This is the most common example of echoic memory. Cognitive psychologist Ulric Neisser popularised the term “echoic memory” in 1967. **Echoic memory** refers to our auditory (sound) sensory memory and is essentially the auditory equivalent of visual sensory memory.

Echoic memories are typically stored in our sensory memory for a slightly longer period than iconic memories: about 3 to 4 seconds. This is necessary because we need to register information in its entirety before we can make it meaningful; hence the delayed reaction.



FIGURE 4 Echoic memory lasts just long enough for us to retain the detail of what has been said and to link it with what is said next.

echoic memory

a sensory register for the fleeting storage of auditory information, lasting about 3 to 4 seconds and helping the brain piece together sounds to make them meaningful

Summary of sensory modalities

Table 2 summarises the characteristics of iconic and echoic memory.

TABLE 2 The characteristics of iconic memory and echoic memory

| | Iconic memory | Echoic memory |
|-----------------------------|---|---|
| Function | A type of sensory register that briefly preserves visual information in its original form | A type of sensory register that briefly preserves auditory information in its original form |
| Main encoding format | Visual | Auditory |
| Capacity | Unlimited | Unlimited |
| Duration | 0.3 to 0.4 seconds | 3 to 4 seconds |
| Forgetting | Memory trace decays rapidly | Memory trace decays rapidly |
| Example | Waving a sparkler in the dark and briefly experiencing an after-image | Retaining the sounds of words long enough to understand the whole word or phrase that has been spoken |

Source: Sperling (1960)

Challenge

Iconic memory

Shut your eyes and try to describe the after-image that remains. It is likely that you will be unable to describe all of it because it has faded too quickly for you to remember it.

Hold a pencil loosely between your thumb and index finger and shake it. The pencil will appear to be floppy because of the after-image it leaves on the sensory receptors in your retinas. **Consider** the evolutionary advantages of iconic memory.

Real-world psychology

Sperling's study on iconic memory

George Sperling (1960) investigated the duration and capacity of iconic memory. Using a tachistoscope (an old-school projector), Sperling flashed a series of 12 letters arranged in a 4 by 3 grid for one-20th of a second (50 milliseconds). After the presentation, participants were instructed to either recall all the letters (whole report) or a specific row (partial report) (Figure 5). In the partial report, flashing of the grid was followed by a high-, medium- or low-sounding tone that signalled to the participants which of the three rows of four symbols to attend to and report.

Sperling found that participants could only recall four to five letters from the whole report but could accurately recall a specific row 75 per cent of the time.

In both studies, Sperling demonstrated that participants were able to hold the visual information they were presented with in their memory. In the partial report, participants didn't know which row they would have to recall until after the stimulus was presented and yet, they could still recall the information accurately 75 per cent of the time. Thus, Sperling deduced that participants were able to hold more of the image than they were consciously aware

of and the low recall was because it faded so quickly. He concluded that while iconic memory has an unlimited capacity, it has a very brief duration.

Sperling further tested the duration of the iconic memory by allowing a delay between the

presentation of the grid in the tachistoscope and the sounding of the tone. He found that the longer the delay, the more symbols were forgotten, with only 50 per cent recalled after a 0.3-second delay and 33 per cent after a 1-second delay.

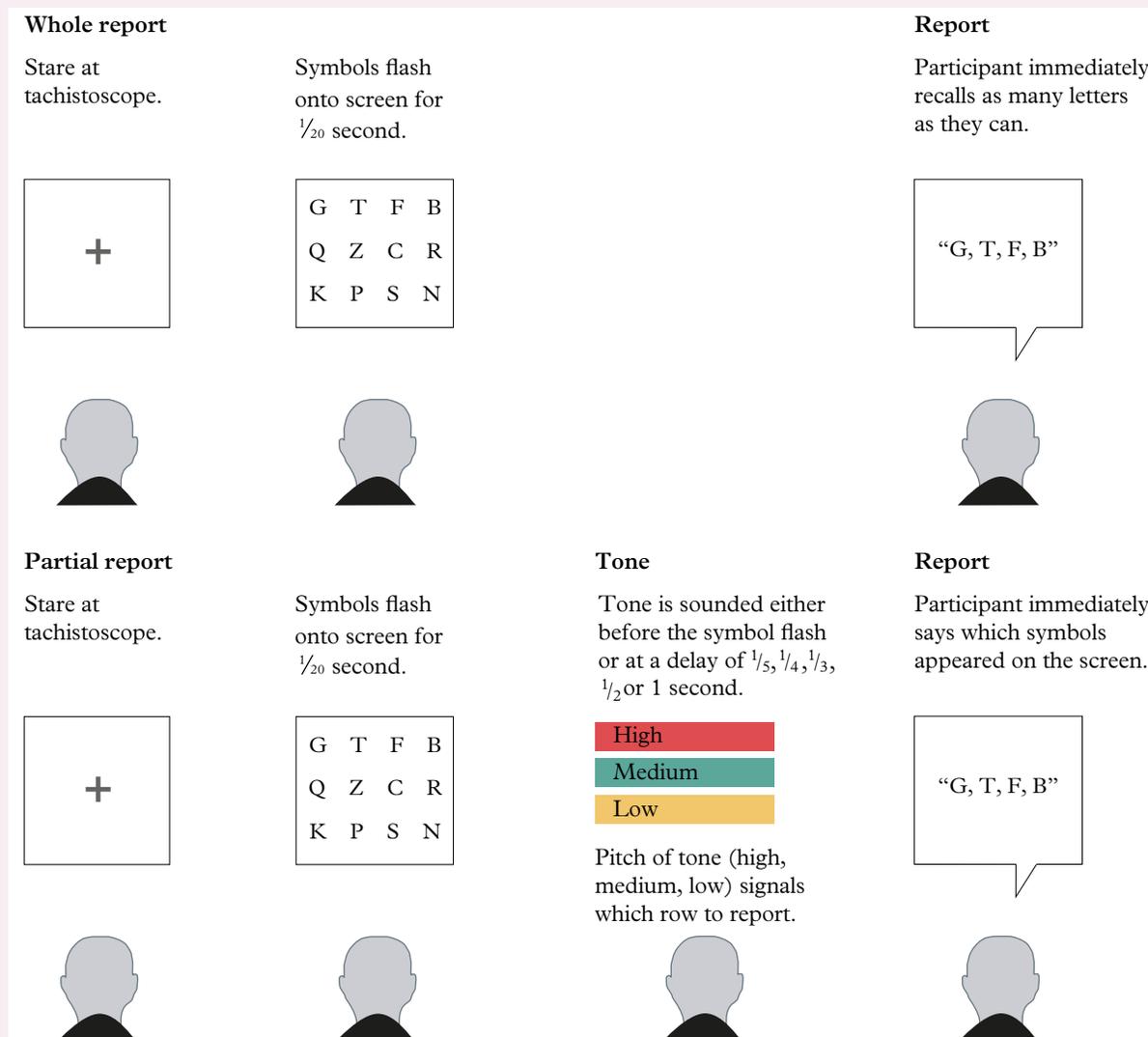


FIGURE 5 In different experiments, participants were asked to recall all the letters (whole report) or a specific row (partial report). Participants relied on the after-image of the symbols projected by the tachistoscope to report the symbols they could remember.

Apply your understanding

- 1 Explain** why Sperling used both a partial and full report. (2 marks)
- 2 Explain** how the findings from Sperling’s study demonstrate that iconic memory
 - a** has a brief duration (2 marks)
 - b** large capacity. (2 marks)

Introducing short-term memory

short-term memory (STM)

a temporary memory system that holds a limited amount of information (5 to 9 pieces) for a short duration (12 to 20 seconds)

Short-term memory (STM) is the second structure in the multi-store model of memory. It receives information from the sensory registers and long-term memory, and holds it for long enough that we can use it. For example, looking up a telephone number and keeping it in your awareness long enough to dial it, mentally rotating an image in your mind, or performing mental maths.

Without our short-term memory, we wouldn't be able to learn new information, recall old information or perform mental functions like doing a calculation (Baddeley, 1999).

Duration and capacity of short-term memory



FIGURE 6 Our short-term memory is limited to five to nine pieces of information. This is why writing down a shopping list for trips to the supermarket is useful.

Study tip

Everyday use of the term “short-term memory” often refers to longer durations: hours, a day or even several days. However, in psychology, as you've just learnt, it refers to a specific aspect of memory with a very short duration and limited capacity.

Short-term memory has a brief duration, typically lasting 20 seconds without rehearsal (Baddeley, 1999). This was demonstrated in a study by Peterson and Peterson (1959), where participants were asked to remember a series of trigrams (three-letter combinations). To prevent rehearsal, they were given a distractor task (counting backwards) before recalling the trigrams at varying intervals. The results showed a sharp decline in recall accuracy over time, dropping to around 10 per cent accuracy after 15 seconds of delay (Figure 7). This suggests that without active rehearsal, information in STM rapidly decays, leading to forgetting.

Short-term memory has a brief duration, typically

Short-term memory is a limited capacity store, able to hold around five to nine pieces of information at a time, a limit famously referred to as “The Magical Number Seven, Plus or Minus Two”, discovered by George Miller (1956). Psychologists often measure the capacity of STM using a digit span test, where participants are asked to recall a sequence of digits in the same order after a brief presentation. The length of the sequence they can remember before making mistakes reflects the capacity of their STM. When the capacity limit is reached, new information can only enter STM by displacing existing information, meaning that older or less relevant data is pushed out to make room for new items.

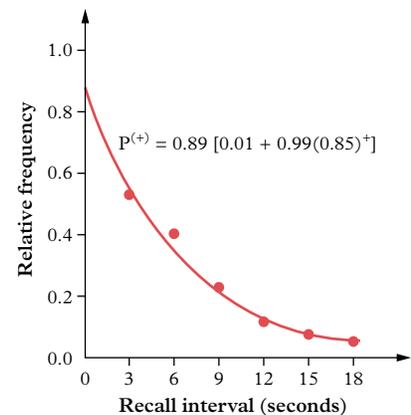


FIGURE 7 Findings from the Peterson and Peterson (1959) study showed that STM has a short duration.

Challenge

Test the capacity of your short-term memory

Complete the following digit span tests.

- Have a partner read aloud each row of the digits shown, with you repeating them immediately. Your partner should proceed through this list until you make errors in two successive sets of digits. This will provide you with an indication of your memory span. Consider whether there was any interference in your ability to retain the information.

9, 3
 7, 4, 6
 5, 0, 3, 7
 2, 6, 8, 1, 4
 7, 3, 9, 0, 2, 5
 8, 5, 3, 0, 1, 6, 2
 9, 5, 3, 2, 4, 8, 0, 6
 2, 5, 7, 1, 0, 8, 3, 6, 4
 9, 2, 5, 7, 3, 1, 0, 8, 4, 6

- 2 Read each row of letters, then look away and try to repeat them.

L J G V Q
A F T E H O
J O Q R D W Y
M D F T U W C H
A S D T H J Q Y O

As the number of letters in each row increases, you will find it more difficult to retain all of them. One limitation is that short-term memory is influenced by how long it takes to say a word or sound. For example, the letter “a” is quicker to say than the letter “w”. Similarly, short-term memory capacity is reduced when people try

to remember complex visual patterns because they have to retain so much detail in each pattern. Work with a partner to design your own experiment, using words rather than letters or numbers. You can research online. Remember to think about the number of syllables in each word. Make sure to include:

- an aim for the experiment
- an experimental hypothesis
- the independent and dependent variables
- results presented in a table (you may also include a graph)
- a conclusion for your experiment.

Skill drill

Modifying an experiment

Science inquiry skills: Understanding the scientific method (Lesson 1.3); Planning investigations (Lesson 1.4)

Different stores of memory will have different durations and capacities. The short-term memory in particular can be very limited in the number of items that can be remembered. This is why when you try cramming for an exam, only a few items will be retained, whereas if information is encoded into the long-term memory it is much more likely to be remembered.

The generally accepted capacity of the short-term memory is seven items plus or minus two. The original researcher was able to confirm this across cultures by giving participants a list of digits or words for 1 minute and then asking them to recall as many as possible.

However, Kellie, a Year 12 student, started to question this number. Given the increased use of technology, people are less reliant on their own memory on a daily basis. Kellie thought that

because of this, seven items plus or minus two may be incorrect for today’s society.

To test this hypothesis, Kellie decided to use a repeated-measures design to test two conditions.

In the first condition, participants were given 15 digits to remember in a 1-minute period. The number of correct responses was collected. The second condition required participants to learn 20 digits in a 1-minute period. Again, the correct responses were collected.

Practise your skills

- 1 **Identify** and operationalise the independent and dependent variable for this experiment. (4 marks)
- 2 **Create** a justified modification for the experiment. (4 marks)
- 3 **Identify** two potential extraneous variables in Kellie’s experiment. (2 marks)
- 4 **Explain** how counterbalancing can be used to help reduce extraneous variables in this experiment. (2 marks)

Control processes for short-term memory

In addition to outlining the structures of memory in their multi-store model, Atkinson and Shiffrin (1968) identified control processes that can extend the capacity and duration of STM. **Chunking** is a coding strategy that involves grouping individual pieces of information into larger, meaningful units or “chunks”. This helps to increase the effective capacity of

chunking

a coding strategy that increases the capacity of short-term memory

maintenance rehearsal

a strategy for keeping information in short-term memory or for moving it into long-term memory by repeating information

STM, allowing more information to be stored. For example, remembering a phone number as “123-456-7890” instead of as 10 separate digits is a form of chunking.

Similarly, the duration of STM can be extended through **maintenance rehearsal**, a process where information is repeated or rehearsed to keep it active in memory. For instance, when trying to remember a list of grocery items, repeating them over and over to yourself helps maintain the information in STM until you can write it down or act on it.

Maintenance rehearsal also increases the chances of this information being moved into your long-term memory. Methods of maintenance rehearsal are summarised in Table 3.



FIGURE 8 We use maintenance rehearsal to remember directions after we've looked them up.

TABLE 3 Methods of maintenance rehearsal

| Method | Example |
|--|--|
| Verbal (using words) | <ul style="list-style-type: none"> Vocal – saying words out loud Sub-vocal – thinking words silently to oneself |
| Non-verbal (using visual or spatial information) | <ul style="list-style-type: none"> Visualising – keeping an image in one's mind Muscular – imagining how it feels to perform an action |

You will learn more about chunking and maintenance rehearsal in Module 8.

Challenge**Topic challenge!**

In small groups, create a string of numbers nine digits long. At the start of each lesson, say the numbers out loud in your group. Do you think you will be able to recall this sequence during Unit 4? **Propose** why you might or might not be able to recall this string of numbers.

Introducing long-term memory

long-term memory (LTM)

a durable memory system that stores a lot of encoded information relatively permanently

semantic network

a form of knowledge representation whereby information is stored in a hierarchical pattern, grouped by meaning and linked to related information

Long-term memory (LTM) is the final store in Atkinson and Shiffrin's (1968) multi-store model of memory. According to their model, information is copied (transferred) into LTM from STM, where it decays according to the decay characteristics of the store. The amount and form of information transferred is a function of controlled processes. Thus, increasing the duration of STM increases the chances that information will be transferred to LTM.

The way information is stored in long-term memory is different from sensory memory and short-term memory. In long-term memory, information is encoded by its meaning (that is, semantically) and stored in **semantic networks**. LTM also exists in each of the sensory modalities. This allows us to remember information about events such as the way chocolate tastes and smells, or how we felt while riding a roller coaster.

LTM plays a crucial role in our identity and everyday functioning. Without LTM, we wouldn't remember important information such as the names of our family and friends, we wouldn't remember the experiences that shaped our identity, and we wouldn't remember the skills that help us function in everyday life.

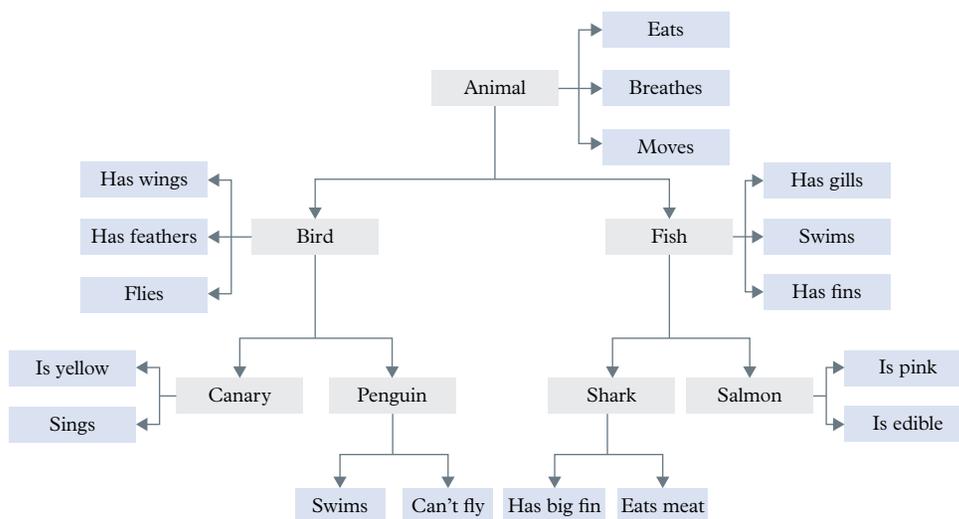


FIGURE 9 Semantic networks

Study tip

Does the image in Figure 9 look familiar? Mind maps are excellent study tools because by actively organising information into similarities and differences, we are helping our brain store the information correctly in our semantic network.

Duration and capacity of long-term memory

It is hard to identify just how long the duration of long-term memory might be. Sometimes, previously stored memories are thought to be forgotten but, with the appropriate cues, they will suddenly come flooding back into conscious awareness. Long-term memories are maintained because of physiological changes to the neurons and their connections with other neurons.

Similarly, it is difficult to measure the capacity of long-term memory and there is probably no way of finding its limits. Different methods of **retrieval** produce different results. It is generally considered that “forgetting” long-term memories is due to poor **retrieval cues** rather than capacity limitations.

Thus, long-term memory is thought to be capable of storing unlimited amounts of information indefinitely.

Control processes for long-term memory

According to Atkinson and Shiffrin (1968), the control processes involved in long-term memory include encoding and retrieval. Encoding refers to how information is transferred from short-term to long-term memory. A key method for this is **elaborative rehearsal**, where new information is connected to existing knowledge in our semantic network to make it more memorable. For example, relating new concepts to personal experiences helps to store information more effectively. Retrieval is the process of accessing stored information, and this can be aided by retrieval cues, which are prompts that activate the neural pathways associated with the memory. Organising information meaningfully and using cues make it easier to retrieve information from long-term memory.

retrieval

the process of accessing information for use

retrieval cue

a mental reminder or prompt that activates our neural network to assist with recollection later on

elaborative rehearsal

a rehearsal strategy that involves connecting new information to existing information within our semantic network

Check your learning 6.2



Check your learning 6.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** the multi-store model of memory. (1 mark)
- 2 **Describe** the function of the short-term memory store. (1 mark)

- 3 **Define** control processes. (1 mark)
- 4 **Identify** which sense is registered in
 - a iconic memory (1 mark)
 - b echoic memory. (1 mark)

◀ Analytical processes

- 5 **Contrast** duration and capacity of memory. (1 mark)
- 6 Tharinda is studying for his Psychology exam in the library by reading the textbook and writing his own notes. He listens to music to block out random noises in the library. **Determine** which sensory register is active as he is reading. (1 mark)

- 7 **Contrast** sensory memory and short-term memory. (1 mark)

Knowledge utilisation

- 8 **Evaluate** Sperling's study of iconic memory and the validity of the findings. (3 marks)
- 9 **Discuss** the effectiveness of maintenance rehearsal as a strategy to increase long-term memory. (3 marks)

Lesson 6.3

The working memory model



Learning intentions
and success criteria

Key ideas

- Baddeley and Hitch's model of working memory shows that there are four separate but interdependent aspects of working memory: the central executive, the phonological loop, the visuospatial sketchpad and the episodic buffer.

Introducing the working memory model

Critics of the multi-store model argued that STM is more complex than the simple, unitary store proposed in the model (Baddeley et al., 2009). Even Atkinson and Shiffrin referred to STM as “working memory” (1968), recognising that it involves active processing of information. Building on this idea and other research that suggested the STM could handle different types of information simultaneously, which led Baddeley and Hitch (1974) to develop the multi-component model of working memory.

Challenge

Waltzing Matilda

Do you know the words to the chorus of “Waltzing Matilda”?

Waltzing Matilda, Waltzing Matilda,
Who'll come a-Waltzing Matilda with me?
And he sang as he watched and he waited 'til his billy boiled,
Who'll come a-Waltzing Matilda with me?

Time yourself as you say the chorus aloud as fast as possible. Time yourself as you say the chorus silently as fast as possible. Time yourself as you say the first word aloud and the second silently and so on as fast as possible. What were your results? **Hypothesise** why you achieved these results.

Working memory model explained

Baddeley defines **working memory** as “a limited capacity system allowing the temporary storage and manipulation of information necessary for complex tasks as comprehension, learning and reasoning” (Baddeley, 2000). Over the years, Alan Baddeley has developed and updated the model of working memory. The latest and current version identifies four components that have distinct roles but work together to process information: the central executive; two slave systems, the phonological loop and visuospatial sketchpad; and the episodic buffer.

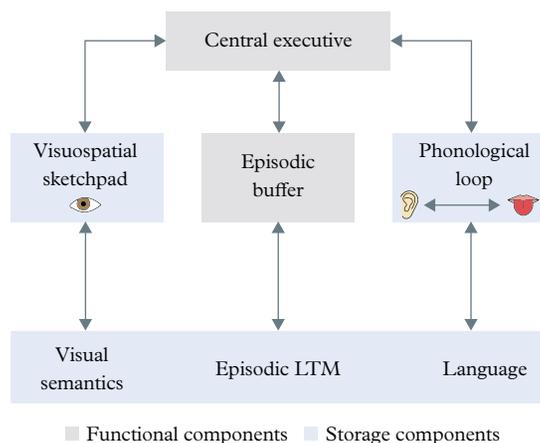


FIGURE 1 Baddeley and Hitch's (2000) model of working memory

Central executive

The **central executive** is the functional component of working memory responsible for switching attention, deciding what material is to be retrieved from or committed to LTM, and performing calculations and making linkages.

The three main functions of the central executive have been identified as:

- **inhibition:** an aspect of attention; screening out irrelevant material
- **switching:** changing attention from one item to another
- **updating:** modifying items brought in from LTM before re-committing them to memory through the episodic buffer; creating a process of accommodation of the semantic network.

Phonological loop

The **phonological loop** is responsible for processing and temporarily holding auditory information. It is composed of two parts: the **phonological store** (inner ear) and the **articulatory loop** (inner voice). The phonological loop is what helps us to make meaning of what we hear by retaining the words from the beginning of the sentence until we have heard the words at the end. The articulatory loop is at work when you repeat information to hold on to it. Pay attention to how you read the words on this page, most likely, you can “hear” the words in your mind, also referred to as your “inner voice”.

working memory

temporary storage and manipulation of information to perform complex tasks

central executive

directs our attention and coordinates the actions of the other components

phonological loop

a storage system for auditory information in working memory comprising the phonological store and articulatory loop

phonological store

a component of the phonological loop that holds auditory information

articulatory loop

a component of the phonological loop that rehearses auditory information

Study tip

The prefix “phono” comes from the Greek word *phōnē*, meaning “sound” or “voice”. The phonological store stores auditory information. “Articulate” means to express clearly. When we engage the articulatory loop, we are “speaking” the information in our minds, hence it is referred to as “inner voice”.

visuospatial sketchpad

the storage system for visual information in working memory

episodic buffer

a theoretical component of working memory that integrates information from components of working memory and long-term memory, to create a unified, time-sequenced representation of events

Visuospatial sketchpad

The **visuospatial sketchpad** allows us to temporarily hold and manipulate visual information. This is the store we use to help us picture, for example, what a room would look like if we shifted the furniture around.

Episodic buffer

The **episodic buffer** acts as a bridge between working memory and LTM and, in doing so, facilitates the integration of information between the different systems. Information retrieved from LTM is associated with information in working memory. Information is also selected and encoded to LTM.

Working memory in everyday life

The following examples explain how we use working memory in everyday life.

Example 1

Imagine that you want to send a text message to a friend to arrange to meet:

- 1 Your central executive gets the episodic buffer to access language from LTM.
- 2 Your central executive forms the message you want to send.
e.g. *Coffee at Charlie's cafe at 12. OK?*
- 3 Your central executive obtains the visual image of your phone's keypad from your visuospatial sketchpad and coordinates the keystrokes that write the message.
- 4 Your central executive encodes the memory of sending the message through the episodic buffer into LTM.

As you can see, the central executive is the controller, manager and decision-maker in working memory.

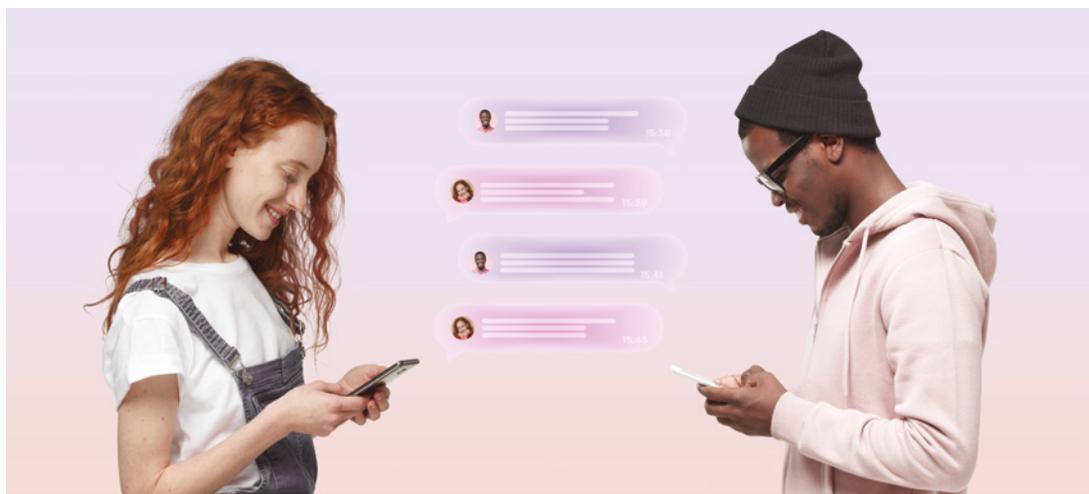


FIGURE 2 The working memory model can be applied to sending a text message to a friend.

Example 2

Imagine that you are going to perform the multiplication problem 7×43 .

- 1 The visuospatial sketchpad enables you to picture the problem.
- 2 The phonological loop enables you to sound the problem in your mind.
- 3 The central executive enables you to realise that you are going to need to retrieve your 7 times tables from LTM.
- 4 The episodic buffer retrieves the 7 times tables from LTM.
- 5 The central executive works out that $7 \times 3 = 21$ and $7 \times 40 = 280$.
- 6 The phonological loop holds the sounds of 21 and 280.
- 7 The central executive adds these together to calculate the answer $280 + 21 = 301$.
- 8 The phonological loop holds the sounds of 301 and enables you to announce the answer.
- 9 The central executive decides if this figure is to be committed to LTM.
- 10 The episodic buffer encodes the information into LTM.

Duration and capacity of working memory

Working memory is a more complete model of the short-term memory store identified in the multi-store model, showing the dynamic nature of information storage and manipulation. It still has the same evidence-based limitations in terms of capacity and duration identified in the multi-store model (Lesson 6.2).

Investigating working memory

Early research showed that the different stores in working memory are reasonably independent (Logie et al., 1990). This means that we can do two or more things simultaneously (multitask), provided the tasks are using different “stores” in working memory. For example, we can drive a car at the same time as recalling information relevant to a conversation we are having with a passenger. In contrast, if two tasks use the same store, it is harder to do them simultaneously. Think about how frustrating it is when you are talking on the phone to someone and a friend next to you is trying to tell you something at the same time.

Working memory is a reasonably stable trait that appears to be heritable (Kremen et al., 2007). People who perform well on working memory tasks also tend to show high levels of ability in such tasks as reading comprehension and even intelligence tests (Engle et al., 1999). They are also likely to be better able to understand other people’s points of view (Barrett et al., 2004, as cited in Kalat, 2008).

Real-world psychology

The concept of working memory from inception to the present

In 1974, Baddeley and Hitch proposed the working memory model, which described short-term memory as an active system with three components: the phonological loop (verbal information), the visuospatial sketchpad (visual and spatial tasks) and the central executive (attention and coordination). This model improved upon earlier memory theories, like the Atkinson and Shiffrin model, by explaining how memory processes multiple types of information simultaneously.

In 2000, Baddeley added the episodic buffer, which integrates information from the other components and long-term memory into a meaningful sequence, such as remembering events in a story. Modern research using brain imaging has linked

- working memory to specific brain regions, such as the prefrontal cortex and parietal lobes. Australian researchers are also investigating working memory's role in learning difficulties and multitasking, highlighting its real-world importance for education and cognitive development.

Apply your understanding

- 1 Explain** how the original working memory model by Baddeley and Hitch (1974) improved upon earlier memory models. (3 marks)
- 2 Identify** two key components of the working memory model and describe their functions. (4 marks)
- Researchers are studying the links between working memory and learning difficulties. **Develop** a research question to investigate a causal relationship between working memory and a performance variable such as academic performance. (1 mark)
- 4 Conduct** research to find two studies that are relevant to the research question (RQ) you created in question 3. **Summarise** the two studies by completing the table below. (8 marks)

| | Study 1 | Study 2 |
|--|---------|---------|
| Title/reference | | |
| Identify the operationalised independent variable relevant to your RQ. | | |
| Identify the operationalised dependent variable relevant to your RQ. | | |
| Summarise the participants in the study. | | |
| Summarise the results of each study. | | |

Study tip

Creating a summary table of the studies is a helpful way to identify similarities (strengths) and differences. Differences between the variables in your RQ and the studies, or between the two studies, increase uncertainty and can help you identify limitations.

Check your learning 6.3



Check your learning 6.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Identify** the aspect of working memory responsible for integrating information from the other components and long-term memory. (1 mark)
- 2 Define** working memory. (1 mark)
- 3 Describe** the role of the visuospatial sketchpad. (1 mark)
- 4 Explain** the role of attention in the working model of memory. (2 marks)

Analytical processes

- 5 Distinguish** the functions of the phonological store and the articulatory loop. (1 mark)
- 6 Compare** the working model of memory to short-term memory in the multi-store model of memory. (2 marks)

Knowledge utilisation

- 7 Evaluate** the working model of memory and describe two strengths. (3 marks)
- 8 Discuss** how working memory limitations might impact a student's ability to multitask while studying. (3 marks)

Lesson 6.4

The levels of processing model of memory

Key ideas

- The levels of processing model of memory suggests that information that is more deeply and elaborately encoded in the memory is more likely to be remembered later on.



Learning intentions and success criteria

Study tip

Some memory failures stem from encoding issues, such as unattended information being lost from the sensory register (Lesson 6.2) or from insufficient attention during processing in STM, which prevents transfer to LTM (Lesson 6.3).

Introducing the levels of processing model of memory

For information to be retrievable, it must be encoded into a form that can be processed by our brain. However, selection of the information to be encoded depends not only on what we attend to but also on how we attend to and process the information. Thus, the quality of a memory trace depends on the depth of processing that occurs during encoding. This is the focus of the levels of processing (LOP) model of memory developed by Craik and Lockhart (1972).

The LOP model explained

Instead of viewing memory as having distinct stores as suggested by the multi-store model of memory, the **levels of processing (LOP) model** proposes that memory retention is determined by the depth of processing that information undergoes during encoding.

Evidence for the LOP model came from experiments conducted by Craik and Tulving (1975). Participants were shown a sequence of words and asked to respond to a yes/no question accompanying each word. Questions were designed to require one of three different levels of processing: structural, which prompted participants to respond to visual characteristics of the word; phonemic, rhyming characteristics of the word; or semantic, making meaning. Examples of each are shown in Table 1. Findings from their experiments supported the LOP model, demonstrating that the deeper the processing of information, the greater the chance of it being retrieved.

levels of processing (LOP) model of memory

a model of memory that suggests a deeper level of processing during encoding results in better retrieval from long-term memory

TABLE 1 Types of encoding and processing

| Type of encoding | Depth of processing | Example | | Recall |
|---|---------------------|----------------------------------|--|---|
| Structural Words are learnt by remembering their physical features, such as whether they were in upper or lower case, started with a vowel or consonant, or were long or short. | Shallow | pOTato brick BOOK Apple | Participants were asked to remember whether the word contained upper-case letters. | Less than 20% of words were recalled after structural encoding. |

| Type of encoding | Depth of processing | Example | | Recall |
|--|---------------------|-----------------------------------|---|---|
| Phonemic Words are learnt by their sounds. | Moderate | Bull Style Amazing Radio | Participants were asked to think of a rhyme (bull/full; style/smile) for the word, or perhaps rhyme and rhythm (What a song/I love the phrasing/and the tune/is just amazing!). | Approximately 57% of words were recalled after phonemic encoding. |
| Semantic Words are encoded by their meaning, which allows them to be placed directly in our semantic networks. | Deep | Gate Yacht Truck Apple | Participants were asked to put the words into a sentence where the meaning of the word would be important to the meaning of the sentence, such as “She opened the gate and entered the garden”. | More than 80% of words were retrieved after semantic encoding. |

The LOP model has practical applications. For example, when you are studying, the deeper and more elaborately you encode information, the more likely it is that you will understand it and remember it later on. Actually thinking about and using the information to be remembered is much more productive for encoding than just looking at or repeating the information.

Challenge

Levels of processing

Unscramble the three complex words and the three simple words in Table 2. Try to recall these words tomorrow. **Consider** which words you think you will recall best.

TABLE 2 Word scramble

| Complex | Simple |
|---------|--------|
| OCRTDO | MORYME |
| OOMTTA | UTEMIN |
| RREEAS | MMERSU |

Skill drill

Evaluating validity

Science inquiry skills: Planning investigations (Lesson 1.4); Evaluating evidence (Lesson 1.8)

Craik and Lockhart (1972) suggested that it is the level of processing that influences how well material is encoded, but other research has shown that it is not as simple as that. Craik and Tulving (1975) found that the more complex the processing, as measured by participants' time to respond to the question, the stronger the memory, even within the same level. Rogers and his colleagues (1977) found

that personal relevance or salience has a major effect on recall, so using questions such as “Does this describe you?” produces better recall than “What does this mean?”.

Later, it was found that memory for participants who related each word to their mothers was just as strong as for those who related the words to themselves (Symons & Johnson, 1997). The conclusion is simple: memory grows stronger the more it is elaborated and linked to things we know

well and care about. Tyler and his colleagues (1979) found that the more effort we have to put into remembering something, the stronger our recall will be once we have encoded it. They gave participants

Practise your skills

- 1 Describe** what a confounding variable is and how it affects the validity of findings in research. (2 marks)
- 2 Evaluate** Craik and Tulving's findings about effects of depth of processing on memory recall by identifying potential confounds and explaining their impact on internal validity. (4 marks)
- 3 Evaluate** Craik and Tulving's findings about the effects of depth of processing on memory recall by comparing their findings to those of the other researchers summarised here and explaining how this impacts validity. (4 marks)

easy anagrams and complex anagrams of words to be remembered and found that the harder the participants had to work to solve the anagrams, the better they remembered the word!

Check your learning 6.4



Check your learning 6.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** the levels of processing model of memory. (1 mark)
- 2 Identify** and explain the three different types of processing and encoding. (6 marks)

Analytical processes

- 3 Compare** the working memory model and the levels of processing memory model. (2 marks)

Knowledge utilisation

- 4 Evaluate** the levels of processing model of memory. (3 marks)
- 5 Discuss** the following statement: "The working memory model provides a better explanation of memory than the levels of processing model of memory." (3 marks)

Practical

Lesson 6.5

Practical: Evaluating the validity of depth of processing



Learning intentions
and success criteria

oxforddigital

This practical lesson is available on Oxford Digital. It is also provided as part of a printable resource that can be used in class.

Lesson 6.6

Review: Understanding memory

Summary

- 6.1 • Models of memory allow researchers to investigate memory by identifying common elements that can then be individually investigated.
- The standard model of memory uses a metaphor of a computer: an information-processing model describes the flow of information involving encoding, storage and retrieval.
- 6.2 • Atkinson and Shiffrin's multi-store model of memory proposes that there are three distinct memory stores: sensory, short-term memory and long-term memory.
- Sensory memory has a brief duration and an unlimited capacity. It relates to the five senses, including iconic memory for sight and echoic memory for sound.
- Short-term memory has a limited capacity (7 ± 2 pieces of information) and duration (20 seconds).
- Long-term memory is thought to have unlimited capacity and unlimited duration.
- 6.3 • Baddeley and Hitch's model of working memory shows that there are four separate but interdependent aspects of working memory: the central executive, the phonological loop, the visuospatial sketchpad and the episodic buffer.
- 6.4 • The levels of processing model of memory suggests that information that is more deeply and elaborately encoded in the memory is more likely to be remembered later on.
- 6.5 • Practical: Evaluating the validity of depth of processing

Review questions 6.6A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- What is the sequence of information processing?
 - Retrieval, encoding, storage
 - Encoding, storage, retrieval
 - Storage, retrieval, encoding
 - Encoding, retrieval, storage
- Which are the three stores in the multi-store model of memory?
 - Sensory memory, short-term memory, working memory
 - Episodic memory, semantic memory, procedural memory
 - Sensory memory, short-term memory, long-term memory
 - Short-term memory, declarative memory, procedural memory
- Which term is used to describe the transfer of information from short-term to long-term memory?
 - Encoding
 - Encryption
 - Transduction
 - Transmission
- Images are temporarily held in
 - implicit memory.
 - sensory memory.
 - short-term memory.
 - long-term memory.
- What is the duration of short-term memory for the average adult?
 - 5 minutes
 - 30 minutes
 - 7 ± 2 seconds
 - 20 seconds
- Which term refers to the time-based loss of information from short-term memory?
 - Decay
 - Amnesia
 - Displacement
 - Proactive or retroactive interference
- Rapid decay in sensory memory
 - creates a stronger memory trace.
 - improves the accuracy of long-term memory.
 - prevents long-term memory from being overloaded.
 - helps to transfer information from sensory to short-term memory.
- The function of maintenance rehearsal in short-term memory is to
 - increase retrieval cues in long-term memory.
 - increase retrieval cues in short-term memory.
 - prevent information decay in long-term memory.
 - prevent information decay in short-term memory.
- The role of the episodic buffer in working memory is to
 - rehearse information until it is committed to long-term memory.
 - act as a permanent storage system for visual and auditory information.
 - integrate and filter visual and auditory information to and from short-term memory.
 - integrate and filter visual and auditory information between long-term memory and other components of working memory.
- What is the role of the central executive in working memory?
 - To store auditory information
 - To encode visual-spatial information
 - To integrate long-term and working memory
 - To allocate attention to tasks and resources
- Which is the subsystem responsible for processing auditory information in working memory?
 - Episodic buffer
 - Central executive
 - Phonological loop
 - Visuospatial sketchpad
- According to the levels of processing model of memory, semantic encoding leads to better memory retention because it
 - emphasises repetition of the stimuli.
 - requires shallow processing of information.
 - focuses on physical characteristics of stimuli.
 - establishes connections with prior knowledge.
- What type of processing is involved in rhyming tasks?
 - Semantic
 - Phonemic
 - Structural
 - Episodic

- 14 A similarity between the working model of memory and the levels of processing model of memory is that
- A both models emphasise the importance of attention in memory retention.
 - B both models emphasise the importance of depth in encoding for memory retention.
 - C both models describe how information is processed and transferred through distinct stores.
 - D the levels of processing model focuses on depth of processing, whereas the working model focuses on active manipulation of information.

Review questions 6.6B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 15 **State** the three processes of memory. (1 mark)
- 16 **State** the duration of iconic and echoic memory. (2 marks)
- 17 **Identify** one strength and one limitation of the multi-store model of memory. (2 marks)
- 18 **Define** semantic networks. (1 mark)
- 19 **Describe** the function of sensory memory. (1 mark)
- 20 Describe the role of the episodic buffer in the working memory model. (1 mark)
- 21 **Describe** an example of
- a short-term memory (1 mark)
 - b long-term memory. (1 mark)
- 22 **Describe** what happens to information that is not attended to in sensory memory. Use an example. (2 marks)
- 23 **Explain** how the process of elaborative rehearsal increases long-term memory. (2 marks)
- 24 **Identify** the capacity and duration of
- a sensory memory (2 marks)
 - b short-term memory (2 marks)
 - b long-term memory. (2 marks)

Analytical processes

- 25 **Distinguish** between encoding and retrieval. (1 mark)
- 26 **Contrast** long-term memory and short-term memory. (1 mark)
- 27 **Differentiate** between how information is lost from sensory memory and long-term memory. (1 mark)
- 28 Rajesh needs to remember a parking spot number, B13, in a busy car park. He doesn't have a pen or his phone to record it, so he silently repeats "B13" to himself as he walks towards the store. **Determine** and **describe** the control process Rajesh is using to extend the duration of his short-term memory. (2 marks)

- 29 Maya is studying for her history exam by making connections between the events she's learning about and personal experiences or stories from her family history. **Determine** and **describe** the control process Maya is using to improve her long-term memory retention. (2 marks)
- 30 **Compare** the duration and capacity of long-term memory and short-term memory. (2 marks)
- 31 **Compare** the multi-store model of memory to the working model of memory with respect to structure and function. (4 marks)
- 32 **Compare** the strengths of the working model of memory and the levels of processing model of memory. (2 marks)
- 33 **Compare** the phonological loop and the visuospatial sketchpad. (2 marks)

Knowledge utilisation

- 34 **Discuss** the importance of attention during the encoding process and how distractions can impact memory formation. (4 marks)
- 35 Troy is a visual arts student and has been working on creating a flip book of images. A flip book is a book with a sequence of images that, when flipped through really fast, looks like one image that is moving. Troy has been researching the type of memory that allows this to happen. **Explain** why the illusion of the flip book is possible with reference to the multi-store model of memory. (3 marks)
- 36 **Evaluate** the multi-store model of memory, identifying one strength, one limitation and one real-world application. (3 marks)
- 37 **Evaluate** the working model of memory, identifying one strength, one limitation and one real-world application. (3 marks)
- 38 **Evaluate** the levels of processing model of memory, identifying one strength, one limitation and one real-world application. (3 marks)

Data drill

Multi-store model of memory

Glanzer and Cunitz (1966) conducted a study on the serial position effect, showing differences in recall for early and late list items. Their findings supported the multi-store model of memory by demonstrating differences in the duration of short-term (~20 seconds) and long-term memory. A Psychology class replicated their study.

Design

- Independent groups experimental design
- Convenience sample of 28 Year 11 Psychology students

Methodology

Participants were shown a list of 15 words, presented with one word at a time, every 3 seconds. Conditions for recalling the words were:

- immediate recall (participants recalled words immediately after presentation)
- delayed recall (participants recalled words after a 30-second distraction task involving counting backwards).

Recall percentages (number of participants who recalled the word divided by the number of participants) were recorded for each word position.

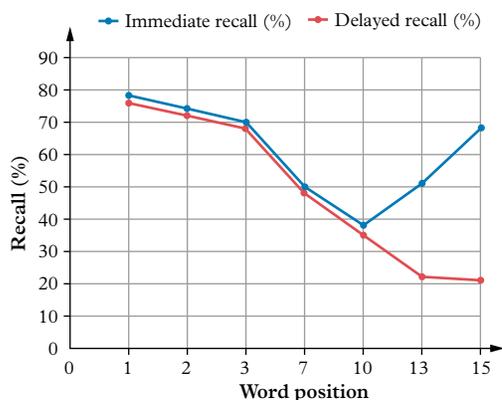


FIGURE 1 Recall percentages for each word position in the immediate and delayed recall conditions

Apply understanding

- 1 **Identify** the word position with the highest recall percentage in the immediate recall condition. (1 mark)
- 2 **Calculate** the difference in recall percentages for word position 15 between the immediate and delayed recall groups. Show your working. (2 marks)

Analyse data

- 3 **Compare** the trends in recall percentages between the immediate recall and delayed recall conditions. Use data from the graph to support your answer. (4 marks)

Interpret evidence

- 4 **Predict** whether the percentage recall in the delayed recall condition would increase, stay the same or continue to decrease if more words were added to the list. **Justify** your prediction. (2 marks)
- 5 The multi-store model of memory claims there are distinct memory stores. **Extrapolate** findings from the immediate recall condition to **evaluate** this claim. Use evidence from Figure 1 to support your answer. (2 marks)



Module 6 checklist: Understanding memory

7

The formation and storage of memories

Introduction

Our memories are a complex set of structures and neural pathways that help us navigate our everyday world, solve problems, recall information, control our movements and help us "remember" emotions that relate to our experiences. Much of our understanding of the complex nature of memories has been developed from case studies, neuroimaging and animal research.

Researchers have long used case studies to explore the connection between the brain and behaviour. Case studies on patients with amnesia (loss of memory) led to the discovery that long-term memory is not a single system but includes different types of memory. The finding that different types of memory rely on distinct brain processes helps explain why some types of memory may remain intact even if others are impaired.

Similarly, research with animals has helped scientists uncover the biological mechanisms of memory. Eric Kandel (American Physiological Society, 2024c) received the Nobel Prize in Physiology or Medicine for his research with sea slugs (*Aplysia californica*). His groundbreaking work revealed that long-term memories are encoded through changes in the strength of synaptic connections. His research demonstrated how learning reshapes the brain and provided evidence that memories are physically stored in our neural networks.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to the formation and storage of memories before you start.

Subject matter

Science understanding

- Describe how information is stored in long-term memory with reference to implicit (i.e. procedural, priming, classical conditioning) and explicit (i.e. episodic and semantic) memory.
- Describe the role of the hippocampus, the neo-cortex and the amygdala in forming and storing explicit memories.
- Describe the role of the cerebellum in forming implicit memories.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- predict possible outcomes from investigations, e.g. identify null and alternative hypotheses
- distinguish between types of investigations, e.g.
 - observational research
- judge the reliability and validity of the experimental process
 - reliability of observers (selection, training)
 - reliability of psychological tests/measures
 - internal validity and external validity
 - validity of psychological tests/measures
- identify and apply ethical principles
 - consideration of the role and bias of the experimenter
 - protection and security of participants' information
 - confidentiality
 - voluntary participation
 - withdrawal rights
 - informed consent procedures
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - p -value from Pearson r
 - parametric inferential statistics
 - p -value from Pearson r

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Lesson 7.1

Types of long-term memory

Key ideas

- Long-term memory is divided into two main categories: explicit and implicit memories.
- Explicit memories can be consciously recalled, and include memories about personal experiences, called episodic memories, and facts, called semantic memories.
- Implicit memories operate without conscious awareness and include procedural memories (motor skills), priming (unconscious influence) and conditioning (learning by association).



Learning intentions and success criteria

Introducing types of long-term memory

Long-term memory is divided into two main categories: memories we consciously recall, known as **explicit memories**, and those that operate without conscious awareness, known as **implicit memories**.

explicit memory

a type of long-term memory that can be consciously recalled, including personal experiences (episodic) and facts (semantic)

implicit memory

a type of long-term memory that operates without conscious awareness, including procedural skills, priming and conditioned responses

episodic memory

explicit long-term memory of episodes or experiences in your life

Study tip

Explicit memory is also called declarative memory because it involves information that we can consciously recall and “declare” or state explicitly.

Explicit memory

Explicit memory, also known as declarative memory, involves recalling information that we can consciously think about and describe. There are two types of explicit memory: episodic and semantic memory (Tulving, 1972).

Episodic memory is the ability to remember information about personal events and experiences. These memories are autobiographical and often involve where and when. For example, remembering where you celebrated your 10th birthday, and when you met your best friend (Figure 1).



FIGURE 1 The memory of where you celebrated a birthday is an example of episodic memory.

Semantic memory involves memory for facts and general knowledge, otherwise known as “what”; for example, remembering what chemicals are used to create the different colours in fireworks, and knowing that the capital of Australia is Canberra.

semantic memory
explicit long-term
memory for facts or
general knowledge

Implicit memory

In contrast to explicit memory, implicit memory operates without conscious awareness (Figure 2). Like explicit memory, there are several types of implicit memory including procedural, priming and classical conditioning.



FIGURE 2 When learning a new task, such as swimming, a conscious and deliberate effort is often required. However, after practice, the retrieval of this knowledge becomes implicit.

Procedural memory, including motor skills and habits, involves knowing how to do things – even though we might not be able to describe how to do them. Once a procedural memory is learnt, it becomes automatic, requiring little conscious effort, such as touch typing (typing without having to look at the keyboard), driving a car or changing chords on a musical instrument. Procedural memories are very resistant to forgetting – people rarely forget how to ride a bicycle, for example (Figure 3).

Priming occurs when exposure to a stimulus makes a person more likely to recognise or identify it later on even though they aren’t aware that they’ve seen it before. Tulving and Schacter (1990) conducted early research on priming, showing that prior exposure to certain stimuli could speed up recognition of related stimuli, even when participants were unaware of the connection. For example, if you see the word “yellow”, you may be quicker to recognise the word “banana” because of the association between the two.

Classical conditioning is a type of implicit memory because it occurs without conscious effort and results in automatic responses. (You will learn more about classical conditioning in Module 9.) It involves learning to associate a neutral stimulus with an

procedural memory
implicit long-term
memory of how to
perform actions

priming
when prior, often
unconscious, exposure
to stimuli influences
a person’s recall
or performance on
later tasks

classical conditioning
an animal or other
organism can passively
learn to show a
naturally occurring
reflex action, such as
salivation, in response
to any stimulus;
learning through
association; also
known as Pavlovian
conditioning



FIGURE 3 Riding a bike is a type of procedural memory, hence the expression, “It’s just like riding a bike” for an activity that people are unlikely to forget how to do. Riding a bike can also be a declarative memory, as you might remember your experience of learning to ride your bike with your parents.

Study tip

Implicit memories can affect our behaviour, without us knowing about it. For example, stereotypes can act as a form of priming that can activate prejudice and lead to discrimination (Module 16).

unconditioned stimulus so that, over time, the neutral stimulus alone can trigger a response. The amygdala plays an important role in this process when the response involves emotion – excitement or fear – by attaching emotional significance to the learnt association (LeDoux, 2000). Classical conditioning is deliberately used by advertisers. For example, a person might watch an advertisement for soft drink that features upbeat music, their favourite celebrity, and scenes of friends laughing and having fun. The product itself (the soft drink) is originally a neutral stimulus, but the emotional elements of the advertisement – fun, energy and social connection – are unconditioned stimuli that trigger positive feelings (unconditioned response). After repeated exposure, just seeing the logo or hearing the jingle (now a conditioned stimulus) can trigger those same positive feelings (conditioned response). The amygdala is responsible for forming and retrieving this emotional association.

Summary of types of long-term memory

Figure 4 summarises the different types of long-term memory.

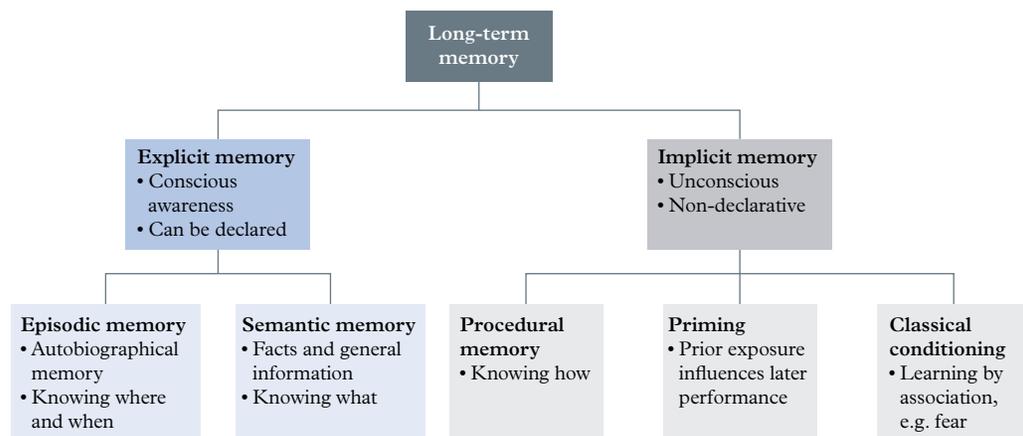


FIGURE 4 The different types of long-term memory

Challenge**Photographic memory**

Photographic memory is the ability to form, and later recall, sharp, detailed visual images of a picture or notes from a page after examining them for only a short period of time. There are very few reports of people who truly have this type

of memory. Sometimes people with exceptional memories are described as having photographic (sometimes called eidetic) memories. **Assess** the advantages and disadvantages of having a photographic memory.

Challenge**What memory are you using?**

With a partner, follow the instructions.

- 1 Sit on your hands while you answer the following questions:
 - a Do you turn your front-door key clockwise or anticlockwise when entering your house?
 - b Do you rotate a tap clockwise or anticlockwise to turn it off?
 - c How do you use a knife and fork?
 - d How do you use chopsticks?

2 What does the image in Figure 5 mean?



FIGURE 5 What does this sign mean?

- 3 What was the name of your Grade 1 schoolteacher?
- 4 Describe the front cover of this book without looking at it.
- 5 Recite the national anthem out loud without singing the melody.
- 6 Name the highest mountain in Australia.

What does this tell you about your memory?

Compare types of long-term memory for the questions.

Real-world psychology

Case studies of Henry Molaison (H. M.) and Clive Wearing

Henry Molaison (H. M.) and Clive Wearing are two of the most well-documented case studies in memory research, offering critical insights into how long-term memories are stored in the brain.

H. M. experienced debilitating seizures and underwent surgery in 1953 to remove portions of his medial temporal lobes, including the hippocampus and amygdala, in an attempt to reduce his seizures. The surgery effectively reduced his seizures, and while his intellect and personality remained largely unaffected, it caused permanent anterograde amnesia; that is, the inability to make new memories. For example, H. M. could not remember personal experiences that occurred after his operation, such as meeting new people or learning new facts. However, he retained the ability to learn new motor tasks, such as tracing shapes in a mirror, even though he could not recall performing the task (Milner et al., 1968).

From the time of his surgery in 1953 until his death in 2008, H. M. was studied by over 100 scientists (Corkin, 2002). Even after his death, his brain was scanned and meticulously cut into 2,401 thin slices for further study (Squire, 2009a).

Similarly, Clive Wearing, a musician with profound memory loss, retained the ability to play the piano effortlessly, even though he could not recall his musical training or recent performances (Wilson & Wearing, 1995).

Apply your understanding

- 1 **Identify** the type of long-term memory affected by H. M.'s surgery. Justify your response. (2 marks)
- 2 **Determine** the parts of the brain that are implicated in the formation and/or storage of explicit memories. (2 marks)
- 3 **Distinguish** between explicit and implicit memory with reference to Clive Wearing. (2 marks)
- 4 **Explain** the significance of H. M.'s case in advancing researchers' understanding of long-term memory storage. (3 marks)

Study tip

Try to associate each type of memory with a skill or event that you recall. For example, you might remember the different states of Australia and recall that this is semantic memory.

Skill drill**Ethics****Science inquiry skills: Planning investigations (Lesson 1.4); Considering safety and ethics (Lesson 1.5)**

Brenda Milner was awarded the Kavli Prize in Neuroscience in 2014, an honour that reflects the profound impact of her research on advancing our knowledge of brain function and memory. Over decades, Milner meticulously and systematically documented her observations of H. M.'s preserved procedural learning, social behaviours and emotional regulation. She also conducted repeated testing on H. M. using tasks such as mirror drawing (Milner et al., 1968), word recall and object recognition (Scoville & Milner, 1957). For example, despite his inability to form new declarative memories, H. M. could improve on tasks through procedural learning.

Milner's findings revealed that there are different types of long-term memory and highlighted the distinct roles of the medial temporal lobe in memory formation and storage.

Practise your skills

- 1 **Describe**, with reference to the scenario, observational research. (2 marks)
- 2 **Identify** a confounding variable in Milner's mirror-drawing task with H. M. Consider the role and bias of the experimenter in your response. (2 marks)
- 3 **Describe** two ethical principles that were compromised in Milner's research given H. M.'s condition. (2 marks)

Check your learning 7.1

Check your learning 7.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the type of long-term memory described by each example.
 - a Remembering a concert you attended with your friend (1 mark)
 - b Knowing there are 12 months in a year (1 mark)
 - c Tying your shoelaces without thinking (1 mark)
 - d Recalling the word "doctor" because you drove past a hospital on the way to school (1 mark)

- 2 **Construct** a diagram to display the different types of long-term memory. (7 marks)

Analytical processes

- 3 **Distinguish** between implicit and explicit memory. (1 mark)
- 4 **Compare** episodic and semantic memory. (2 marks)

Knowledge utilisation

- 5 **Evaluate** this claim: The strongest type of memory is procedural memory. (3 marks)

Lesson 7.2

Formation and storage of explicit memories

Key ideas

- The hippocampus plays a role in forming and consolidating explicit memories, and storing spatial navigation memory.
- Consolidation is the process of strengthening and permanently storing memories in the neocortex. Findings point to storage of sensory information in the lobes responsible for processing the related sensory information.
- Because of the hippocampus's close proximity to the amygdala, it is also implicated in the relationship between emotion and memory.



Learning intentions
and success criteria

The role of the hippocampus

The hippocampus is a finger-sized curved structure that lies in the interior of each of the temporal lobes and is located close to the amygdala (Figure 1). The hippocampus plays an essential role in the formation of explicit memories (semantic and episodic), memory consolidation and the storage of spatial navigation.

Memory formation

Evidence supporting the role of the hippocampus in the formation of explicit memories comes from case studies. After undergoing bilateral surgery of his medial temporal lobes, which included portions of the hippocampus and amygdala, H. M. developed permanent **anterograde amnesia**. He could not form new explicit long-term memories, though his short-term memory, procedural memory, intelligence and previously stored memories remained intact (Milner et al., 1968). Similarly, after suffering hippocampal damage from viral encephalitis, Clive Wearing exhibited severe anterograde amnesia but retained the ability to play the piano (Wilson & Wearing, 1995).

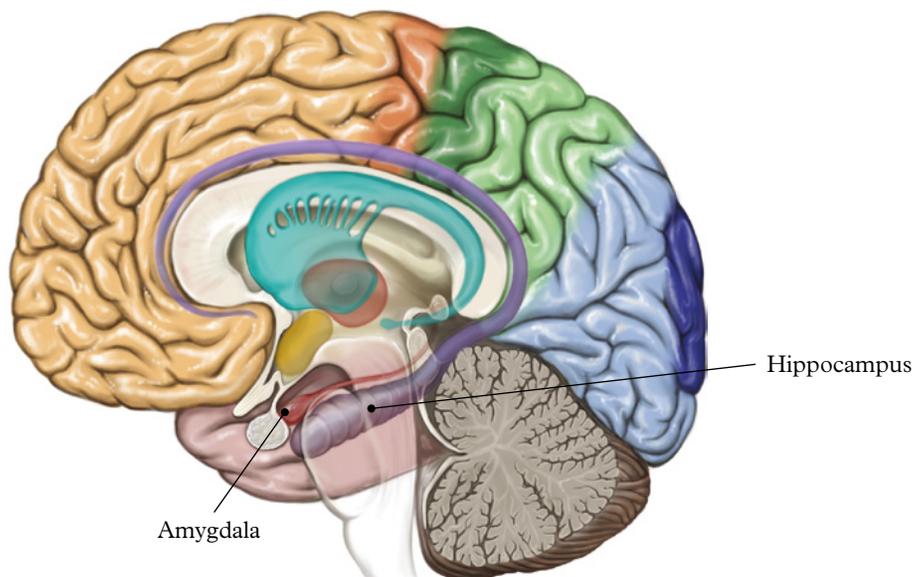


FIGURE 1 Location of the hippocampus and amygdala in the brain

anterograde amnesia

the inability to create new memories, usually following a traumatic injury

Memory consolidation

consolidation

the process in which the brain forms a permanent representation of memory

retrograde amnesia

the inability to recall events, facts or experiences of the past

The hippocampus plays an important role in the process of **consolidation** (the permanent storage of a memory) of explicit memory. For example, in one neuroimaging study, participants were shown words to learn. How well the words were remembered later on could be predicted from how much activation occurred in the hippocampus during the presentation (Alkire et al., 1998; Brewer et al., 1998).

Both the hippocampus and neocortex (the largest part of the cerebral cortex) encode information during initial learning (Squire et al., 2015). Over time, gradual changes in the neocortex strengthen connectivity among cortical regions, allowing for the establishment of more stable and permanent long-term memories. As these cortical networks are reinforced, the hippocampus's role in supporting long-term memory storage declines (Squire, 2009b) (Figure 2). This is supported by evidence from patients with **retrograde amnesia**, who often lose memories closest to the time of the accident while retaining older memories. Researchers have also used fMRI to demonstrate that recent memories showed greater activity in the hippocampus, while older, consolidated memories activated the neocortex (Takashima et al., 2009). Similarly, the neural activity in the hippocampus of mice gradually diminished 25 days after the initial memory was formed; however, neural activity for the memory increased in areas in the cerebral cortices of the mice (Bontempi et al., 1999). This pattern suggests that recent memories are still dependent on the hippocampus for consolidation, whereas older memories have been transferred to the neocortex (Squire & Alvarez, 1995).

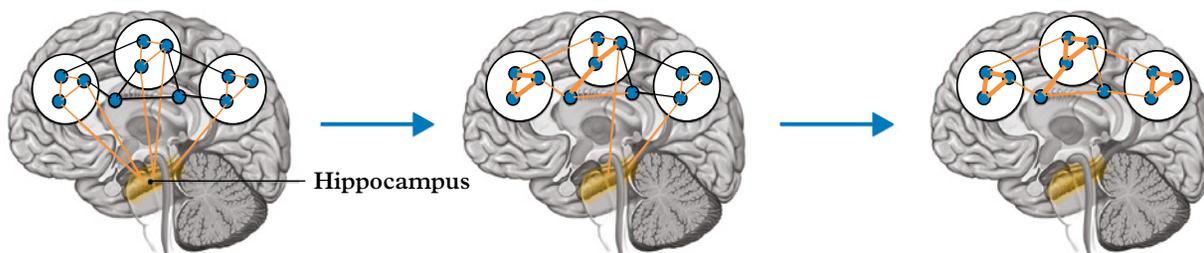


FIGURE 2 Consolidation is the gradual process of stabilising memories by increasing the complexity, distribution and connectivity among regions of the neocortex.

Long-term memory formation is a major function of sleep. The hippocampus is particularly active during slow-wave sleep (Lisman & Morris, 2001), suggesting this is when memory consolidation occurs. Researchers have found that human performance on a visual discrimination task continued to improve 2 to 4 days after the initial training, even with no additional practice, but only if the participants had slept within the first 30 hours after training (Stickgold et al., 2000).

Real-world psychology

The water maze

A study using rats indicated that the hippocampus plays a vital role in the consolidation process. The rats were trained in a water maze, a tank of milky water from which they could escape once they had quickly learnt the location of a hidden, submerged platform where they could stand.

Immediately after they had learnt to swim to the platform, the rats were given a drug that temporarily disabled their hippocampus and prevented consolidation. When they were retested in the maze 16 days later, these rats performed poorly. This indicated that the hippocampus has a role in consolidation.

In a different trial, rats were not given the drug after completing the maze: consolidation of learning the water maze was allowed to take place. However, these rats were given the drug 16 days later when they were retested. It was found that these rats also performed poorly because they were unable to retrieve the information that they had learnt about the platform. This demonstrated that the hippocampus also has a role in retrieval of explicit memory (Riede et al., 1999).

Apply your understanding

- Describe** one ethical issue involved in using rats in the experiment. (1 mark)
- Evaluate** the validity of animal research in the study of human memory. (3 marks)

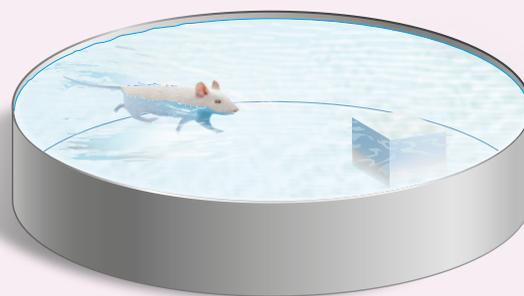


FIGURE 3 The rat learns to escape the water by standing on the submerged platform.

Spatial memory

The hippocampus also plays a role in the formation and storage of spatial memory; that is, memory that allows us to navigate and recall locations. For example, in the water maze experiment, rats with hippocampal **ablations** were unable to remember the location of a hidden platform they had previously learnt (Morris et al., 1982). In human research, described in *Real-world psychology: Spatial memory storage*, MRI scans by Maguire and colleagues (2000) found that London taxi drivers, who require extensive spatial navigation skills, had significantly larger posterior hippocampi compared to matched control groups (London bus drivers).

ablation
the surgical removal of
body tissue

Real-world psychology

Spatial memory storage

Maguire and colleagues (2000) conducted a study to investigate the relationship between hippocampal volume and spatial memory. In a quasi-experiment, MRI scans were used to compare 18 licensed London taxi drivers with 17 London bus drivers. Participants were matched for age, driving experience and handedness to ensure fair comparisons. Taxi drivers were chosen because they are expected to memorise the streets of London before they obtain a licence to drive a taxi (known in London as “Doing the knowledge”), while bus drivers follow fixed routes.

The results revealed that taxi drivers had significantly larger posterior (back) hippocampi and smaller anterior (front) hippocampi compared to bus drivers. Furthermore, a positive correlation was found between the number of years spent as a taxi driver and the volume of the posterior

hippocampus. These findings suggest that the hippocampus undergoes structural changes in response to the demands of spatial navigation.



FIGURE 4 London taxi drivers are expected to memorise the streets of London before they can obtain a licence.

◀ This research was helpful in understanding the role of the hippocampus in memory. Additionally, the study's use of matched participants and objective

MRI scans are strengths; however, its small sample size and limited generalisability (restricted to male, London-based drivers) are limitations.

Apply your understanding

1 **Propose** why London taxi drivers may have larger hippocampi than people with other occupations. (2 marks)

2 **Describe** a strength and limitation of the type of experimental design used in this research. (2 marks)

The role of the neocortex

The neocortex, the largest part of the cerebral cortex, is a multilayered structure responsible for higher-order cognitive functions such as sensory perception, reasoning, language, decision-making and memory. It is divided into four distinct lobes: frontal, parietal, occipital and temporal.

The neocortex works with the hippocampus to form and store semantic memories (factual knowledge) and episodic memories (personal experiences). While the hippocampus initially encodes episodic memories, the neocortex is responsible for long-term storage in the brain's semantic network (McClelland et al, 1995).



FIGURE 5 The auditory information received from the siren of an emergency services vehicle is encoded and stored in the temporal lobe.

Although research is ongoing, findings point to the storage of information in the lobes of the brain responsible for processing the related sensory information. For instance, visual information is encoded and stored in the occipital lobe, auditory information in the temporal lobe (Figure 5), tactile or spatial information in the parietal lobe, and motor movement in the frontal lobe. Additionally, the temporal lobes store semantic information related to object concepts (Martin, 2007), language (Lambon Ralph et al., 2017) and faces (Kanwisher et al., 1997). For example, neuroimaging studies show how damage to the temporal lobe results in difficulty understanding word meanings and recognising familiar objects. Importantly, research shows that episodic memories are not isolated but rather form a distributed and interconnected memory network that is activated to recall episodic memories.

The role of the amygdala

The amygdala and hippocampus work closely together to help form and recall emotional memories, but they have different roles. The amygdala is responsible for detecting the emotional importance of a situation – especially if it involves fear, threat or reward – and triggering physiological responses. The hippocampus, on the other hand, records the details of the event, such as where and when it happened. When a person experiences a strong emotion, the amygdala activates and signals the hippocampus to prioritise the encoding and consolidation of that memory (McGaugh, 2004; Phelps, 2004; Roozendaal & McGaugh, 2011).

This is why emotional events – such as a surprise party, a moment of embarrassment or winning a game (Figure 6) – are often remembered more clearly than everyday or neutral experiences. Neuroimaging studies have shown that when people are remembering an emotional

event, their amygdala is more active, and this is linked with better memory recall later (Canli et al., 2000; Dolcos et al., 2004).

To summarise, the amygdala contributes to the intensity and importance of emotional memories, while the hippocampus helps put the pieces together into a complete story. Working together, they allow us to remember both what happened and how we felt, so we can learn from the experience.



FIGURE 6 The amygdala plays a part in the consolidation of explicit memory with emotional content, such as winning an important sports competition.

Check your learning 7.2



Check your learning 7.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the type of amnesia that involves the inability to recall past events. (1 mark)
- 2 **Identify** the role of the hippocampus in memory formation. (1 mark)
- 3 **Describe** the role of the hippocampus in memory consolidation. (1 mark)

Analytical processes

- 4 **Compare** the roles of the hippocampus and neocortex in memory formation. (2 marks)

Knowledge utilisation

- 5 **Evaluate** the following statement: “Without the hippocampus, people would not be able to transfer memories to long-term storage”. (3 marks)

Lesson 7.3

Formation and retrieval of implicit memories

Key ideas

- The cerebellum assists with the formation and retrieval of implicit memories, particularly procedural memories and those formed through classical conditioning.



Learning intentions and success criteria

The role of the cerebellum

The cerebellum plays a critical role in the formation and retrieval of implicit memories, particularly procedural memories (motor-skill tasks) and those formed through classical conditioning (Sanes et al., 1990). A procedural memory is a type of implicit (unconscious) and long-term memory that helps you perform a particular task without conscious awareness of previous experiences. For example, procedural memories are automatically retrieved and used in executing integrated procedures involved in cognitive and motor skills, whether that be tying shoelaces, driving a car or reading a book. Using PET scans, Schachter and colleagues (1996) demonstrated that during implicit memory tasks, the cerebellum shows



FIGURE 1 When you access the skill of roller blading (motor skill), your cerebellum assists in relaying this procedural memory so that you are able to roller blade again.

significant activation. The cerebellum works in conjunction with other structures, including the motor cortex and basal ganglia, to encode and refine motor skills through practice, making movements smooth and precise. During retrieval, the cerebellum activates the relevant neural systems, enabling you to automatically perform a task or motor skill without consciously thinking about it (Figure 1).

Evidence from studies of individuals with damage to the cerebellum highlights its role in implicit memory. Patients with damage to their cerebellum experience difficulty learning new motor skills and executing fine, coordinated movements, such as reaching or walking (Fiez, 1996). However, they retain the ability to recall motor skills learnt prior

to injury. They can also form new procedural memories, but they are unable to form new declarative memories (Baddeley & Warrington, 1970).

Additionally, research has demonstrated that damage to the cerebellum impairs the ability to form classically conditioned responses. A classically conditioned response is another form of implicit memory. A study found that rabbits with damaged cerebella were not able to be classically conditioned to the blink response when given a puff of air to the face (Green & Woodruff-Pak, 2000).

The role of the amygdala

The amygdala also plays an important role in conditioning, particularly fear, by processing and storing the association between a neutral stimulus and an aversive event. Damage to the amygdala in animals and humans disrupts fear conditioning. For example, rats with lesions to the amygdala were unable to associate a neutral stimulus with an aversive stimulus (LeDoux, 1996), and fMRI studies (LaBar et al., 1995) show that patients with amygdala damage could not acquire conditioned fear responses (Bechara et al., 1995).

Check your learning 7.3



Check your learning 7.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the type of long-term memory the cerebellum is involved in forming. (1 mark)
- 2 **Identify** one effect of cerebellar damage on motor skills. (1 mark)
- 3 **Describe** what is meant by procedural memory. (1 mark)

Analytical processes

- 4 **Compare** the roles of the cerebellum and amygdala in forming memories. (2 marks)

Knowledge utilisation

- 5 **Discuss** how findings from studies on cerebellar damage and amygdala damage contribute to our understanding of implicit memory. Use examples from research to support your response. (4 marks)

Lesson 7.4

Review: The formation and storage of memories

Summary

- 7.1 • Long-term memory is divided into two main categories: explicit and implicit memories.
- Explicit memories can be consciously recalled, and include memories about personal experiences, called episodic memories, and facts, called semantic memories.
- Implicit memories operate without conscious awareness and include procedural memories (motor skills), priming (unconscious influence) and conditioning (learning by association).
- 7.2 • The hippocampus plays a role in forming and consolidating explicit memories, and storing spatial navigation memory.
- Consolidation is the process of strengthening and permanently storing memories in the neocortex. Findings point to storage of sensory information in the lobes responsible for processing the related sensory information.
- Because of the hippocampus's close proximity to the amygdala, it is also implicated in the relationship between emotion and memory.
- 7.3 • The cerebellum assists with the formation and retrieval of implicit memories, particularly procedural memories and those formed through classical conditioning.

Review questions 7.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 Which option best describes the roles of the hippocampus and amygdala in memory formation?
 - A Hippocampus: explicit, declarative memories; amygdala: implicit, conditioning
 - B Hippocampus: implicit, declarative memories; amygdala: explicit, declarative memories
 - C Hippocampus: implicit, procedural memories; amygdala: explicit, declarative memories
 - D Hippocampus: explicit, procedural memories; amygdala: implicit, declarative memories
- 2 Where would you expect to find the greatest amount of brain activity for a person learning French verbs for the first time?
 - A Cerebellum
 - B Hippocampus
 - C Hypothalamus
 - D Right frontal lobe
- 3 Which statement is correct with respect to the activity of the hippocampus?
 - A The hippocampus is particularly active during sleep. This is also a time when ageing is likely taking place.
 - B The hippocampus is particularly active during sleep. This is also a time when consolidation is likely taking place.
 - C The hippocampus is particularly active during concentration. This is also a time when attention is likely taking place.
 - D The hippocampus is particularly active during concentration. This is also a time when consolidation is likely taking place.

- 4 Tony is an elderly retired plumber. He can easily remember how to attach a new tap to a water pipe but he cannot recall the names of his new neighbours.
A Tony's implicit memory is better than his explicit memory.
B Tony's explicit memory is better than his implicit memory.
C Tony's episodic memory is better than his prospective memory.
D Tony's prospective memory is better than his retrospective memory.
- 5 The cerebellum has a key role in processing and retrieving
A short-term memories. **B** explicit memories.
C procedural memories. **D** declarative memories.
- 6 Which statement is true of episodic memory?
A Episodic memory includes skills and procedures used for tasks.
B Episodic memory stores knowledge of language, facts and concepts.
C Episodic memory refers to long-term memory that is not consciously accessible.
D Episodic memory consists of personal experiences that are tied to a specific time and place.
- 7 How would you describe the role of the neocortex with respect to explicit memories?
A It adds emotional content to memories.
B It processes and encodes explicit memories.
C It stores short-term and declarative memories.
D It consolidates declarative long-term memories.
- 8 What did studies of patients with damage to their hippocampi help researchers discover?
A How classical conditioning may work
B How declarative memories are stored
C Two types of long-term memory: procedural and declarative memory
D Two types of long-term memory: explicit and implicit memory
- 9 A skill that does not require conscious recollection by our memory is what kind of memory?
A Implicit memory **B** Explicit memory
C Episodic memory **D** Retrospective memory
- 10 The cerebellum is responsible for
A explicit memories.
B episodic memories.
C semantic memories.
D memory for motor-skills tasks.
- 11 Which part of the brain would you expect to see damage to if a person could not remember what movie they saw last night?
A Amygdala **B** Cerebellum
C Occipital lobe **D** Hippocampus
- 12 Consolidation (permanent storage of a memory) takes place in the
A cerebellum. **B** amygdala.
C hippocampus. **D** cerebral cortex.
- 13 Which type of long-term memory storage is likely to be involved when a person recalls how to play a computer game after not having played it for some time?
A Episodic **B** Semantic
C Declarative **D** Procedural
- 14 The key part of the brain that would most likely be responsible for emotional memories is the
A amygdala. **B** cerebellum.
C hippocampus. **D** basal ganglia.
- 15 The key part of the brain that would most likely be responsible for long-term procedural memory and movement is the
A amygdala.
B cerebellum.
C hippocampus.
D basal ganglia.

Review questions 3.4B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 16 **Describe** the role of the hippocampus in the storage and transfer of new memories. (1 mark)
- 17 **Identify** the type of memory involved in a skill that does not require conscious recollection. (1 mark)
- 18 **Describe** the type of memory involved when you remember you have to go to a doctor's appointment in the morning. (1 mark)
- 19 **Describe** priming. (1 mark)

20 Describe the role and function of the amygdala with respect to emotion and memory, and provide an example of what can happen when the amygdala is damaged. (2 marks)

21 Explain the process of consolidation. (2 marks)

Analytical processes

22 Differentiate between explicit and implicit memory. (1 mark)

23 Contrast the roles of the hippocampus and cerebellum in forming and storing memories. (1 mark)

24 Distinguish between procedural memory and classical conditioning with reference to the key structures involved. (4 marks)

25 Compare the functions of semantic memory and episodic memory. (2 marks)

26 Compare the roles of the hippocampus and neocortex in learning. (2 marks)

27 Determine why a person may remember how to ride a bike, but not remember details of the bike ride she took with a friend the previous day. Use your understanding of brain structures in your response. (2 marks)

Knowledge utilisation

28 Discuss the importance of the amygdala in memory storage. (3 marks)

29 The following statement has been made about memory: “As you age, you will remember how to complete actions over memories of events.”

a Evaluate this claim and use a specific example. (4 marks)

b Create a research question that targets a specific audience and scenario. (4 marks)

Data drill

The amygdala and emotional memory

Figure 1 shows the activity of the amygdala in relation to emotional memory in healthy human subjects. The scatterplot shows the relationship between relative glucose metabolic rate (activity) of the right amygdala in subjects viewing a series of emotionally unpleasant film clips and the long-term memory of the film clips.

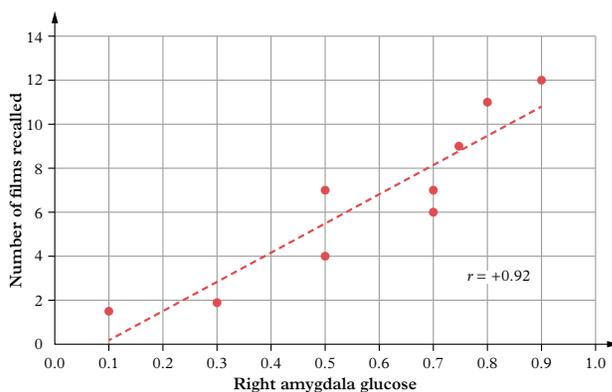


FIGURE 1 Amygdala activity and the recall of films

A Pearson correlation coefficient was used to measure the relationship between the two variables and a p -value was calculated ($p < 0.01$).

Apply understanding

- 1 Identify** the highest number of films recalled. (1 mark)
- 2 Determine** the related amygdala activity for participants who remembered four films. (1 mark)

Analyse data

- 3 Identify** the strength and direction of the relationship between amygdala activity and long-term memory. Use evidence to support your response (2 marks)

Interpret evidence

- 4 Infer** the significance of the relationship with reference to the p -value. (2 marks)



Module 7 checklist: The formation and storage of memories

Study tip

Interpreting correlational data is an important part of your Senior Psychology course. When working with a correlation, it is important to remember that correlation does not equal causation, no matter how strong the relationship.

8

How we remember and forget

Introduction

We all forget – sometimes for an instant, sometimes forever! Trying to remember someone's name, needing to recall a formula during a maths test, or reminiscing about what a great holiday we had all involve different methods of retrieval.

This ability to retrieve information from the memory can be affected by many things. While research has found that there are ways we can improve our memory, it can also be damaged in ways that are beyond our control.

In this module, we will distinguish between the different methods of retrieving memories. We will also examine how information is lost from memory and discuss strategies to improve memory.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to remembering and forgetting before you start.

Subject matter

Science understanding

- Contrast recall, recognition and relearning.
- Describe problems with memory such as encoding failure, retrieval failure and interference effects.
- Discuss strategies to improve memory, including spacing, interleaving, chunking, elaborative and maintenance rehearsal, and the method of loci.
- Interpret data about the context-dependency of memory from a modified experiment following Grant et al. (1998).

Science as a human endeavour

- Identify the changes to memory associated with ageing.

Science inquiry

→ Investigate

- the context-dependency of memory by modifying an experiment (Grant et al. 1998)
- the duration of short-term memory, e.g. Peterson & Peterson (1959)

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and operationalise variables to be manipulated, measured and controlled
- distinguish between types of investigations
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - measures of uncertainty, including dispersion in a sample (range, interquartile range, standard deviation) and using a sample to make an inference about the population from which it was drawn (standard error, confidence intervals)
 - parametric inferential statistics, e.g.
 - two-sample *t*-test (unpaired and paired)
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- extrapolate findings to determine unknown values, predict outcomes and evaluate claims
- use data and reasoning to discuss and evaluate the reliability and validity of evidence
- suggest improvements and extensions to minimise uncertainty, address limitations and improve the overall quality of evidence
- acknowledge sources of information with standard scientific referencing conventions.

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Practicals

oxforddigital

These lessons are available on Oxford Digital.



Lesson 8.2 Context dependency of memory

Lesson 8.1

Recall, recognition and relearning



Learning intentions
and success criteria

Key ideas

- Recall is the process of retrieving stored information using no cues (free recall or serial recall) or limited cues (cued recall).
- Recognition is a type of retrieval that requires finding a correct response among incorrect alternatives.
- Relearning is where an individual has to reacquire knowledge or skills that they have previously acquired.

Introducing recall, recognition and relearning

Memory is the cognitive process that allows individuals to encode, store and retrieve information. Three key processes demonstrate how stored information can be retrieved: recall, recognition and relearning (Figure 1).

Recall

recall

retrieval of stored information using few or no cues

free recall

recalling as much information as possible in any order, without cues

serial recall

recalling information in the order in which it was presented

cued recall

recall assisted by cues, not involving the original items to be retrieved

Recall involves retrieving stored information using few or no cues. An example is answering a short-answer question. There are three main types of recall:

- **Free recall** is involved in a task in which the participants are required to retrieve as much information as they can in any order (e.g. a list of items to purchase from the supermarket, or a brain dump).
- **Serial recall** involves recalling information in the order in which it was presented (e.g. the names of cities visited on an overseas journey).
- **Cued recall** uses various prompts (cues) to assist the retrieval process (e.g. “The surname is short and begins with a D”).

Recognition

recognition

a process of retrieval that requires identification of a correct response from a set of alternatives

Recognition refers to identifying the correct information among a list of incorrect pieces of information. For example, being able to select the correct answer to a multiple-choice question from a list of four alternatives.

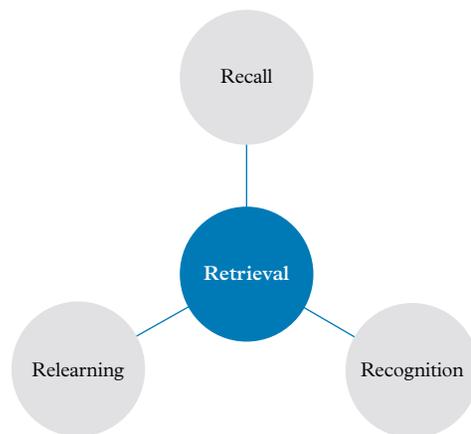


FIGURE 1 Stored information can be retrieved through recall, recognition and relearning.



FIGURE 2 Cued recall: a photo makes it easier to recall the names of all the people in your class, especially if it is a class from a long time ago.

A researcher is studying how quickly individuals can learn and apply a new language. Which approach to intelligence does this best reflect?

- A Multiple intelligences model
- B Triarchic theory of intelligence
- C Psychometric approach to intelligence
- D Information processing approach to intelligence

FIGURE 3 Can you recognise the answer to this question from your Unit 2 Psychology studies?

Recognition is generally more accurate than recall because it provides more cues to assist retrieval. For example, if you were asked to name the students who were in your Year 7 English class, what percentage of the class do you think you could recall? If, on the other hand, you were given a list of 50 names and asked to identify (recognise) those who were in your Year 7 English class, the number of names that you remember would almost certainly be higher.

Recognition and cued recall are sometimes confused, and it is important to distinguish between them. Think of the example of remembering the names of students in your Year 7 English class. Recognition would involve you being given a list of names that included those who were in the class with many other names. Cued recall would involve you being given cues to the information, such as a class photograph or the initials of the class members, but not the evidence of the items to be remembered (the actual names).

Relearning

Relearning refers to reacquiring knowledge that was previously learnt but forgotten; it is easier than learning something for the first time. This is the case with all aspects of memory but is especially true of procedural memory. Have you ever returned to a previously learnt skill, like a sport or playing a musical instrument, after a period of time and picked it up quickly? This is the savings effect of relearning. Many people find the same with speaking a foreign language.

relearning
reacquiring knowledge
that was previously
learnt but forgotten

If the time taken to learn the material originally can be measured and compared with the time taken to relearn the same material, then a savings score can be calculated:

$$\text{Savings score} = \frac{(\text{Time for original learning}) - (\text{Time for relearning})}{(\text{Time for original learning})} \times 100\%$$

As an alternative, “Trials” can be substituted for “Time”:

$$\text{Savings score} = \frac{(\text{Trials needed for original learning}) - (\text{Trials needed for relearning})}{(\text{Trials for original learning})} \times 100\%$$

A more sensitive measure will register that a memory is present even if only a small amount of the memory remains. A less sensitive measure will only register that a memory is present when a large proportion of it remains.

It is worth noting that relearning is the most sensitive measure of retrieval, while recall is the least sensitive measure of retrieval. This means that if a very small amount of the memory remains, relearning will identify that it is there – even if recognition and recall cannot.



FIGURE 4 More sensitive tasks may require relearning; less sensitive tasks can be remembered with free recall.

Skill drill

Ebbinghaus and the forgetting curve

Science inquiry skills: Understanding the scientific method (Lesson 1.3); Planning investigations (Lesson 1.4); Evaluating evidence (Lesson 1.8)

Hermann Ebbinghaus was the first person to perform systematic research into remembering (or forgetting), publishing his findings in 1885.

Ebbinghaus experimented using only one participant – himself. He did not want previous knowledge to interfere with his results, so he learnt lists of pronounceable, nonsense syllables – three-letter combinations such as “bup”, “tov”, “ruj” and “lev”. Having tested himself until he had perfect scores for remembering the “words” on each list, ▶

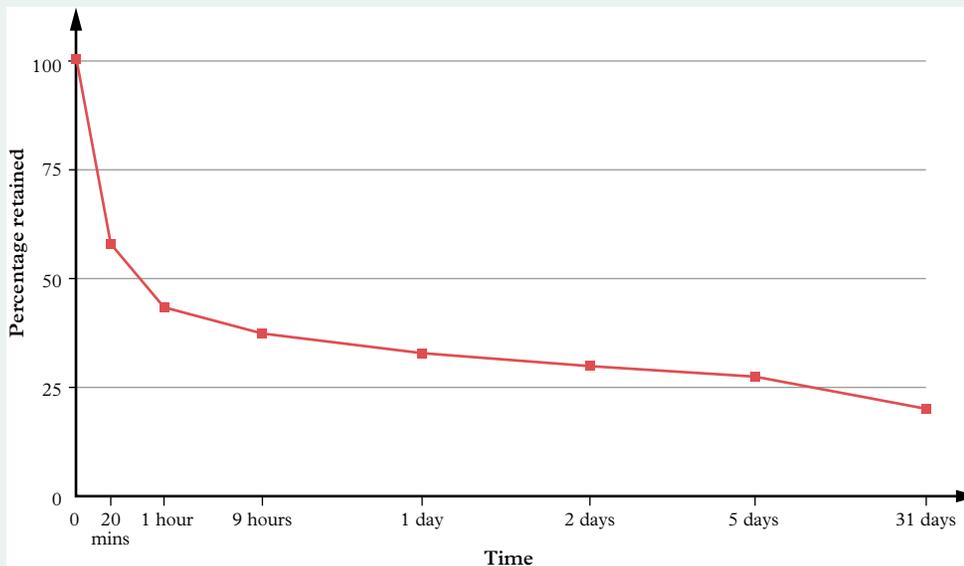


FIGURE 5 Ebbinghaus's results

he waited for various periods of time – ranging from 20 minutes to 31 days – and then tested himself again to see what percentage of the learnt material he had retained. His results (Figure 5) show that forgetting occurred most rapidly in the first 20 minutes, at a moderate rate until 1 hour had passed, and then very gradually for the next 31 days.

Since the publication of Ebbinghaus's forgetting curve, the same features have been shown in other research, no matter what form of memory was tested. Most forgetting occurs immediately after the information has been learnt, so the beginning of a forgetting curve has the steepest slope. More than 50 per cent of the material is forgotten within the first hour.

If the material was originally overlearnt (that is, learnt over and over even when already well known), then it is likely to be retained for longer

and with greater accuracy. Factors such as the complexity of the material learnt and even the intelligence of the learner do not seem to affect the rate of forgetting.

Practise your skills

- Identify** two limitations of Ebbinghaus's experiment. (2 marks)
- Explain** how these limitations negatively affect the validity of Ebbinghaus's results. (4 marks)
- Design a modified experiment.
 - Describe** the change. (1 mark)
 - Identify** the type of design. (1 mark)
 - Describe** the operationalised independent and dependent variables. (2 marks)
- Justify** your modification by explaining how your change will improve the validity of Ebbinghaus's results. (1 mark)

Challenge

Shared memories

With a classmate, choose a memory that you share. It might be something that happened in class, on school camp or outside of school. Then answer the following questions separately.

- When did the event happen?
- Why did the event happen?
- Who was there? What were they wearing?

- What was the weather like?
- What was said at the time of the event?
- How did everyone feel about the event?

Compare your answers and see if they are similar or different. **Discuss** why you think your recollection of this event is either similar or different.

Real-world psychology

Memory changes in older adults

As Australia's population ages, understanding the effects of ageing on memory becomes increasingly important for individuals and policymakers. Age-related memory changes are a natural part of ageing but can vary depending on health, lifestyle and environmental factors. Research has shown that older adults may experience declines in working memory and episodic memory (responsible for holding and retrieving short-term information or specific past events) while semantic memory, which stores general knowledge and facts, often remains stable.

A longitudinal study conducted by the Centre for Healthy Brain Ageing (CHeBA) in Sydney, as part of the Sydney Memory and Ageing Study, investigated rates and predictors of healthy cognitive ageing in Australians aged 70 to 90 years. The study tracked over 1,000 participants who were assessed every 2 years in terms of memory, language and reasoning abilities. Additionally, a close friend or family member was interviewed. Results highlighted that while minor forgetfulness, such as forgetting names or misplacing objects, was common, more significant declines occurred when health issues, such as cardiovascular disease or untreated diabetes, were present.

The findings emphasised the role of modifiable lifestyle factors like regular physical activity, a Mediterranean diet and cognitive engagement (e.g. reading, puzzles) in slowing cognitive decline.

The research raises questions about how ageing-related memory changes impact daily life and public health systems in Australia, as well as strategies for promoting cognitive longevity in an ageing population.

Apply your understanding

- Describe** two types of memory that are most commonly affected by ageing. (2 marks)
- Explain** one reason why episodic memory tends to decline more significantly than semantic memory in older adults. (2 marks)
- The Sydney Memory and Ageing Study identified lifestyle factors that influence memory. **Create** a research question that investigates one modifiable factor's effect on cognitive decline. (1 mark)
- Identify** one strength and one limitation of CHeBA's longitudinal study and the impact this has on validity. (4 marks)

Check your learning 8.1



Check your learning 8.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- Describe** recall, recognition and relearning. (3 marks)
- Calculate** Roger's saving score if it took him 8 hours to learn a list of Australian native plant names at the beginning of term, and then only 4 hours to relearn the same plant names for his exam. (2 marks)
- Describe** free recall, serial recall and cued recall. (3 marks)

Analytical processes

- Charlie learnt to play the piano as a child. Originally, it took Charlie a year to learn to read

music. Charlie has recently moved house and now has a piano again. He started to play the piano a week ago and can already read the sheet music well. **Calculate** the savings score for Charlie's reading of sheet music. (1 mark)

- Contrast** recall and recognition. (1 mark)

Knowledge utilisation

- Vicki was anxious about her Psychology exam. However, she felt better when she noticed that a large proportion of the exam was multiple choice. **Determine** why this made Vicki feel better. **Justify** your response. (2 marks)

Lesson 8.2

Practical: Context dependency of memory



Learning intentions and success criteria

oxforddigital

This practical lesson is available on Oxford Digital. It is also provided as part of a printable resource that can be used in class.

Lesson 8.3

Encoding failure



Learning intentions and success criteria

Key ideas

- Forgetting occurs when we are unable to retrieve information from memory. This can occur either if information is unavailable (not successfully stored) or inaccessible (information is stored but cannot be retrieved).
- Encoding failures prevent information from being stored and affect availability. Causes of encoding failures include lack of attention, limitations of the short-term memory store (trace decay and displacement), failure to consolidate memory traces effectively, and shallow processing.

Introducing encoding failure

forgetting

inability to retrieve information from memory

Forgetting occurs when we are unable to retrieve information from memory, a frustrating experience that is particularly common in high-pressure situations, such as exams. Forgetting can be understood through the lens of the models of memory you learnt about in Module 6. These include the information processing model (Lesson 6.1), which describes memory as involving the processes of encoding, storage and retrieval, and the multi-store model (Lesson 6.2), which views memory as a linear system where information passes through sensory memory, short-term memory (STM) and long-term memory (LTM). Forgetting arises when issues occur at any of these stages.

Before looking at causes of forgetting, it will help to distinguish between availability and accessibility. **Availability** refers to whether information has been successfully stored in memory, and is therefore available for retrieval, while **accessibility** concerns whether stored information can be retrieved and brought into conscious awareness (Tulving & Pearlstone, 1966; Baddeley et al., 2020). Typically, **encoding failures**, which prevent information from being stored, affect availability, whereas retrieval failures, where the correct or sufficient cues are missing, impact accessibility.

In this lesson, we will focus on encoding failures, the first stage in the memory process. Encoding is the formation of a memory trace; if encoding fails, the information is unavailable for retrieval. Common causes of encoding failures include lack of attention, limitations of the STM store, failure to consolidate memory traces effectively, and shallow processing.

availability

successful storage of information into long-term memory

accessibility

successful retrieval of information from long-term memory

encoding failure

failure to securely store a memory trace

Encoding failure

According to the multi-store model of memory, encoding failures can occur when information is not effectively transferred through the stages of memory into long-term storage. This can occur due to lack of attention, or the limitations of STM.

Lack of attention

To form a memory trace, the information must be attended to. Information that is not attended to is not passed to the short-term memory store and is lost from the sensory register. For example, if your teacher provides an explanation in class, but you are distracted by your phone, you likely failed to encode the information (Figure 1). As the information was never stored, it will not be available for retrieval later on.

Limitations of short-term memory store

Recall from Lesson 6.2, STM has a limited capacity (7 ± 2 pieces of information) and duration (approximately 20 seconds). There are several reasons that encoding failure can occur in STM:

- **Trace decay:** information in STM fades rapidly unless rehearsed. If rehearsal is interrupted, the memory trace weakens and can be lost.
- **Displacement:** New information entering STM can displace older information due to its limited capacity.

Consolidation into long-term memory

Consolidation is a process by which initially fragile memory traces are stabilised over time. During consolidation, the hippocampus temporarily stores and organises new information before transferring it to the neocortex for more permanent storage. This process can take hours or days and is highly vulnerable to disruption. Interruptions such as stress, lack of sleep or competing cognitive demands can impair consolidation, leading to encoding failures where the memory trace remains incomplete or unstable, making retrieval impossible.

Shallow processing

Research on levels of processing (Lesson 6.4; Craik and Tulving, 1975) suggests the quality of a memory trace depends on the depth of processing that occurs during encoding. Shallow processing, such as focusing on superficial features (e.g. memorising words by their appearance or sound), creates less durable memory traces than deep processing, which involves analysing meaning and relevance. Thus, while the information was likely encoded, it may lack sufficient cues to aid in retrieval.



FIGURE 1 Being distracted by your phone in class means that you are not attending to your teacher, which is likely to lead to a failure to encode what your teacher is telling you.

trace decay
rapid fading of
information from
short-term memory

displacement
new information taking
the place of existing
information in
short-term memory

Check your learning 8.3



Check your learning 8.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** two causes of encoding failure in memory. (2 marks)
- 2 **Describe** how trace decay leads to forgetting in short-term memory. (1 mark)

Analytical processes

- 3 **Distinguish** availability from accessibility in the context of forgetting. (1 mark)
- 4 **Compare** encoding failures that occur due to lack of consolidation and level of processing. (2 marks)

Knowledge utilisation

- 5 A student cannot recall details from a lecture because they were preoccupied with texting during class.
 - a **Determine** the most likely cause of forgetting. (1 mark)
 - b **Justify** your response with reference to the multi-store model of memory. (3 marks)

Lesson 8.4

Retrieval failure

Key ideas

- Retrieval failures occur when stored information cannot be accessed. The tip-of-the-tongue phenomenon refers to the feeling that a memory exists but cannot be retrieved at that moment.
- Retrieval failure theory suggests that forgetting occurs when retrieval cues, mental reminders or prompts are absent or insufficient.
- The encoding specificity principle states that the associations formed at the time of encoding new memories will be the most effective retrieval cues. This includes context-dependent cues (external or environmental cues) and state-dependent cues (internal cues such as emotions) that help with retrieval.



Learning intentions and success criteria

tip-of-the-tongue phenomenon (TOT)

the feeling of knowing the answer even if we cannot remember it in the moment

Introducing retrieval failure

While encoding failures prevent information from being stored in LTM, retrieval failures occur when stored information cannot be accessed, even though it remains available in memory (Tulving & Pearlstone, 1966). According to the multi-store model of memory (Atkinson & Shiffrin, 1968), information encoded into LTM is organised semantically (by meaning). The more connections made during encoding, the more cues are available to help retrieve information from the interconnected semantic networks.

A common example of retrieval failure is the **tip-of-the-tongue phenomenon (TOT)**, where an individual feels they know a piece of information but cannot immediately retrieve

it (Figure 1). For example, you might be trying to remember the name of a classmate. “What is his name? I can see his face, the colour of his hair, his eyes – and his name starts with R. Ron? Rob? Rod? Roger? ... Now I remember; it’s Ryan.” Often, partial information, such as the first letter of a name, can be recalled accurately, and the full memory typically surfaces after a short delay. TOT occurs in all languages, at least once a week for people on average, but this rate of occurrence increases as we get older. TOT demonstrates the role of incomplete or ineffective cues resulting in detailed or total retrieval failure. There are several explanations of retrieval failure, including retrieval failure theory, encoding specificity principle and interference theory (which you will learn about in Lesson 8.5).



FIGURE 1 It’s on the tip of my tongue; I just can’t retrieve it right now!

Retrieval failure theory

The **retrieval failure theory**, proposed by Endel Tulving (Tulving & Thomson, 1973), suggests that forgetting occurs when retrieval cues are absent or insufficient. **Retrieval cues** are mental reminders or prompts that we create to assist our recollection later on. We may create these cues deliberately, implicitly or both.

When we encode new information, we naturally make connections to existing knowledge within our semantic network. These connections can act as retrieval cues when pathways are activated, spreading through the associated nodes to access the target memory.

For example, if a student learns about photosynthesis in biology class and links the concept to plants, sunlight and chlorophyll, these associations form part of the semantic network. Later, when trying to recall information about photosynthesis, cues like “sunlight” or “plants” can activate the related pathways, enabling successful retrieval (Figure 2). However, if the appropriate cues are missing or weak, the connections may not activate fully, leading to retrieval failure.

retrieval failure theory

the inability to retrieve material due to an absence of the right cues or a failure to use them

retrieval cue

a mental reminder or prompt that activates our neural network to assist with recollection later on



FIGURE 2 If you are trying to remember information about lions, being presented with a kitten may help your brain trigger further information about cats.

According to Tulving, a good retrieval cue is similar to the original encoding of the information. For example, if the sound of the word was emphasised during encoding, then the retrieval cue should be to do with the sound of the word (phonemic cue). Alternatively, if the meaning of the word was emphasised during encoding, then the retrieval cue should be concerned with meaning (semantic cue; Tulving & Thomson, 1973).

To be sure that we will remember new information, we need to make a conscious and deliberate effort to create effective retrieval cues. This can be done in many ways – some methods include creating bizarre images in our mind or making associations between information already in our memory and the new information.

Encoding specificity principle

encoding specificity principle

the idea that associations encoded at the time we learned new information make the most effective retrieval cues

The **encoding specificity principle** (Tulving & Thomson, 1973) states that the associations formed at the time of encoding new memories will be the most effective retrieval cues. In other words, retrieval is most effective when the conditions at the time of retrieval match those present during encoding. This is because when we learn new information, we also encode additional details about the external environment (context) and our internal state (mood or feelings). These details act as retrieval cues that can aid memory recall.

Context-dependent cues

context-dependent cue

a cue to assist retrieval from long-term memory, connected to the external environment in which learning took place

Context-dependent cues refer to the learner's external environment (the context) in which the memory was formed. Environmental cues include sounds, smells, temperature and other environmental stimuli that were linked to the material being learnt at the time. For example, research by Godden and Baddeley (1975) demonstrated this with divers who recalled words better when tested in the same environment (underwater or on land) as where the words were learnt. Similarly, when people have forgotten details of an event, they are flooded with detailed memories upon returning to the place where the original memory was formed. Police often take witnesses back to the scene of a crime to help them retrieve important details that could assist the investigation.



FIGURE 3 If you experienced something for the first time near the Brisbane River at sunrise, the river or the sunrise could act as a future context-dependent cue.

State-dependent cues

state-dependent cue

a cue to assist retrieval from long-term memory, connected to the internal environment (mood state or physical condition) in which learning took place

State-dependent cues, on the other hand, refer to a person's "internal environment", and include the physiological and/or psychological state that they were in at the time of learning, such as their mood, level of anxiety and whether they were intoxicated, medicated or sober. For example, it has been found that when we are happy, we are more likely to remember happy events, but if we are sad we tend to have unhappy memories. State-dependent learning and retrieval cues might help explain why some people have difficulty recalling information when they are in examinations. For example, if a student studies while feeling calm and relaxed but takes the exam while anxious, the mismatch in emotional states may make it harder to retrieve the information.

Check your learning 8.4



Check your learning 8.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** two different types of retrieval cues. (2 marks)
- 2 **Describe** what happens during ineffective coding. (1 mark)
- 3 **Explain** what a state-dependent cue is. (2 marks)
- 4 **Explain** retrieval failure theory. (2 marks)

Analytical processes

- 5 **Compare** context-dependent cues and state-dependent cues. (2 marks)

Knowledge utilisation

- 6 **Determine** the role of retrieval cues in the tip-of-the-tongue phenomenon. (2 marks)

Lesson 8.5

Interference effects

Key ideas

- Proactive interference is when prior information or memories prevent individuals from encoding and storing new material.
- Retroactive interference is when new information or memories prevent individuals from accessing or retrieving prior material.



Learning intentions and success criteria

Interference theory

Have you ever found yourself becoming confused or forgetting information when you sit several examinations on the same day? It might be that you have not forgotten the information, but that interference is making the information in your memory inaccessible. This happens when we learn two telephone numbers or personal identification numbers (PINs) for bank accounts (Figure 1).

Interference theory refers to difficulties in retrieving information from memory caused by competing information. Interference can occur proactively or retroactively.

Proactive interference occurs when older information interferes with our ability to retrieve newly learnt material. For example, you might have studied Italian in Year 7 and then learnt Spanish in Year 8. In a Spanish verbs test, your older knowledge of Italian verbs might interfere with your ability to retrieve the correct Spanish verbs.



FIGURE 1 If you open a new Netflix account, remembering your new password may interfere with your ability to recall other/older passwords.

proactive interference when previously learnt material inhibits our ability to encode and store new material

retroactive interference

when newly acquired material inhibits our ability to retrieve previously learnt material

Study tip

The prefix “pro” means “forward”, thus, proactive interference occurs when previously learnt information comes *forward* to interfere with the retrieval of newer, similar information. “Retro” means “backwards”, thus, retroactive interference occurs when new information moves *backwards* to interfere with the retrieval of previously learnt, similar information.

Retroactive interference, on the other hand, is when newly learnt material interferes with our ability to retrieve previously learnt material. Continuing the previous example, retroactive interference may cause your more recent knowledge of Spanish verbs to interfere with your ability to retrieve the correct Italian verbs for the test.

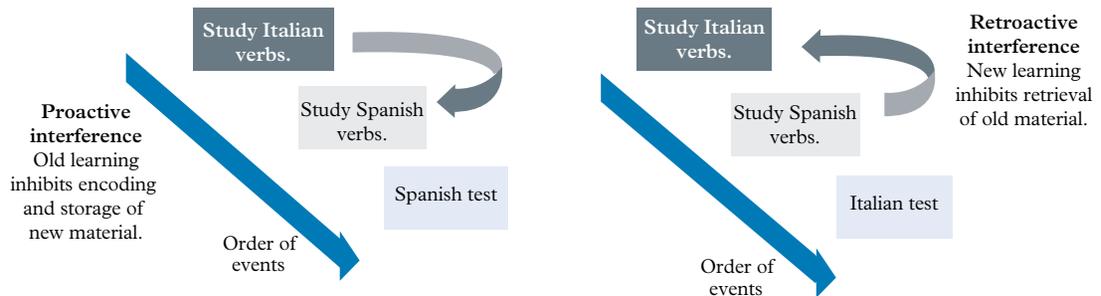


FIGURE 2 Proactive interference occurs when previously learnt Italian verbs interfere with the encoding of recently learnt Spanish verbs. Retroactive interference occurs when learning new Spanish verbs interferes with the retrieval of previously learnt Italian verbs.

Effect of similarity on retrieval

Interference is likely to be most pronounced when the two sets of material are very similar. This was shown in a study by McGeoch and McDonald (1931) and many studies since then. In this well-known study, the researchers had participants memorise a list of two-syllable adjectives, and then after a set time interval, memorise another list of information. After another time interval, participants were tested on how many of the words they could remember from the original list. The researchers varied the level of similarity between the two lists of information. It was found that the amount of information that was forgotten from the original list increased as the level of similarity between the two sets of information increased.

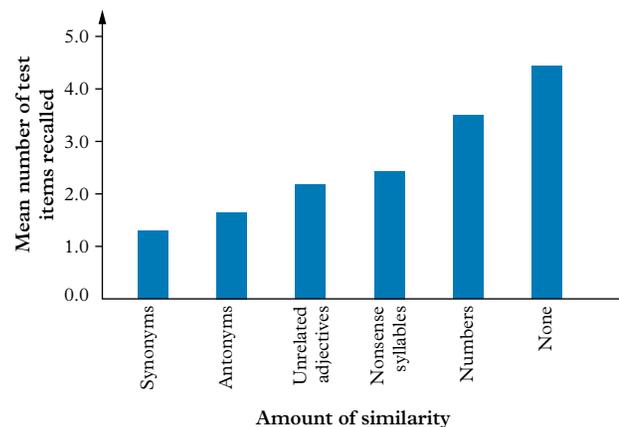


FIGURE 3 McGeoch and McDonald (1931) found that the amount of interference is greatest when the material is similar.

Strengths and limitations of interference theory

Although this theory seems plausible, has been readily replicated in laboratory settings and has validity in terms of our own personal experiences, it is not without its critics. While researchers agree that interference does occur, they also point out that the laboratory experiments have tended to use tests of recall, which are particularly prone to interference; for example, recall of word lists and nonsense syllables. They also point out that in real life, interference might not occur so readily. For example, reading and remembering passages of meaningful information uses semantic memory, which is less prone to interference (Carlson et al., 2007).

Check your learning 8.5



Check your learning 8.5: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Explain** interference. (2 marks)
- 2 **Identify** the two types of interference described in interference theory. (2 marks)

Analytical processes

- 3 **Compare** retroactive interference and proactive interference. (2 marks)

Knowledge utilisation

- 4 **Predict** what might happen if a student memorises two similar sets of historical dates for separate exams on the same day. **Justify** your prediction with reference to interference theory. (4 marks)

Lesson 8.6

Improving memory

Key ideas

- Chunking (grouping) extends the capacity of short-term memory, while maintenance rehearsal (repetition) extends the duration of short-term memory.
- Elaborative rehearsal is where information is given meaning and is linked to other information in our memory.
- The method of loci is a type of mnemonic (memory strategy) that associates newly learnt information with specific locations of a familiar environment, called a memory palace. The memory palace locations serve as retrieval cues in lieu of environmental, state or other retrieval cues.
- Spacing (distributed practice) and interleaving (mixing different topics) enhance cognitive processing and memory retrieval.



Learning intentions and success criteria

Introducing improving memory

Your ability to recall the information learnt during class and from textbooks is vital for academic success. How we encode information as it enters our memory systems affects our ability to recall this information later. There are many strategies and techniques that we can use to improve our memory – at both the encoding and the recall phases – which we will review. First we will look at improving STM and LTM.



FIGURE 1 This lesson will give you some strategies for improving your memory of the material you are taught in class.

Improving STM capacity: Chunking

chunking

a coding strategy that increases the capacity of short-term memory

Study tip

Recall that Atkinson and Shiffrin's multi-store model of memory (Lesson 6.2) not only describes the structure of memory but also identifies control processes, such as chunking and maintenance rehearsal, (that can extend the 7 ± 2 pieces of information capacity and duration (approximately 20 seconds) of STM.

Chunking is a coding strategy that involves grouping individual pieces of information into larger, meaningful units or “chunks”.

By organising small pieces of information into meaningful patterns, each chunk is counted as one item, which means that more information can be held in STM.

For example, if someone is trying to remember a mobile phone number 0412345678, the 10 digits exceed the capacity of STM. This limitation can be overcome if the digits are grouped into smaller units such as 0412 345 678.

Chunking is even more effective when the chunks themselves have their own meaning in LTM (e.g. “365” for days in a year, “007” is associated with James Bond, and “911” is associated with emergency services in American TV or “000” for emergency services in Australia).



FIGURE 2 Chunking greatly increases the amount of information that we can hold in short-term memory. This is useful when we are trying to recall a phone number.

Improving STM duration: Maintenance rehearsal

The duration of STM is limited compared to that of LTM. It lasts for approximately 20 seconds provided there is no displacement. Displacement occurs when new information enters STM and pushes out information that is already there. To retain information in our STM, we need to solve the problem of its limited duration. To do this we use **maintenance rehearsal**. If you rehearse the information in STM, you increase the chances of retaining the information.

Maintenance rehearsal enables us to keep information in STM for a longer period of time. It means repeating the information over and over again (Figure 3). As long as we are not interrupted, we can keep information in STM almost indefinitely by this method; however, we can't spend our lives thinking about the same five to nine pieces of information, so new information fills the spaces and displaces the old items.

Maintenance rehearsal does not add meaning to the information or link it to other material already in LTM. It just holds it in STM for a longer time and, when maintenance rehearsal stops, the information will be lost approximately 20 seconds later.

However, repetition of information in STM increases the likelihood that it will be transferred to LTM.



FIGURE 3 This student is writing a list of words over and over to improve their memory of the spellings.

maintenance rehearsal

a strategy for keeping information in short-term memory or for moving it into long-term memory by repeating the information

Skill drill**Short-term memory uses acoustic encoding****Science inquiry skills: Evaluating evidence (Lesson 1.8); Communicating scientifically (Lesson 1.9)**

Conrad (1964) demonstrated in an empirical study that short-term memory appears to encode items mostly in an acoustic (sound) code. The beginning of his paper is shown in Figure 4. Conrad's experiments suggested that, regardless of whether we see or hear information, we usually repeat the information verbally rather than visually when we want to retain it in our short-term memory. Table 1 summarises methods of verbal and visual maintenance rehearsal.

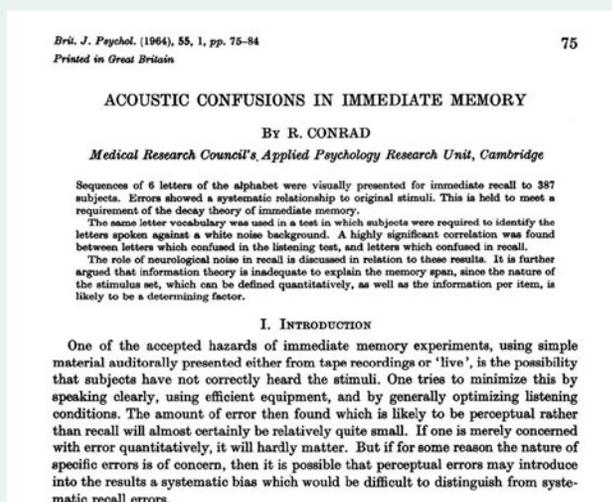


FIGURE 4 Conrad's paper on acoustic encoding

TABLE 1 Methods of maintenance rehearsal

| Method | Example |
|--|---|
| Verbal (using words) | <ul style="list-style-type: none"> Vocal – saying words out loud Sub-vocal – thinking words silently to oneself |
| Non-verbal (using visual or spatial information) | <ul style="list-style-type: none"> Visualising – keeping a pictorial image in one's mind Muscular – imagining how it feels to perform an action |

Conrad showed that when the presented letters rhymed (e.g. B, T, C, P, D, E), they were significantly harder to recall than non-rhyming letters (e.g. Z, R, N, W, Q, A) because there was acoustic confusion.

Conrad also found that when letters were presented visually to participants, errors still tended to be based on acoustic confusability. He concluded that even when information enters the short-term memory in visual format, it is still encoded acoustically.

Practise your skills

- Create** an APA-formatted reference of the study using the information from Figure 4. (1 mark)
- Conduct** your own research to find another study that either corroborates or refutes the findings by Conrad (1964). Summarise the study that you found. (4 marks)
- Evaluate** the reliability and validity of the evidence (Conrad and your second study). (4 marks)

Real-world psychology**Duration of short-term memory**

Peterson and Peterson (1959) demonstrated in an experiment that STM has a duration of approximately 20 seconds unless the information is rehearsed.

They asked participants to remember a single nonsense trigram of three consonants, such as "DKT". Participants' recall of the trigram was

recorded after delays of 3, 6, 9, 12, 15 or 18 seconds. It was found that recall was very good (80 per cent) after 3 seconds but was only 10 per cent after 18 seconds. This study demonstrated the duration of STM and also the role of maintenance rehearsal in STM. Figure 5 indicates the duration of the nonsense trigrams in STM for different periods of time. ▶

◀ In the second experiment, participants were given a task to prevent them from rehearsing the trigram. They were asked to count backwards by threes from

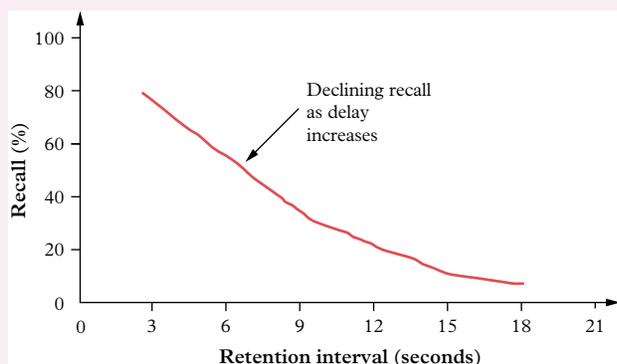


FIGURE 5 Results for Peterson and Peterson's study for the percentage of trigrams recalled after a delay

the time each trigram was presented to the time a light signalled them to recall it. This is called a "filled delay". Results showed that recall after a filled delay was poor, even after 15 seconds. This study demonstrated the role of displacement in STM. Figure 6 illustrates the experiment.

Apply your understanding

- 1 Describe** the trend, pattern or relationship shown in Figure 5. (2 marks)
- The use of trigrams is not very realistic. **Suggest** a modification that would improve the mundane realism of the study. (1 mark)
- 3 Explain** why it was necessary for participants to count backwards during the study. (2 marks)

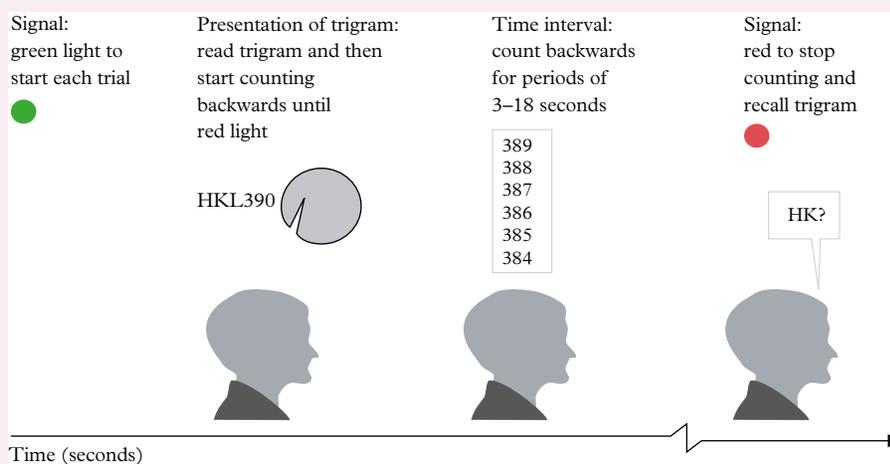


FIGURE 6 Peterson and Peterson's experiments on duration of STM

Improving LTM: Elaborative rehearsal

elaborative rehearsal

a process by which we give meaning to information and link it to other information in our semantic network

Study tip

You can use elaborative rehearsal to help you study by making connections among ideas you are learning (e.g. Venn diagrams, tables, mind maps) and connecting the material to your own experiences.

Elaborative rehearsal is a process by which we give meaning to information and link it to other information already in the memory, i.e. our semantic network. By thinking of examples of concepts as we are learning them, we tend to process the information at a deeper semantic level. As demonstrated by Craik and Tulving's (1975) levels of processing experiment, information rehearsed elaboratively is more likely to move from STM to LTM.

To understand elaborative rehearsal, we'll use a tent analogy. In this analogy, think of a memory as a tent pole. If you only secure the pole by putting it up quickly without ropes, it is unstable and can fall easily. This is like shallow processing or simple maintenance rehearsal, where information is only repeated without deeper connections or meaning.

In contrast, elaborative rehearsal and semantic processing are like tying multiple ropes from the pole to the ground (Figure 7). Each rope represents a



FIGURE 7 Just as tying multiple ropes from a tent pole to the ground provides a strong foundation for the tent, so too does elaborative rehearsal for LTM.

meaningful connection whereby the new information is linked to prior knowledge. The more “ropes” you tie – the more connections you create – the stronger and more secure the tent becomes, just like a memory becomes more stable and durable in long-term memory.

Challenge

Mobile phone number

Ask a classmate to give you a mobile phone number to remember. You can use maintenance rehearsal or chunking to try to remember it, but you will probably find that you have forgotten it later.

However, you might be able to link the numbers with the birthdays or ages of family and friends –

or you might convert the numbers into a song with a familiar tune. Test your memory for the number at the end of the lesson to measure the effectiveness of your method of elaborative rehearsal. **Summarise** your experience in a brief paragraph.

Improving LTM: The method of loci

The **method of loci** is a **mnemonic**, memory strategy, that involves associating newly learnt information with specific locations in a familiar environment. The visual imagery can enhance recall by creating alternative retrieval cues that do not rely on matching context or internal states during recall.

The method of loci is famously used by memory champions to perform incredible feats, such as memorising the order of an entire deck of 52 playing cards. This technique involves mentally placing each card at specific locations in a familiar environment, often referred to as a memory palace. For example, a memory champion might visualise their childhood home and mentally “walk” through it, assigning each card to a specific location. The process begins by associating each playing card with a vivid, memorable image or character. For instance:

- The Ace of Spades could be visualised as a pirate with a spade-shaped eye patch.
- The Queen of Hearts might be imagined as the Queen of England holding a large red heart.
- The Three of Clubs could be represented by a tree with club-shaped branches.

Once these associations are created, the champion mentally places each card’s image at a predetermined location in their memory palace. For instance:

- At the front door, they imagine the pirate (Ace of Spades) dramatically kicking the door open with a loud crash.
- In the kitchen, they visualise the Queen of Hearts sitting at the table, drinking tea from a giant, red, heart-shaped teacup.
- In the living room, they picture a tree (Three of Clubs) growing through the floor, its branches breaking through the ceiling.

The champion continues this process, assigning each card’s vivid image to specific locations as they “walk” through their memory palace. When it’s time to recall the deck, they simply retrace their mental journey, visiting each location and retrieving the associated image. This allows them to recall the cards in perfect order with remarkable accuracy.

The method of loci works so effectively because it relies on creating meaningful visual and spatial associations – all of which engage deep cognitive processing and the brain’s natural capacity for remembering locations and images. Research by Bower (1970) and countless studies since have shown that spatial memory and imagery significantly enhance recall, making the method of loci a powerful tool for mastering large amounts of information.



method of loci

a mnemonic that focuses on visualisations to strengthen memory

mnemonic

a strategy or method that can be used to improve or strengthen memory

Study tip

Loci is the plural of locus, meaning “place” or “location” in Latin.

FIGURE 8 Using the method of loci can help memory champions remember the order of an entire deck of playing cards!

Improving LTM: Spacing

Memory is subject to decay over time, as demonstrated by Ebbinghaus's forgetting curve (1885). Ebbinghaus found that newly learnt information is rapidly forgotten unless actively reviewed (Lesson 8.1). Research shows that spacing (distributed practice) significantly slows forgetting by strengthening memory traces.

spacing

a study method that involves spreading out study sessions over time to improve long-term memory

Spacing involves spreading out study or practice sessions over time rather than engaging in massed practice (cramming). It allows the brain to process, consolidate and strengthen memories, enhancing long-term retention.

For example, in a meta-analysis of 254 studies involving over 14,000 participants, Cepeda and colleagues (2006) found that spaced practice led to significantly better recall compared to massed practice. Neuroscience supports this process through the principle of neuroplasticity. Each time we retrieve a memory, neural connections within the memory trace are strengthened, reinforcing the neural pathway and making the information more durable and accessible over time.

Figure 10 explains how you can use spacing in your own study.

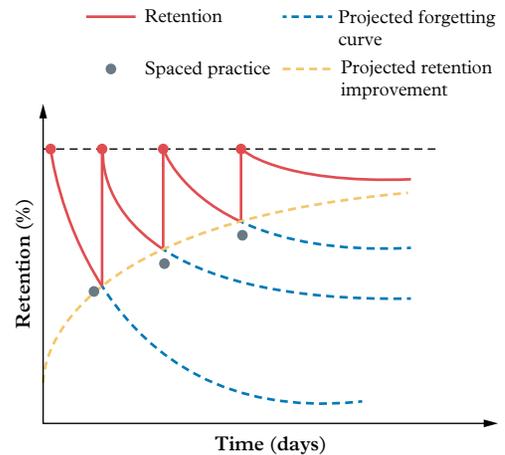


FIGURE 9 Spacing or distributed practice improves retrieval.

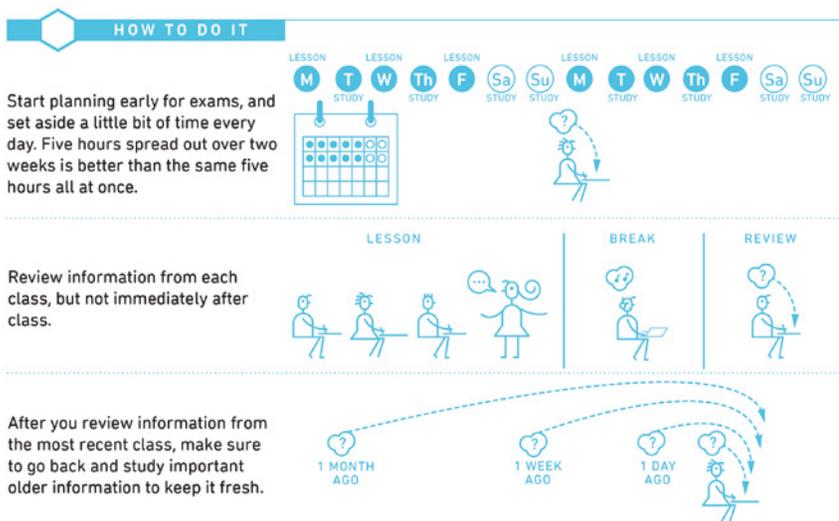


FIGURE 10 To improve long-term memory and retrieval, space repeated practice sessions over a long period. Set up a study schedule where you spend 30 minutes a day recalling information from yesterday, last week and a month ago.

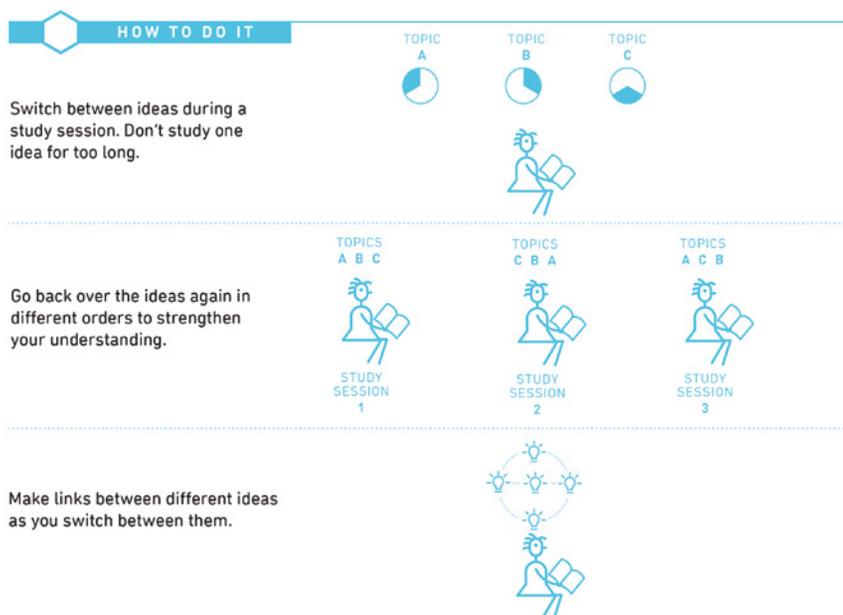
Improving LTM: Interleaving

interleaving

a study method that involves mixing different topics or types of problems within a single study session to improve learning and problem-solving

Interleaving builds upon the concept of spacing but involves mixing different topics or types of material during study sessions. Unlike blocked practice, where one topic is studied in isolation, interleaving encourages learners to switch between related topics. This enhances cognitive processing and memory retrieval by making the brain compare, contrast and organise information effectively. Rohrer and Taylor (2007) demonstrated the effectiveness of interleaving in mathematics learning. Students who practised interleaved problem sets (e.g. switching between algebra, geometry and trigonometry) outperformed those who used blocked practice. Interleaving forced students to distinguish between types of problems and apply appropriate strategies, which strengthened recall and transfer of knowledge.

Figure 11 explains how you can use interleaving in your own study.

**Study tip**

Create a study plan involving spaced and interleaved retrieval to improve your understanding and long-term recall of content for your external exam.

FIGURE 11 To improve long-term memory and retrieval, interleave the study of topics as shown.

Summary of strategies to improve memory

TABLE 2 Sources of memory failure and strategies for improvement

| | Sensory register | STM store | LTM store |
|-------------------|---------------------|-----------------------------------|---|
| Source of failure | Lack of attention | Trace decay Displacement | Lack of consolidation Using shallow processing |
| Improvement | Selective attention | Chunking Maintenance rehearsal | Elaborative rehearsal Method of loci Spacing and interleaving |

Check your learning 8.6



Check your learning 8.6: Complete these questions online or in your workbook.

Retrieval and comprehension

- Identify** a strategy to enhance the capacity of short-term memory. (1 mark)
- Describe** relearning. (2 marks)
- Describe** context-dependent cues and provide an example of one that you currently use. (2 marks)
- Describe** how elaborative rehearsal helps improve long-term memory. (2 marks)

Analytical processes

- Contrast** spacing and interleaving. Provide an example of each to make clear the difference. (3 marks)

- Compare** maintenance rehearsal and elaborative rehearsal. (2 marks)

Knowledge utilisation

- Hans is studying for his Psychology exam. His brother is next door playing a video game with very distinctive sounds. One exam day, the hall is silent and Hans struggles to recall what he studied.
 - Describe** retrieval failure with reference to the scenario. (2 marks)
 - Explain** how Hans could have used the method of loci to reduce retrieval failure on exam day. (2 marks)
- Discuss** the benefits of maintenance and elaborative rehearsal. (4 marks)

Lesson 8.7

Review: How we remember and forget

Summary

- 8.1 • Recall is the process of retrieving stored information using no cues (free recall or serial recall) or limited cues (cued recall).
- Recognition is a type of retrieval that requires finding a correct response among incorrect alternatives.
- Relearning is where an individual has to reacquire knowledge or skills that they have previously acquired.
- 8.2 • Practical: Context dependency of memory
- 8.3 • Forgetting occurs when we are unable to retrieve information from memory. This can occur either if information is unavailable (not successfully stored) or inaccessible (information is stored but cannot be retrieved).
- Encoding failures prevent information from being stored and affect availability. Causes of encoding failures include lack of attention, limitations of the short-term memory store (trace decay and displacement), failure to consolidate memory traces effectively, and shallow processing.
- 8.4 • Retrieval failures occur when stored information cannot be accessed. The tip-of-the-tongue phenomenon refers to the feeling that a memory exists but cannot be retrieved at that moment.
- Retrieval failure theory suggests that forgetting occurs when retrieval cues, mental reminders or prompts are absent or insufficient.
- The encoding specificity principle states that the associations formed at the time of encoding new memories will be the most effective retrieval cues. This includes context-dependent cues (external or environmental cues) and state-dependent cues (internal cues such as emotions) that help with retrieval.
- 8.5 • Proactive interference is when prior information or memories prevent individuals from encoding and storing new material.
- Retroactive interference is when new information or memories prevent individuals from accessing or retrieving prior material.
- 8.6 • Chunking (grouping) extends the capacity of short-term memory, while maintenance rehearsal (repetition) extends the duration of short-term memory.
- Elaborative rehearsal is where information is given meaning and is linked to other information in our memory.
- The method of loci is a type of mnemonic (memory strategy) that associates newly learnt information with specific locations of a familiar environment, called a memory palace. The memory palace locations serve as retrieval cues in lieu of environmental, state or other retrieval cues.
- Spacing (distributed practice) and interleaving (mixing different topics) enhance cognitive processing and memory retrieval.

Key studies

Grant et al., 1998

Review questions 8.7A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 Ebbinghaus's forgetting curve is basically the same shape as curves shown by later researchers, but he appears to have forgotten more material and at a faster rate than other research showed. What is a likely reason?
 - A Ebbinghaus was experimenting on himself and his involvement was unethical.
 - B Nonsense syllables cannot be encoded according to their meaning, so only shallow processing was possible.
 - C Ebbinghaus tried to learn large numbers of lists of nonsense syllables at the same time, so there was much proactive interference.
 - D Ebbinghaus tried to learn large numbers of lists of nonsense syllables at the same time, so there was much retroactive interference.
 - 2 Proactive interference is
 - A difficulty forming new memories after a traumatic event.
 - B difficulty recalling memories from before a traumatic event.
 - C difficulty learning material at a later stage due to earlier learnt material causing problems with the encoding process.
 - D difficulty recalling material learnt at an earlier stage due to later learnt material causing problems with the retrieval process.
 - 3 What does retrieval failure, where we know something perfectly well but can't recall it in the moment, indicate?
 - A Retrograde amnesia
 - B Short-term forgetting
 - C Anterograde amnesia
 - D Cue-dependent forgetting
 - 4 Retroactive interference refers to
 - A difficulty forming new memories after a traumatic event.
 - B difficulty recalling memories from before a traumatic event.
 - C difficulty learning material at a later stage due to earlier learnt material causing problems with the encoding process.
 - D difficulty recalling material learnt at an earlier stage due to later learnt material causing problems with the retrieval process.
 - 5 Richard has just changed mobile phone providers and he has a new mobile number. When his friends ask him for his new number he keeps giving his old number by mistake and finds he has to write the new number on the back of his hand. What is the likely reason for his difficulty in learning the new mobile number?
 - A He experienced mnemonics from the old number he had learnt earlier.
 - B He experienced proactive interference from the old number he had learnt earlier.
 - C He experienced maintenance rehearsal from the old number he had learnt earlier.
 - D He experienced retroactive interference from the old number he had learnt earlier.
 - 6 Xiau is preparing a study timetable for his examinations. He is studying Legal Studies and Economics, which he feels are similar to each other in processes and content. Which study program will be the most effective?
 - A He only studies one of these subjects on any one day.
 - B He always studies these two subjects in the same order.
 - C He studies Economics before Legal Studies on odd dates, and Legal Studies before Economics on even dates.
 - D He makes sure that he studies a different subject, such as Physics, in between studying Economics and Legal Studies.
- Use the following information to answer questions 7 to 9.*
- Carla is trying to list all the people who attended her 11th birthday party 10 years ago so that she can invite them to her 21st birthday celebration. She knows they all went to her school.
- 7 Which of the following would be most useful in helping her remember who went to her party?
 - A A photograph of Carla's Year 6 class when she was 11
 - B A list of all the names of the students in Year 6 at Carla's school when she was 11

- C** A photograph of the parents of the children who attended Carla's 11th birthday party
- D** An invitation list for the 11th birthday party that only has the first names of the guests
- 8** Which of the following would enable Carla to use recognition?
- A** Looking at a photograph of her Year 6 class when she was 11
- B** Reading a list of all the names of the students in Year 6 at her school when she was 11
- C** Looking at a photograph of the parents of the children who attended her 11th birthday party
- D** Reading an invitation list for the 11th birthday party that only has the first names of the guests
- 9** Which of the following would allow Carla to use cued recall?
- A** Looking at a photograph of her Year 6 class when she was 11
- B** Reading a list of all the names of the students in Year 6 at her school when she was 11
- C** Looking at a photograph of the parents of the children who attended her 11th birthday party
- D** Reading an invitation list for the 11th birthday party that only has the first names of the guests
- 10** Relearning is calculated using a "savings score", which is a measure of the improvement in learning speed (either by trials or by time) when relearning material that was learnt on a previous occasion. What is the formula for calculating the savings score, where T_1 is the number of trials (or amount of time) taken to learn the material on the first occasion, and T_2 refers to the number of trials (or amount of time) taken to relearn the material on the second occasion?
- A** $\frac{T_1 - T_2}{T_1} \times 100\%$ **B** $\frac{T_2 - T_1}{T_1} \times 100\%$
- C** $\frac{T_1 - T_2}{T_2} \times 100\%$ **D** $\frac{T_2 - T_1}{T_2} \times 100\%$
- 11** Inspector Clouseau is trying to solve a murder. He takes witnesses to the scene of the crime and asks them to tell him everything they can remember. Soon, a witness provides accurate information that leads to an arrest. What strategy did the inspector use to improve the witnesses' recall?
- A** Use state-dependent cues to assist memory.
- B** Use context-dependent cues to assist memory.
- C** Stimulate the semantic memories of the witnesses.
- D** Stimulate the procedural memories of the witnesses.
- 12** When Jacqui studied for her Psychology exam at home, she used an oil burner that filled the room with the scent of lavender. On the day of her exam, she tipped a few drops of lavender onto her handkerchief and found that sniffing this occasionally helped her to remember her material. The main strategy Jacqui was using to aid her memory during the exam was
- A** cued recall.
- B** state-dependent cues.
- C** context-dependent cues.
- D** context-dependent and state-dependent cues.
- 13** Ineke studied hard for her boat-operator's licence and went to the traffic office to sit the test. While waiting for her appointment, she became increasingly anxious but did as her Psychology teacher had advised and imagined that she was sitting at her desk at home, relaxing and studying the regulations. When it was time for her to answer the questions, she passed the test. What strategy did Ineke use to enable her to remember the material?
- A** Cued recall
- B** State-dependent cues
- C** Context-dependent cues
- D** Context-dependent and state-dependent cues
- 14** Which statement best describes the process of interleaving?
- A** Visualising information in specific locations to aid recall
- B** Repeating the same topic or task until mastery is achieved
- C** Studying similar information in long, uninterrupted sessions
- D** Practising different topics or types of problems within the same study session
- 15** Sarah has a biology test next week. Instead of studying all the material in one night, she decides to review the content for 30 minutes each day leading up to the exam. What memory strategy is Sarah using?
- A** Spacing
- B** Chunking
- C** Interleaving
- D** Maintenance rehearsal

Review questions 8.7B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 16 Identify** two methods that can enhance short-term memory. (2 marks)
- 17 Describe** retrieval cues. (1 mark)
- 18** Eugene's new employee is Robert Moore, but Eugene keeps calling him Roger, mixing him up with the actor Roger Moore. **Identify** and **describe** the cause of Eugene's retrieval failure. (2 marks)
- 19 Explain** the encoding specificity principle. (2 marks)
- 20** Godden and Baddeley (1975) demonstrated that divers had better recall when tested in the same (matched) environment (underwater or on land) than those who were tested in different (mismatched) learning and testing environments. **Explain** how the method of loci could have been used to reduce this retrieval failure. (3 marks)

Analytical processes

- 21 Distinguish** between trace decay and displacement. Provide an example to make the difference clear. (2 marks)
- 22** Max is unable to remember the key points of a chapter in his English text. He was daydreaming in class when these points were discussed. **Determine** the most likely cause of Max's forgetting. (1 mark)
- 23 Contrast** context-dependent and state-dependent cues. Provide an example of each. (4 marks)
- 24 Compare** encoding failure and retrieval failure. (2 marks)

Knowledge utilisation

- 25** A teacher gives two different tests to two groups of students. Group A completes a fill-in-the-blank test (recall), while Group B completes a matching test (recognition).
- a Determine** which test would likely result in better performance. (1 mark)
- b Justify** your response using your understanding of recall and recognition. (2 marks)
- 26** Julia studied French in high school. As an adult, while trying to learn Spanish, she keeps mixing up the vocabulary for the two languages. **Discuss**, with reference to interference effects, the cause of Julia's memory difficulties. (3 marks)
- 27 Propose** how Julia can overcome her memory difficulties caused by interference, using your understanding of memory improvement strategies. (2 marks)
- 28** Roberta is planning a Saturday study timetable for her QCE examinations. She is taking Specialist Maths, Psychology, English, Biology and Australian History. She feels that English and Australian History are similar to each other and Psychology and Biology are similar to each other, but Specialist Maths is different altogether. She needs to study every subject on Saturday. **Design** a study program for Roberta using your knowledge of spacing and interleaving.

| Time | Subject |
|----------------------|---------|
| 9:00 to 10:30 am | |
| 10:45 am to 12:15 pm | |
| 12:45 to 2:15 pm | |
| 2:30 to 4:00 pm | |
| 4:15 to 5:45 pm | |

- 29** Sensitivity refers to the ability of a measure to detect whether information has been stored in long-term memory, with more sensitive measures being better at identifying even weak or partial traces of learnt material.
- a Categorise** the three main measures of retention – recognition, recall and relearning – from least to most sensitive. (3 marks)
- b Justify** your categorisation with reference to the relevant theory. (3 marks)

Data drill

Divided attention during encoding and retrieval

A psychology class performed a modified version of Craik and Tulving's (1975) research on divided attention on memory recall. In the experiment, participants were tasked with learning a list of 15 words. Participants were randomly allocated to one of two conditions:

- 1 Distraction during encoding: Participants received mobile phone messages while memorising the words.
- 2 Distraction during retrieval: Participants received mobile phone messages while recalling the words.

The researchers hypothesised that distractions during encoding would cause encoding failure and result in significantly lower average recall than participants who were distracted during retrieval.

Design

- Mixed design, repeated and independent groups experimental design
- Convenience sample of 28 Year 11 Psychology students
- Dependent variable: the number of correctly recalled words (out of 15)

TABLE 1 Average number of words recalled by participants in the encoding distraction and retrieval distraction conditions

| Condition | <i>n</i> | <i>M</i> | <i>SD</i> | <i>CI</i> |
|------------------------------|----------|----------|-----------|-----------|
| Distraction during encoding | 14 | 5.8 | 1.2 | 0.63 |
| Distraction during retrieval | 14 | 7.2 | 1.0 | 0.52 |

Apply understanding

- 1 **Calculate** the standard error of the mean for both conditions, using the formula: $SE = \frac{SD}{\sqrt{n}}$ (4 marks)

Analyse data

- 2 **Identify** a feature of the data that makes it appropriate to use an unpaired *t*-test. (1 mark)
- 3 **Identify** whether the assumption of equal variance is met. Use evidence to support your answer. (2 marks)

Interpret evidence

- 4 **Draw a conclusion**, with reference to the confidence intervals of the mean, about whether type of distraction (distraction during encoding or retrieval) has a significant effect on memory recall. (4 marks)



Module 8 checklist: How we remember and forget

UNIT 3

Topic 3 review

Multiple choice

(1 mark each)

- 1 What is the duration of echoic memory?
 - A 20 seconds
 - B 1 to 3 seconds
 - C 3 to 4 seconds
 - D 10 to 15 seconds
- 2 Which of the following describes explicit memory?
 - A Unconscious memory of associations
 - B Memories enhanced by emotional states
 - C Memories that can be consciously recalled
 - D Memories of how to perform tasks like riding a bike
- 3 What is the role of the central executive in working memory?
 - A To process auditory information
 - B To store visual and spatial information
 - C To store episodic information temporarily
 - D To allocate attention and coordinate tasks
- 4 What is proactive interference?
 - A When retrieval cues are absent
 - B When memories are not encoded deeply
 - C When new memories interfere with old ones
 - D When old memories interfere with new ones
- 5 Which brain area is implicated in emotionally charged memories?
 - A Amygdala
 - B Cerebellum
 - C Hippocampus
 - D Prefrontal cortex
- 6 A student struggles to recall information until they return to the room where they studied. This demonstrates
 - A episodic memory.
 - B semantic memory.
 - C state-dependent memory.
 - D context-dependent memory.
- 7 Which memory retrieval method involves relearning material faster the second time?
 - A Free recall
 - B Recognition
 - C Relearning
 - D Cued recall
- 8 What does encoding specificity suggest?
 - A STM duration depends on rehearsal.
 - B Chunking reduces memory interference.
 - C Retrieval cues should match original encoding.
 - D The more deeply we encode, the better we retrieve.
- 9 Which process in memory requires no cues?
 - A Recognition
 - B Relearning
 - C Free recall
 - D Cued recall
- 10 Which type of memory is most influenced by the cerebellum?
 - A Episodic
 - B Semantic
 - C Implicit
 - D Explicit
- 11 What is an example of a state-dependent cue?
 - A Using flashcards
 - B Studying in a quiet library
 - C Revising with a memory palace
 - D Studying while happy and recalling while happy
- 12 “Priming” in implicit memory can be described as
 - A encoding cues for semantic memory.
 - B associating memories unconsciously.
 - C repeating information to maintain recall.
 - D practising information for long-term memory.
- 13 What type of failure happens when a memory was never encoded deeply enough?
 - A Retrieval failure
 - B Encoding failure
 - C Proactive interference
 - D Retroactive interference

- 14 Sarah cannot retrieve the name of her first teacher, even though she feels it's "on the tip of her tongue". This is an example of
- A retrieval failure.
 - B chunking failure.
 - C encoding failure.
 - D proactive interference.
- 15 Which aspect of the multi-store model was revised in later models like working memory?
- A Short-term memory is passive storage.
 - B Sensory memory has unlimited capacity.
 - C Memory processes are not interconnected.
 - D Long-term memory requires semantic encoding.

Short response

- 16 **Identify** the capacity of short-term memory. (1 mark)
- 17 **Describe** retrieval failure, using an example. (2 marks)
- 18 **Describe** how chunking is used to enhance short-term memory. (1 mark)
- 19 **Describe** the role of the cerebellum in memory. (1 mark)
- 20 Jake walked into a room to get his keys but immediately forgot why he was there. When he went back to the kitchen, he suddenly remembered. **Identify** the type of memory cue that helped Jake recall his goal. (1 mark)
- 21 **Differentiate** between implicit and explicit memory. (1 mark)
- 22 **Describe** the relationship between the amygdala and the hippocampus in memory. (1 mark)
- 23 **Explain** how spacing improves memory. (2 marks)
- 24 Lucy prepared for her Psychology exam by linking new information to concepts she already knew. For example, she compared working memory to a computer's processor.
- a **Identify** the rehearsal strategy Lucy used. (1 mark)
 - b **Explain** why it is effective. (2 marks)
- 25 David tries to memorise a grocery list by visualising the items in different rooms of his house. For example, he imagines bananas in the kitchen and milk in the living room.
- a **Identify** the memory strategy David is using. (1 mark)
 - b **Evaluate** the strategy by providing a strength and a limitation of the strategy. (2 marks)
- 26 **Compare** the levels of processing (LOP) model of memory and the multi-store model with reference to how information is encoded and stored in long-term memory. (2 marks)
- 27 **Differentiate** between recall and recognition. Provide an example of each. (3 marks)
- 28 **Identify** a strength and limitation of using maintenance rehearsal as a strategy to study for an exam. (2 marks)
- 29 During a workplace training session, employees were asked to memorise a series of safety procedures. Group A was shown the procedures on a slideshow with step-by-step instructions. Group B watched a video demonstration of the procedures being performed. Group C was asked to practise the procedures themselves after receiving verbal instructions.
- a **Identify** which component of the working memory model is most engaged for each group. (3 marks)
 - b **Identify** the group most likely to recall the procedures accurately a week later. **Justify** your answer using the levels of processing model. (2 marks)
 - c **Use** the multi-store model to **explain** why Group C might have an advantage over the other groups in transferring the procedures into long-term memory. (2 marks)

30 A class modified the experiment by Grant and colleagues (1998) to determine if context affects memory for newly learnt information.

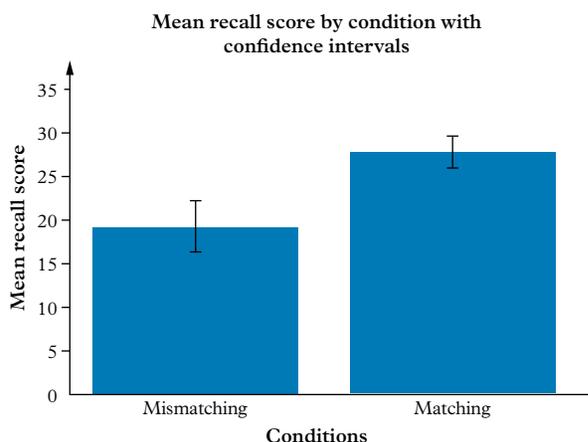
Null hypothesis: There will be no difference in the number of words recalled by participants in the matching and mismatching conditions.

Alternative hypothesis: Participants in the matching condition will recall more words than those in the mismatching condition.

Design:

- Independent groups design
- Sample size: 20 participants, 10 in each group

Results:



- Identify** the mean of each group. (2 marks)
- Determine** which group has the greatest uncertainty around the mean. (1 mark)
- Infer** if there is a significant difference between the matching and mismatching conditions.
Justify your answer. (2 marks)
- Identify** which hypothesis should be accepted. (1 mark)

TOTAL MARKS

/51 marks

Introduction

Stimulation of any of our senses can cause a reflexive response; this is the result of classical conditioning. For example, smelling freshly cut grass can remind you of spring. Any time a stimulus that was originally neutral (i.e. had no effect) now causes a behavioural or emotional reaction, classical conditioning has occurred. The conditioned responses may be physical (e.g. sneezing) or emotional (e.g. excitement).

We also learn to repeat the behaviours that bring the results we want and avoid the results we don't want. Operant conditioning is a form of learning in which behaviour becomes controlled by its consequences. For example, we study to get good marks. We tell jokes to make our friends laugh. We eat so that we won't feel those nasty pangs of hunger. The list of these is almost endless – and it's not only us. Our pets, farm animals, wild animals and any organism capable of performing a voluntary behaviour has learnt, through operant conditioning, to repeat the actions that bring good results and to avoid performing those actions that bring unpleasant results.

Is it possible to learn without direct participation in the process? Do classical and operant conditioning theories explain all forms of learning? How do people learn to use machinery or even simple items such as cutlery? Would it be wise for a learner driver to simply hop in a car and learn how to drive, or for a child to use power tools, such as electric drills or electric knives, by trial and error?

In this module, we will discuss how you learn by association in classical conditioning, and by reinforcement or punishment in operant conditioning. We will also discuss social learning theory and distinguish between modelling and vicarious conditioning. The underlying theories of behaviourism, and social and cognitive psychology will also be explored.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to learning before you start.

Subject matter

Science understanding

- Compare classical conditioning, operant conditioning and social learning theory, and discuss the underlying theories of behaviourism and social and cognitive psychology.
- For classical conditioning
 - describe the concepts unconditioned stimulus (UCS), unconditioned response (UCR), neutral stimulus (NS), conditioned stimulus (CS) and conditioned response (CR)
 - distinguish between stimulus generalisation and discrimination
 - describe extinction and spontaneous recovery
 - describe learned fear responses, with reference to the “Little Albert” experiment.
- For operant conditioning
 - distinguish between negative and positive reinforcement, and negative and positive punishment
 - describe stimulus generalisation and discrimination
 - describe extinction and spontaneous recovery
 - describe the operation of the “Skinner box” in operant conditioning studies.
- For social learning theory
 - distinguish between modelling and vicarious conditioning
 - describe vicarious conditioning, as observed in the “Bobo doll” experiments conducted by Bandura and colleagues.

Science as a human endeavour

- Appreciate that theories of learning have been developed with reference to one another, and by an ongoing empirical process, e.g.
 - Skinner (1948) developed his theory of operant conditioning in response to Pavlov’s (1897/1902) work on classical conditioning
 - Bandura (1977) developed his theory of observational (or social) learning to extend learning theory to account for the influence of models observed in social contexts.
- Recognise the significant ethical issues involved in early conditioning studies, including Pavlov (1897/1902) and Watson & Rayner (1920).
- Consider the impact of role models (music, film, television) on teenage behaviour.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and operationalise variables to be manipulated, measured and controlled
- distinguish between types of investigations, e.g.
 - experiments (independent and dependent variables)
 - independent groups
 - observational research
- identify and use appropriate sampling procedures for selection and allocation of participants
- identify and apply ethical principles, e.g.
 - voluntary participation
 - informed consent procedures
 - debriefing
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - measures of uncertainty, including dispersion in a sample (range, interquartile range, standard deviation) and using a sample to make an inference about the population from which it was drawn (standard error, confidence intervals)
- select, synthesise and use evidence to
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- suggest improvements and extensions to minimise uncertainty, address limitations and improve the overall quality of evidence.

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Lesson 9.1

The underlying theories of learning

Key ideas

- Behaviourism emphasises the role of environmental factors in shaping behaviour.
- Classical and operant conditioning are behaviourist approaches to learning.
- Social and cognitive psychology are ignored in behaviourism and contribute to the social learning theory.



Learning intentions and success criteria

Introducing theories of learning

The process of **learning** has links to many fields of psychology, including behaviourism, social psychology and cognitive psychology. There is no single theory that can explain all forms of learning. This lesson will introduce classical conditioning, operant conditioning and social (observational) learning theories, and how they link to behaviourism, and social and/or cognitive psychology (Figure 1).

learning

a relatively permanent change in behaviour or knowledge in response to experience

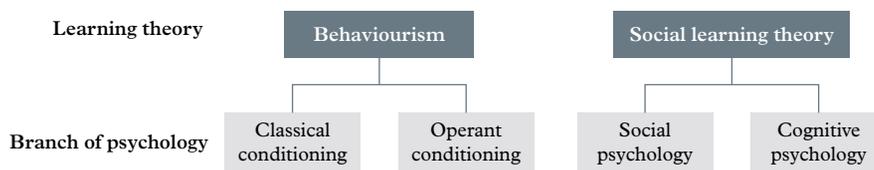


FIGURE 1 Theories of learning are related to different branches of psychology and they all contribute to our understanding of learning.

Conditioning and behaviourism

Behaviourism is a learning theory that focuses on observable behaviours and the way they are influenced by the environment. It is the basis of the work completed by John B. Watson, B. F. Skinner and Ivan Pavlov. Behaviourists believe that all behaviours are acquired through conditioning, which occurs through interaction with the environment.

behaviourism

a learning theory that focuses on observable behaviours and the way they are influenced by the environment

John B. Watson

John B. Watson (Figure 2) is best known as the founder of behaviourism with his work in the early twentieth century revolutionising psychology. Behaviourism introduced scientific methods to psychology where experiments could be replicated, and data produced was objective and measurable. Watson's (1913) seminal paper, "Psychology as the behaviorist views it", laid the foundation for behaviourism by focusing on observable behaviours and rejecting introspection and the study of internal mental processes.

One of Watson's most famous experiments was the "Little Albert" study, conducted with Rosalie Rayner (1920), where they conditioned a young child to fear a white rat by pairing the rat with a loud, frightening noise. This experiment demonstrated that emotional responses could be conditioned in humans, supporting the idea that behaviour is learnt through interaction with the environment. Lesson 9.2 provides further details on this study and its ethical implications.



FIGURE 2 John B. Watson

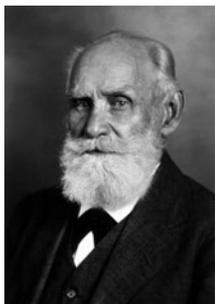


FIGURE 3 Ivan Pavlov

Ivan Pavlov

Ivan Pavlov's work on classical conditioning began in the 1890s (Figure 3). His initial experimental work with dogs led to the discovery of the conditioned reflex. From 1901 to 1936, Pavlov continued to refine his theory of classical conditioning, conducting many experiments to explore the various aspects of conditioned reflexes. Classical conditioning is a learning process in which a neutral stimulus becomes associated with a meaningful stimulus, eventually triggering a conditioned response. You will learn more about this in Lesson 9.2.



FIGURE 4 B. F. Skinner

B. F. Skinner

B.F. Skinner's work expanded the field of behaviourism by introducing operant conditioning (Figure 4). This theory of conditioning focuses on how behaviours are influenced by their consequences, with reinforcement (positive or negative) increasing the likelihood of a behaviour and punishment decreasing it. While Watson rejected the study of internal mental states entirely, Skinner acknowledged their existence; however, he believed that behaviour could be fully explained by examining environmental influences and reinforcement histories. Operant conditioning provided a more nuanced understanding of how behaviours are acquired and maintained. This approach to learning highlights the importance of observable behaviours and external factors, rather than internal mental states, in understanding how individuals acquire new skills and knowledge. Lesson 9.3 details the key processes involved in operant conditioning and the "Skinner box" used in his animal conditioning experiments.

Through conditioning, behaviourism provides a framework for understanding how habits are formed and how behaviour can be modified. Table 1 summarises the strengths and limitations of behaviourism.

TABLE 1 Strengths and limitations of behaviourism

| Strengths | Limitations |
|--|--|
| <ul style="list-style-type: none"> • Easier to conduct scientific research using observable and measurable behaviours • Used successfully in therapeutic and training techniques to modify behaviour • Provides clear and testable predictions about behaviour • Strategies like positive reinforcement and structured environments in the educational setting have been shown to improve learning outcomes and behaviour management | <ul style="list-style-type: none"> • Reductionist approach to behaviour, reducing complex human behaviour to simple stimulus–response associations, overlooking internal mental processes such as thoughts and emotions • Limited scope, not accounting for all types of learning, for example, observational learning • Low ecological validity as findings from animals cannot be compared to human behaviour • Ethical concerns with some behaviourist approaches involving punishment that could lead to a negative psychological effect |

social psychology

the study of how people's thoughts, feelings, beliefs and goals are constructed within a social context by other people, whether actual or imagined

social learning theory (SLT)

describes the way in which people acquire certain behaviours by watching and learning from role models; the initial focus of observational learning

Social psychology and social learning theory

Learning in the context of **social psychology** involves understanding how individuals acquire new behaviours, knowledge and skills through social interactions and the influence of others. Social psychology examines how people's thoughts, feelings and behaviours are shaped by the social environment and the presence of others.

One of the key theories linking learning and social psychology is Albert Bandura's **social learning theory (SLT)**. This theory proposes that people learn by observing and imitating the actions of others, a process known as observational learning (Figure 5). Bandura's theory highlights several critical components necessary for learning through observation: attention,



FIGURE 5 Social (observational) learning theory proposes that people learn through observation of others, like this child learning to use a paint roller by observing her mother.

retention, reproduction and motivation. For instance, individuals must first pay attention to a model's behaviour, retain the observed behaviour in memory, be capable of reproducing the behaviour, and have the motivation to do so, often influenced by the observed consequences of the behaviour.

This theory underscores the importance of social influences on learning, suggesting that much of what we learn comes from our interactions with others and the social context in which we live. SLT bridges behaviourism and cognitive psychology, suggesting that people learn behaviours through observation, imitation and modelling. You will learn more about SLT in Lesson 9.4.

Social psychology also explores how group dynamics, social norms and cultural factors impact learning. For example, peer pressure and group conformity can significantly influence an individual's learning process and behaviour adoption. By understanding these social factors, we can better comprehend how learning occurs in real-world settings and how social environments can be structured to facilitate positive learning outcomes.

Table 2 summarises the strengths and limitations of social learning theory. Unit 4, Topic 1 Social psychology explores this field of psychology in more detail.

TABLE 2 Strengths and limitations of social (observational) learning theory

| Strengths | Limitations |
|---|--|
| <ul style="list-style-type: none"> • Provides insight into how social influences, such as peer pressure and group dynamics, affect learning and behaviour • A key concept of social psychology that highlights the importance of learning through observation and imitation • Wide application to real-world settings such as education, therapy and organisational behaviour • Holistic approach considering both environment and cognitive factors in understanding behaviour | <ul style="list-style-type: none"> • Over-emphasis on external social factors at the expense of internal cognitive processes • Limited consideration of biological/genetic factors on behaviour and learning • Assumption that rational decision-making is always applied by humans in making decisions, when behaviour can be influenced by emotions, biases and impulsive reactions |

Cognitive psychology and social learning theory

cognitive psychology

the study of internal mental processes such as thinking, problem-solving, language, attention, memory and decision-making

cognitive development

the development of mental processes and abilities throughout the lifespan

Study tip

To revise your understanding of Piaget's and Vygotsky's theories of cognitive development, review Unit 1, Topic 2.

Cognitive psychology and learning are interconnected, as cognitive psychology focuses on understanding the mental processes that underpin learning. Learning and cognitive development are fundamental processes that shape how individuals acquire knowledge, skills and behaviours throughout their lives.

Cognitive development refers to the progression of mental processes such as thinking, reasoning, problem-solving and memory. This development is influenced by both genetic factors and environmental interactions. Key theories in this field include Jean Piaget's stages of cognitive development, which describe how children's thinking evolves in complexity from infancy through adolescence, and Lev Vygotsky's sociocultural theory, which emphasises the role of social interaction and cultural context in cognitive growth. Learning, on the other hand, involves the acquisition of new information or behaviours through experiences, practice and observation. It is closely linked to cognitive development, as effective learning often requires the ability to process and understand information.

The links between cognitive psychology and learning are evident in SLT. This theory incorporates cognitive processes such as attention, retention and reproduction into the understanding of how people learn from their environment. SLT also highlights the importance of modelling, where individuals learn by imitating others. Cognitive psychology examines how we process and replicate observed behaviours, including the role of memory, attention, perception and cognitive schemas in this process (Figure 6). This theory also recognises the importance of metacognition (awareness and regulation of one's own learning process) in support of learners being more effective and independent. Together, these processes enable individuals to adapt to their environments, solve problems, and achieve personal and academic growth.



FIGURE 6 Cognitive psychology is related to SLT in that it examines how we process and replicate observed behaviours.

TABLE 3 Strengths and limitations of cognitive psychology in learning

| Strengths | Limitations |
|---|--|
| <ul style="list-style-type: none"> • Effective practical applications (e.g. cognitive behavioural therapy) • Aids in understanding how learners process information • Used in the development of learning strategies such as spaced retrieval practice, enhancing memory retention and understanding | <ul style="list-style-type: none"> • Limited ability to make objective observations as cognitive processes cannot be directly observed and are inferred from behaviour • Approach may oversimplify the complex mental processes of cognition into discrete components • Often neglects emotional factors and focuses only on rational thought processes in learning • Underestimates the effect of individual differences in learning when cognitive theories generalise cognitive processes as uniform across individuals |

Summary of theories of learning

In summary, behaviourism focuses on learning through direct interaction with the environment via conditioning, while social and cognitive psychology emphasise the role of mental processes and social interactions in learning. Social (observational) learning theory effectively combines these perspectives, highlighting how we learn from observing others and the cognitive processes involved in this learning.

Check your learning 9.1



Check your learning 9.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the main concept behind behaviourism. (1 mark)
- 2 **Identify** the two types of conditioning. (2 marks)
- 3 **Describe** how social and cognitive psychology contribute to social (observational) learning theory. (2 marks)

Analytical processes

- 4 **Contrast** the strengths of behaviourism and social psychology in relation to learning. (2 marks)

Knowledge utilisation

- 5 **Discuss** the historical development of behaviourism. (4 marks)

Lesson 9.2

Classical conditioning

Key ideas

- Classical conditioning is a three-phase process through which a neutral stimulus becomes involuntarily associated with an unconditioned stimulus, leading to the development of a conditioned response.
- Learnt behaviours acquired through conditioning can be extinguished if the conditioned stimulus is repeatedly presented without the unconditioned stimulus.
- Previously extinguished behaviours can spontaneously recover if the conditioned stimulus is presented again after some time, although usually weaker.
- Stimulus generalisation occurs when an organism responds to stimuli that are similar to the original conditioned stimulus, whereas stimulus discrimination is the ability to discern and respond to only the conditioned stimulus and not similar stimuli.
- A learnt fear response is a reaction to a perceived threat that has been conditioned through past experiences.



Learning intentions and success criteria

Introducing classical conditioning

Consider the following reactions.

- You start to feel anxious when you walk through the entrance of a hospital, even though you are only going to visit an aunt who has a new baby.

- You are driving with your P-plates when you hear a siren and see flashing lights behind you. You get a sinking feeling in your stomach but then realise, with relief, that it's a fire engine and not the police, so you pull over to let them through (Figure 1).
- Your dog salivates when he hears the microwave “ping”.

All of these behaviours have been learnt through a simple process known as **classical conditioning**.

classical conditioning

an animal or other organism can passively learn to show a naturally occurring reflex action, such as salivation, in response to any stimulus; learning through association; also known as Pavlovian conditioning

association

a learnt connection between two (or more) objects or events – especially significant in classical conditioning

unconditioned stimulus (UCS)

a stimulus that causes an unconditioned response (classical conditioning)

unconditioned response (UCR)

a response that occurs naturally in response to the unconditioned stimulus (classical conditioning)

neutral stimulus (NS)

a stimulus that causes no response (classical conditioning)

conditioned stimulus (CS)

a previously neutral stimulus that, after being repeatedly paired with an unconditioned stimulus, elicits a conditioned response (classical conditioning)

conditioned response (CR)

an automatic learnt response that occurs when a conditioned stimulus is presented, after being repeatedly paired with an unconditioned stimulus (classical conditioning)



FIGURE 1 If you see flashing lights while driving, you might panic and think it's the police, until you realise it's a fire truck and calm down.

Classical conditioning is a three-phase process that involves developing an **association** with a stimulus (or stimuli) that results in a learnt response. These three phases are outlined in Table 1. Once the person or organism has been conditioned, their response is reflexive (absent of conscious choice). Classical conditioning has its roots in behaviourism, which assumes all learning occurs through interactions with the environment and that environment shapes behaviour. Both Ivan Pavlov and John B. Watson investigated conditioned neutral stimuli eliciting reflexes in the subject's conditioning.

TABLE 1 The three phases of classical conditioning

| Phase | Description |
|------------------------------------|--|
| First phase (before conditioning) | <ul style="list-style-type: none"> • Involves a response to a stimulus that has not yet been conditioned. It is natural or automatic. • This is explained as an unconditioned stimulus (UCS) that results in an unconditioned response (UCR). • During this phase there is also a neutral stimulus (NS) that causes no response. |
| Second phase (during conditioning) | <ul style="list-style-type: none"> • Involves the development of an association between the neutral stimulus (NS) and the unconditioned stimulus (UCS). • This causes the neutral stimulus (NS) to become a conditioned stimulus (CS). |
| Third phase (after conditioning) | <ul style="list-style-type: none"> • Results in the now conditioned stimulus (CS) producing a conditioned response (CR) as a result of its association with the unconditioned stimulus (UCS). |

Challenge**Dinnertime**

Every night after school, your parents ask you to set the table at 5:45 pm. On the weekend, you've noticed you start to get hungry for dinner around 6 pm – despite not having dinner until later. **Explain** why this happens, and make sure to refer to classical conditioning when justifying your response.

Pavlov's research

Classical conditioning was first described in the early twentieth century. Ivan Pavlov, who had won the Nobel Prize for Physiology in 1904, was continuing his research on the digestive system of dogs when he noted that the dogs salivated before they received food.

Pavlov hypothesised that the dogs had come to associate the footsteps of the laboratory technician who fed the dogs with the presence of the food that was given to them, and that this sound had been conditioned to cause the reflex response of salivation.

Originally, the stimulus (food) produced the response (salivation). Eventually, the sight or sound of the laboratory technician became the stimulus, which produced salivation. The salivation response, which is biologically based in the nervous system and occurs involuntarily (that is, it is a reflex response), had now been conditioned to respond to a new stimulus (the sight or sound of the technician).

Pavlov began to experiment by associating various sounds (a bell, a tuning fork and a metronome) with the food and found that, after a few trials, the dogs could be conditioned to respond to these sounds by salivating. The set-up of Pavlov's experiment is shown in Figure 2.

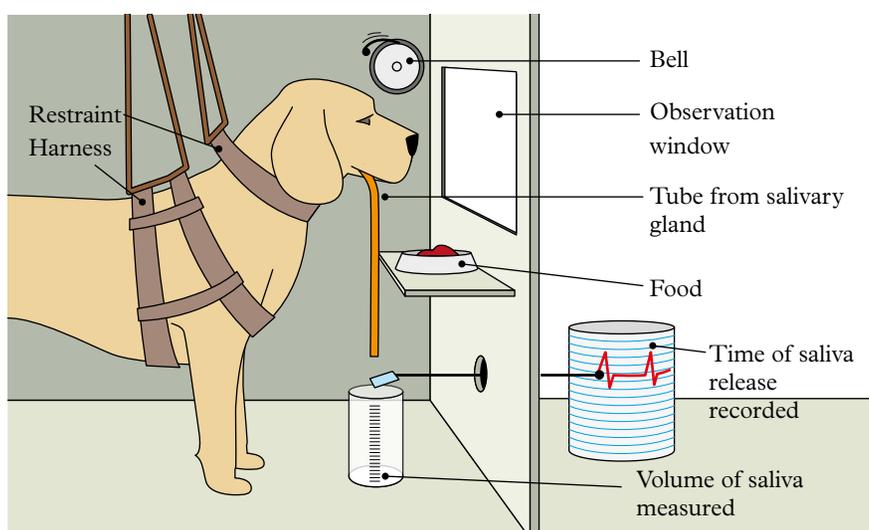
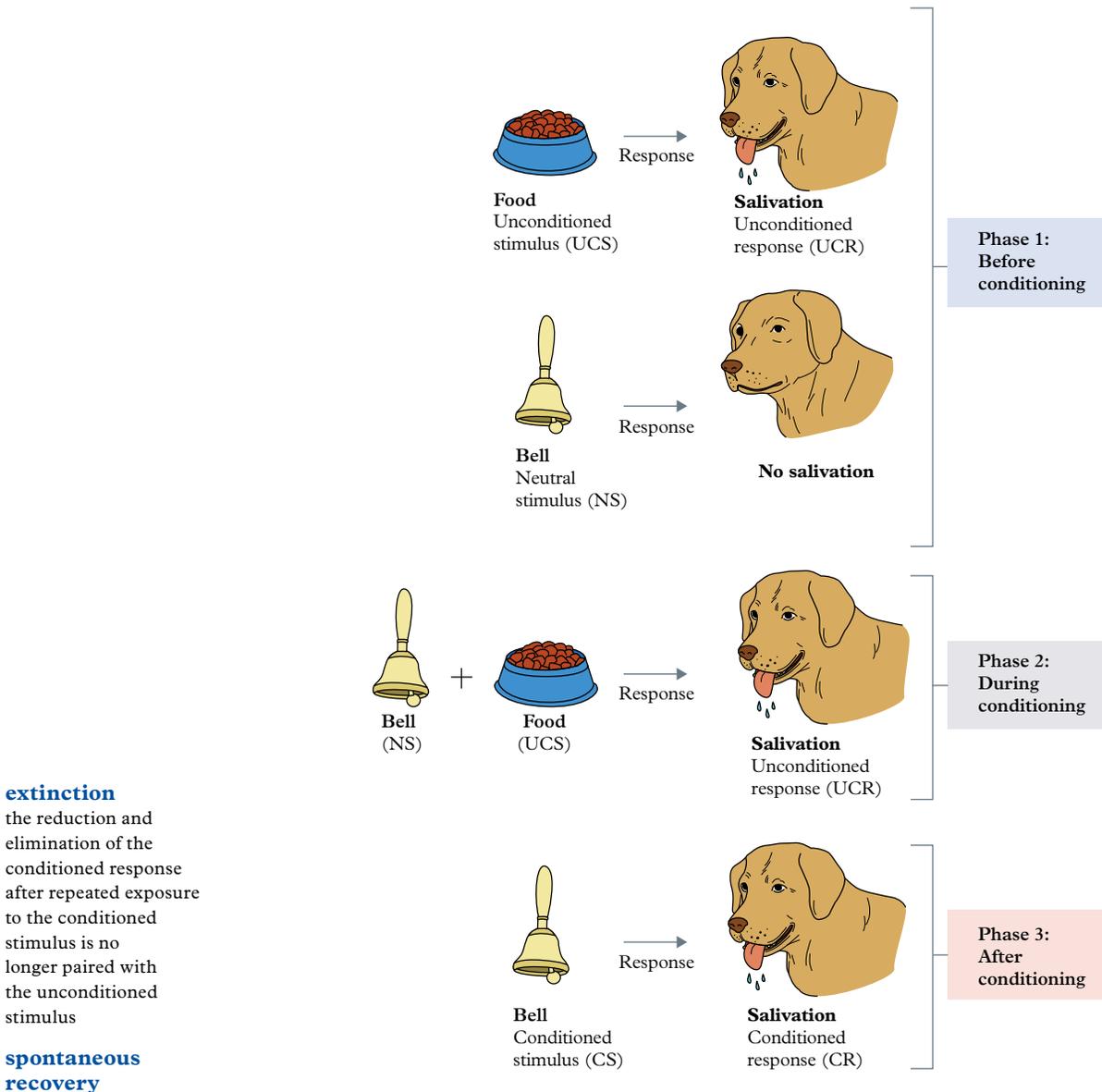


FIGURE 2 Pavlov's research with dogs provided evidence for a very simple type of learning that was based on the repetitive association of different stimuli.

As a result of Pavlov's work, clear evidence was provided for a very simple type of learning that was based on the repetitive association of different stimuli – classical conditioning. The results of Pavlov's research with dogs are summarised in Figure 3.

**extinction**

the reduction and elimination of the conditioned response after repeated exposure to the conditioned stimulus is no longer paired with the unconditioned stimulus

spontaneous recovery

the reappearance of an extinguished response after a rest period despite the absence of a consequence

stimulus generalisation

in classical conditioning, when an organism responds to any stimulus that is similar to the conditioned stimulus

stimulus discrimination

in classical conditioning, when an organism responds to the conditioned stimulus but not to any stimulus that is similar to the conditioned stimulus

FIGURE 3 The three-phase process of classical conditioning in Pavlov's experiment

Extinction and spontaneous recovery

Pavlov found that **extinction** occurred when the bell was repeatedly rung without being followed by food. Over time, the dog produced less saliva in response to the bell until ringing the bell did not cause salivation at all.

After a pause of some hours after extinction of the conditioned response, during which the bell was never sounded, ringing the bell again caused a slight return of salivation, demonstrating **spontaneous recovery** had occurred.

Pavlov discovered that after a dog had been conditioned to salivate in response to the sound of a bell, it would also salivate when a buzzer was sounded, even though the buzzer had never been paired with the unconditioned stimulus of food.

This was a demonstration of **stimulus generalisation**. If the buzzer was frequently sounded but never paired with the food, the dog would soon learn not to respond with salivation – extinction of that response would then occur. If the bell was still occasionally paired with the food, the dog would salivate to the sound of the bell but not the buzzer.

Stimulus discrimination had now taken place.

Figure 4 shows the relationship between the three phases of classical conditioning, and extinction and spontaneous recovery.

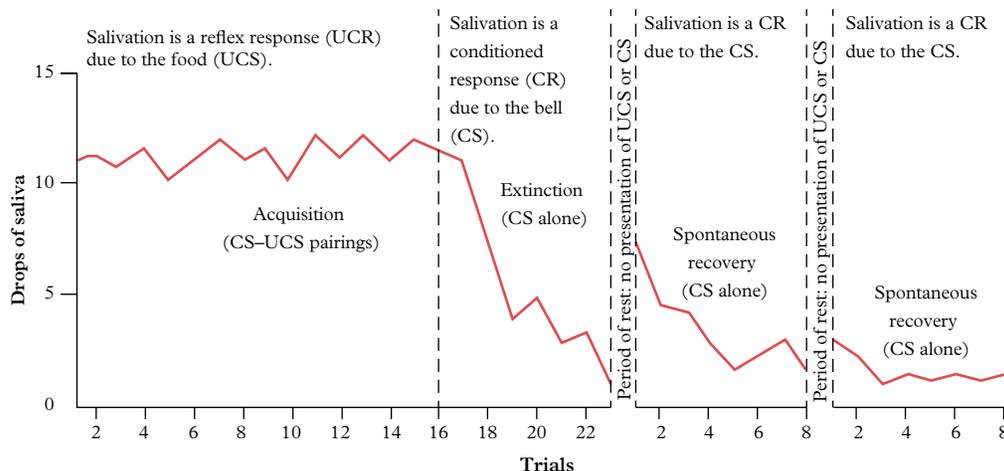


FIGURE 4 Learning (acquisition), extinction and spontaneous recovery in classical conditioning

Real-world psychology

The use of animals in research

The use of animals in research is a topic with both strong support and significant opposition. Proponents argue that animals are valuable in research because their bodily systems are similar to those of humans, providing a good starting point for understanding human biology and diseases. For example, maze-learning tasks with rats have been instrumental in studying the role of the hippocampus. Additionally, animal behaviour can be controlled more easily than human behaviour, and animals do not have expectations that could influence experimental results. The shorter lifespans of many animal species also allow researchers to study the effects of ageing more efficiently. Moreover, when the risk of physical or psychological harm to humans is too great, animals provide an alternative for conducting necessary research.

On the other hand, critics of animal research point out that the extent to which results can be generalised to humans is often limited. They also argue from an ethical standpoint that humans have a responsibility to protect animals from harm rather than expose them to it for scientific purposes. Despite these concerns, animal research has led to significant psychological findings, such as insights into brain plasticity, the timing of critical learning periods, the effectiveness of medications for various disorders, the neural basis of learning (e.g. long-term potentiation) and physiological responses to stress.

In Australia, the code for the care and use of animals for scientific purposes was established to ensure that animals are treated with respect and that ethically acceptable practices are followed in research. This code mandates that the use of animals must have scientific merit and integrity, and any harm to the animals must be minimised. This framework aims to balance the scientific benefits of animal research with the ethical obligation to treat animals humanely.

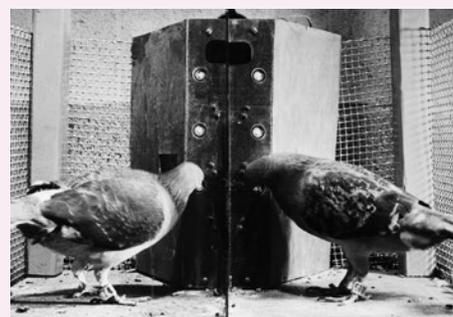


FIGURE 5 Skinner used animals in boxes in his research. You will learn more about this research in Lesson 9.3.

Apply your understanding

- 1 Identify** one advantage and one disadvantage of animal research. (2 marks)
- 2 Describe** an example where the use of animal research has contributed to psychological knowledge. (1 mark)
- 3 Explain** why animal research is essential to science. (2 marks)

Classical conditioning in action

Classical conditioning is happening all around us – and to us – all the time. The following are some common examples of conditioned responses due to classical conditioning.

- You start to feel happy because you are walking down the street where your partner lives.
- A mother who has breastfed her baby will tell you about this response: when it is approaching feeding time and she hears or sees her baby, her breast milk will start to flow.
- People who have been swooped by magpies can develop feelings of anxiety when they see a magpie sitting in a tree, and may even experience the anxiety when other birds are seen (stimulus generalisation). If this fear is reinforced by extreme swooping events, it may become strong enough to be a specific phobia.

Try to identify things you have been classically conditioned to do. Think about sports you play and your classes at school. Identifying the NS, UCS, CS and CR in these scenarios will help you recognise them in examination questions. Consider using a template like the one shown in Figure 6 to support your understanding and application of classical conditioning.

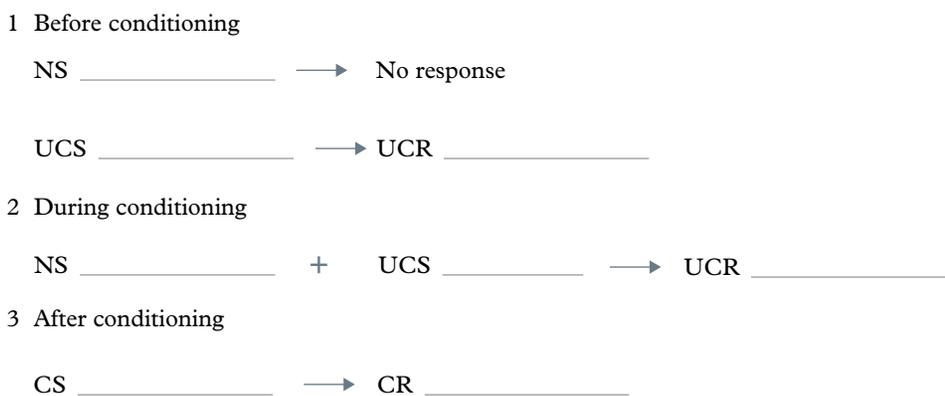


FIGURE 6 Use this template to practise identifying conditioned responses.

Aversion therapy

aversion therapy

a form of treatment using classical conditioning to cause an undesired behaviour to create an unwanted response, thereby reducing the incidence of the behaviour

Aversion therapy is an application of classical conditioning where a person with an unwanted behaviour learns to associate the unwanted behaviour with an unpleasant event. For example, in order to get a little boy to stop biting his fingernails, his parents may paint his fingernails with “bitter aloes”, a substance that tastes very bitter and causes a gag reflex, so that every time he bites his nails he almost vomits! This repeated association between fingernails in the mouth and gagging will soon cause the very act of bringing his hand to his mouth to stimulate gagging and the nail-biting behaviour will quickly stop. The process is shown in Figure 7.

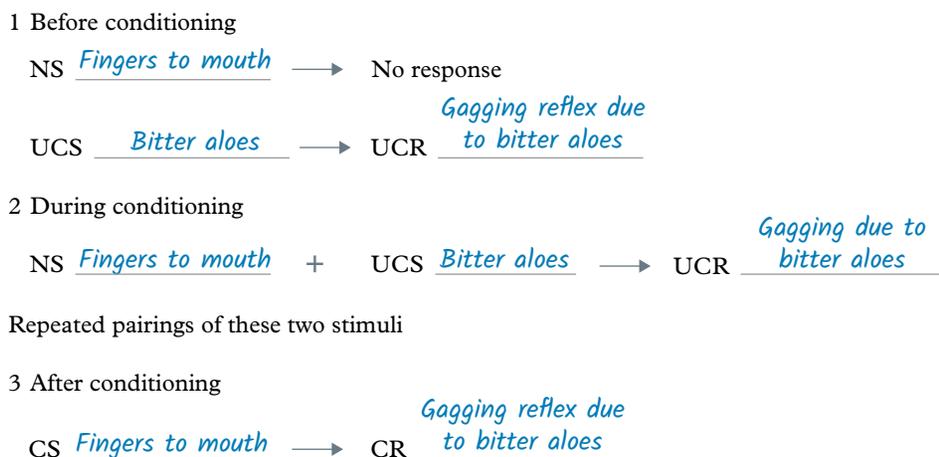


FIGURE 7 Classical conditioning can be used for aversion therapy, to stop individuals from reacting or behaving in a certain way; in this example, biting their nails.

Skill drill**Types of investigations**

Science inquiry skill: Understanding the scientific method (Lesson 1.3); Planning investigations (Lesson 1.4); Considering safety and ethics (Lesson 1.5)

Classical conditioning can be used to treat bedwetting. A study investigated participants with a condition called enuresis (persistent involuntary discharge of urine, in bed or on clothing, after the age when bladder control is expected).

Two hundred participants between the ages of 5 and 9 years were gathered. Participants were divided into two groups of 100 each; one group would receive 3 months of treatment, and the other group would not receive any treatment.

Researchers decided to use the sound of a buzzer as the unconditioned stimulus (UCS) that awakens a sleeping child when urine hits a pad underneath the sleeping child. The sound of the buzzer would soon be paired with the sensation of a full bladder. The researchers reasoned that after a series of such paired presentations, the response of waking up (at first only triggered by the buzzer) should begin to occur in response to stimulation from a full bladder. The child would go to the toilet instead of wetting the bed while asleep.

In the non-treatment group, the results were as follows:

- 60 participants wet their beds on more than 75 per cent of nights

- 27 wet their beds 50 per cent to 75 per cent of the time
- 13 wet their beds less than 50 per cent of the time.

In the treatment group, the results were as follows:

- 44 participants never wet the bed on any night
- 10 participants wet the bed less than 10 per cent of nights
- 14 participants wet the bed between 10 per cent and 20 per cent of nights
- 17 wet the bed 20 per cent or more of nights.

Practise your skills

- 1 Identify** the type of investigation used by the experimenters. (1 mark)
- Sampling methods and participant selection can have a large effect on experimental results. In addition, the sample in this study was very specific.
 - a Consider** how this sample could be gathered. (2 marks)
 - b Identify** one ethical consideration that would apply to this study, and **explain** how you would manage this. (2 marks)
- 3 Identify** the independent variable and the dependent variable involved in this experiment. (2 marks)
- 4 Propose** two modifications for this experiment and explain how they would redirect, refine or extend this study. (2 marks)

The “Little Albert” experiment: Learnt fear

In 1920, American psychologist John B. Watson and his graduate student Rosalie Rayner carried out one of the most (in)famous pieces of research (Watson & Rayner, 1920) in the area of classical conditioning and behaviourism.

“Little Albert” (a pseudonym), who was 9 months of age, was “borrowed” from a childcare facility at the prestigious Johns Hopkins University. Little Albert, a placid child who was selected on the grounds that he had never been seen to cry, was placed on the floor in Watson’s laboratory and allowed to play with a white rat. Little Albert showed no fear; nor did he respond negatively to other animals and objects such as a rabbit, a dog, a monkey, cotton wool and human masks. He did, however, show fear when a steel bar was struck with a hammer, making a loud noise just behind his back.



FIGURE 8 Little Albert was conditioned to respond with fear to a white rat. This fear then applied to many other objects that could be related to the rat, including dogs, rabbits and Santa Claus's beard, demonstrating stimulus generalisation.

Study tip

Whenever you read about a psychology experiment, consider the ethical implications. In the case of "Little Albert", think about informed consent and harm.

Two months later, Watson paired the rat with a loud noise by striking a steel bar with a hammer just behind Albert's head when he touched the rat. At first, although this caused Albert to jump in fear, he did not cry. After seven pairings of the rat and the noise (over two sessions, 1 week apart), Albert did cry. Soon afterwards, when the rat was presented but no noise sounded, Albert cried and tried to crawl away from it.

Little Albert also showed fear when presented with other white and fluffy objects such as a dog, a rabbit, a fur coat and a Santa Claus mask, demonstrating stimulus generalisation. However, it is interesting to note that the fear response was much reduced when he was in a different and much larger laboratory.

Ethical implications

The research conducted by Watson in his "Little Albert" experiment would certainly contravene many ethical principles that are in place today, as discussed in Lesson 1.5.

By today's standards, it is extremely unlikely that a human ethics committee would approve an experiment such as Watson's. One of the most important ethical considerations in research – that no physical or psychological harm must come to participants – was undoubtedly ignored. Little Albert came away from the study psychologically damaged, with a fear of rats, among other furry creatures and objects.

In addition, Watson failed to obtain informed consent from its participant, since Albert was too young to understand the terms of the experiment. Nor was permission sought from Albert's parents on his behalf. Watson also failed to properly debrief Little Albert, which in this case would involve extinguishing the conditioned response to fear white and fluffy objects.

Challenge

Childhood experiences

After reading about the experiment involving "Little Albert" think about your own childhood. Are there things that you are afraid of or have a specific reaction to that may have been reinforced as a child by your parents? Select one example and **identify** the UCS, NS and CR, then **determine** if stimulus generalisation has occurred or if extinction has taken place.

Check your learning 9.2



Check your learning 9.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- Describe** classical conditioning. (1 mark)
- Describe** each of the following classical conditioning concepts and provide an example for each

- neutral stimulus (2 marks)
- conditioned stimulus (2 marks)
- unconditioned stimulus (2 marks)
- conditioned response (2 marks)
- unconditioned response. (2 marks)

- 3 **Describe** stimulus generalisation. (1 mark)
- 4 **Explain** extinction and spontaneous recovery. (2 marks)
- 5 **Describe** learnt fear responses, with reference to the “Little Albert” experiment. (2 marks)
- 6 When he was younger, Jacob’s parents thought he was eating too much pizza. Jacob had water sprayed in his face every time he ate pizza as a child. Jacob is now 17, and each time he eats pizza he flinches as though he will be sprayed with water again. **Identify** the UCS, CS, NS, CR and UCR in this scenario. (5 marks)

Analytical processes

- 7 **Differentiate** between stimulus generalisation and stimulus discrimination. (1 mark)
- 8 **Contrast** spontaneous recovery and extinction. (1 mark)

Knowledge utilisation

- 9 **Assess** the ethical implications of Watson’s “Little Albert” experiment. (2 marks)
- 10 **Design** a methodology to reverse the effects of Pavlov’s conditioning, such as seen in the “Little Albert” study. (3 marks)

Lesson 9.3

Operant conditioning

Key ideas

- The three-phase model of operant conditioning involves: the **Antecedent** that makes the conditions right for the **Behaviour** to follow and be reinforced (or extinguished) by its **Consequences**.
- The elements of operant conditioning involve reinforcers and punishers.
- Stimulus generalisation and stimulus discrimination are part of the antecedent phase of operant conditioning.
- The “Skinner” box was used in training animals to perform certain voluntary behaviours.



Learning intentions and success criteria

Introducing operant conditioning

B. F. Skinner began experimenting with rats and pigeons in the 1930s. He trained the animals to perform certain voluntary behaviours, such as turning in a circle when a light flashed or pressing a lever when a bell rang. He trained them by rewarding them with food if they performed the behaviour. After only a few training trials, the animals would perform the behaviour every time. Skinner’s views were not as extreme as Watson’s, as he believed that animals do have a mind that influences behaviour; however, he believed it was more useful to study observable behaviour rather than internal mental processes.

The type of learning described by Skinner is called **operant conditioning** because animals and people learn to operate in their environment to produce desired consequences. An operant is a response that occurs without any stimulus – this is a **voluntary behaviour** that acts upon the environment in the same way each time. For example, your operant when driving through a 40-kilometre-per-hour school zone is the behaviour of slowing down.

operant conditioning

a type of learning in which behaviour becomes controlled by its consequences

voluntary behaviour

an action that is controlled by the person or animal performing it

The consequence you are trying to avoid is a fine, which acts as a negative reinforcement. By slowing down, you avoid the negative consequence, which reinforces the behaviour of driving at a reduced speed in school zones (Figure 1).

The operation of the “Skinner box”

The device in Figure 2 is called a Skinner box. It was designed and used by B. F. Skinner in his operant conditioning experiments, hence its name. It is also known as an operant conditioning chamber used to study animal behaviour.

It operates based on the following:

- 1 Box set-up:** The box contains a lever or key that the animal can press. It also includes a mechanism to deliver rewards (e.g. food) or punishment (e.g. a mild electric shock).
- 2 Behaviour and reinforcement:** When an animal, such as a rat or pigeon (like in Skinner’s original study), is placed inside the box, it may accidentally press the lever or peck the key. If pressing the lever/key results in a reward (positive reinforcement), the animal is more likely to repeat the behaviour. Conversely, if the lever pressing stops an unpleasant stimulus (negative reinforcement), the animal is more likely to repeat the behaviour to avoid the discomfort.
- 3 Behaviour and punishment:** When an animal inside the box presses the lever and it delivers a mild shock (positive punishment), the animal will learn to avoid pressing the lever.
- 4 Schedules of reinforcement:** The timing and frequency of the reinforcement can also be manipulated (e.g. reward given every second time the lever is pressed). These schedules help researchers to understand how different patterns of reinforcement affect learning and behaviour. For example, in Skinner’s original study with pigeons (1948), the rate of reinforcement (how often the food was presented with lever/key pressing) played a significant role: shorter intervals between food presentations led to more rapid and defined conditioning of the learnt behaviour.



FIGURE 1 Driving at 40 kilometres per hour in a school zone is a voluntary behaviour you engage in to avoid a negative consequence (a fine).

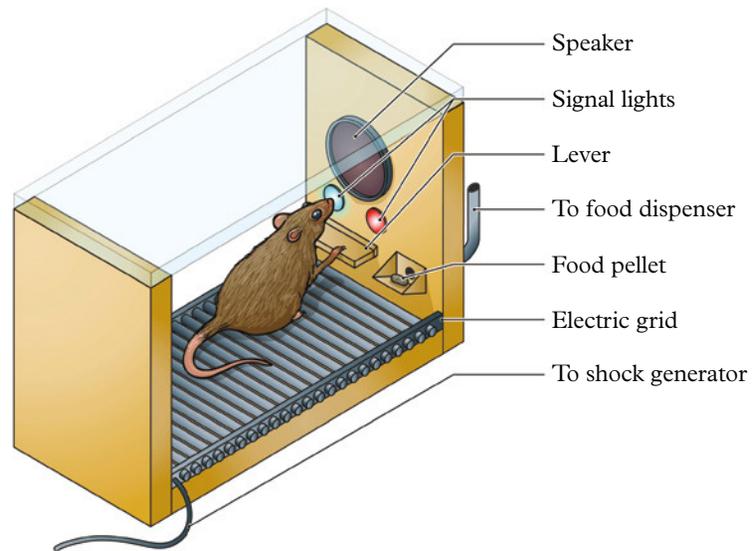


FIGURE 2 Skinner box set-up

three-phase model (ABC of operant conditioning)

the assumption that the antecedent makes the conditions right for the behaviour to follow and be encouraged or discouraged by its consequences

The ABC of operant conditioning

One thing that Skinner noticed was that the conditions needed to be right before the behaviour occurred. This can be referred to as the **three-phase model (ABC of operant conditioning)**: the **A**ntecedent (the environment or discriminative stimulus) that makes the

conditions right for the **B**ehaviour (also referred to as an operant behaviour) to follow and be reinforced (or extinguished) by its **C**onsequences. Figure 3 uses an example to summarise the three-phase model.

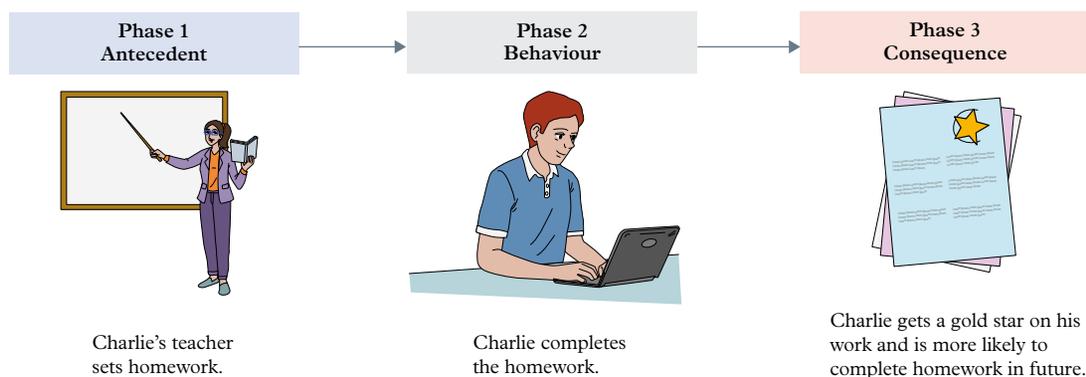


FIGURE 3 The three-phase model, or ABC, of operant conditioning

Skinner used the term **discriminative stimulus** to describe the antecedent (or the condition that influences behaviour by predicting the likely outcome of a behaviour). A good example of a discriminative stimulus is when person Y wants to ask person Z out on a date. If Z has smiled at Y, laughed with Y, and Z's body language generally has shown encouragement, Y may be more likely to show the behaviour (asking) that will lead to the consequence (Z accepting the invitation) (Figure 4). The identification of the antecedent as a discriminative stimulus is important when we come to consider stimulus generalisation and stimulus discrimination in operant conditioning.



FIGURE 4 The antecedent is the man in yellow smiling at the man in green. The behaviour is the man in green asking out the man in yellow. The consequence is the man in yellow saying "Yes!"

Challenge

Consequences

Identify the behaviour and the consequence for each of the following scenarios.

- 1 Your blind friend's guide dog stops at the edge of the pavement until there are no cars passing.
- 2 You bring your partner a special card for your 6-month anniversary and you get a huge, loving hug.
- 3 Your parents offer to give you \$50 for every assessment in which you get an A+; you work very hard!
- 4 You are training for more than 4 hours each day to get into the AIS swimming squad.
- 5 When you first got your P-plates, you were excited to drive to all your friends' houses. A few weeks later, you got a letter saying you had been "pinged" by a speed camera for doing 67 kilometres per hour in a 60-kilometre zone. You were fined over \$320 and you received one demerit point. Since then, you have become a very careful and observant driver.

Study tip

Applying a concept to a real-life example is a great way to support understanding of the concept.

discriminative stimulus

in operant conditioning, Skinner's term for the precondition that indicates that behaviour will be reinforced

Elements of operant conditioning: Reinforcement

Reinforcers and punishers are key elements in operant conditioning. They may be either positive or negative.

A **reinforcer** is any stimulus (action or event) that strengthens or increases the likelihood of a response (behaviour):

- **Positive reinforcement:** a reward that strengthens a response by providing a pleasant or satisfying consequence. If you take a bite of a delicious piece of cake, you are very likely to have another bite.
- **Negative reinforcement:** the removal, reduction or prevention of an unpleasant stimulus. If you wake up with a headache the day after a rock concert and are able to fix it by taking a headache tablet, it makes it very likely that you will take a headache tablet any time you want to get rid of a headache.

reinforcer

a stimulus or event that increases the likelihood of a response

positive reinforcement

a consequence that strengthens a response by providing a pleasant or satisfying outcome, increasing the likelihood that a behaviour will be repeated

negative reinforcement

the removal, reduction or prevention of an unpleasant stimulus in response to a behaviour, increasing the likelihood that a behaviour will be repeated

punisher

a stimulus that decreases the likelihood of a particular response recurring

positive punishment

a form of punishment that occurs when something undesirable is added to decrease the chance of the behaviour occurring again (e.g. being given extra chores at home for arriving home after curfew)

negative punishment (response cost)

a form of punishment that occurs when something desirable is removed to decrease the chance of the behaviour occurring again (e.g. removing a mobile phone if misused)

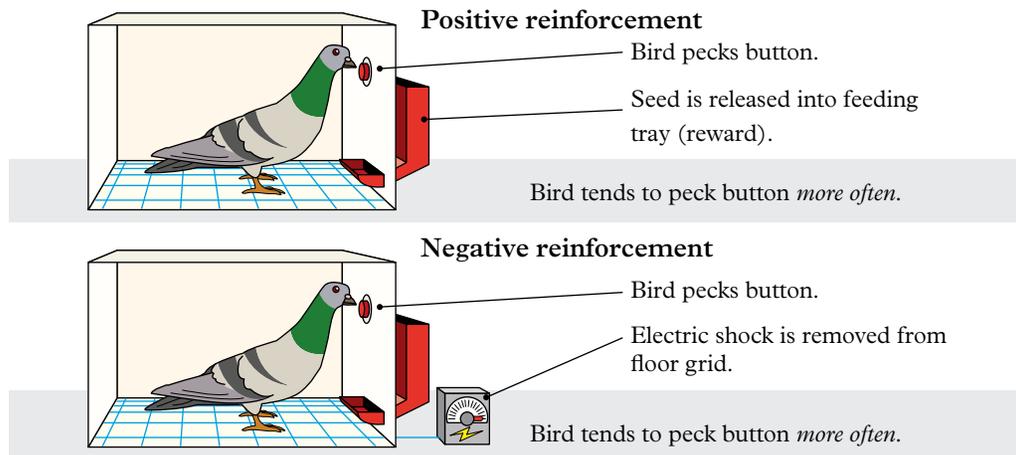


FIGURE 5 In B. F. Skinner's study, pigeons received positive reinforcement when seed (food) was released after they pressed a button. The pigeons received negative reinforcement when the floor was set with electric shocks, and they pressed the button to remove the shocks.

Elements of operant conditioning: Punishment

A **punisher** is any stimulus (action or event) that weakens or decreases the likelihood of a response (behaviour). Punishers are any consequences that lead to a decrease in a given response. The consequence does not need to be intended as a punisher! For example, a quiet student who is “fussed over” by the teacher every time she offers a response in class, may see such attention as threatening (punishing) rather than rewarding (reinforcing), as the teacher had probably intended.

- **Positive punishment** (sometimes just called punishment): a behaviour followed by a negative or undesirable experience. For example, if you stand up quickly in an aeroplane and bang your head on the overhead luggage locker, you will probably stand up more slowly and carefully next time! Other examples include a parent yelling at a child who has drawn on their bedroom wall or a mother cat picking up a kitten that has run away and shaking it.
- **Negative punishment** (sometimes called response cost): a form of punishment that entails something desirable being removed, such as being grounded (losing freedom), having your mobile phone taken away or being fined for speeding on the roads (losing money).

Positive punishment or negative reinforcement

Positive punishment is distinct from negative reinforcement. Positive punishment decreases the probability of the response, while negative reinforcement (like positive reinforcement) increases the probability of a response.

Although both negative reinforcement and positive punishment involve an unpleasant stimulus (e.g. a reprimand or a fine), it is considered punishment when this unpleasant stimulus follows the response (such as an inappropriate behaviour). It is considered negative reinforcement when the response (the behaviour) stops an existing unpleasant stimulus.

Several side effects result from punishment. Frustration, aggression and feelings of helplessness may develop in a person who is punished frequently, with the punished person feeling aggrieved and aggressive towards the person administering the punishment. For example, judges are sometimes targeted as victims by criminals they have sentenced to prison. Children may resent teachers or parents who have punished them – even if the punishment was fair and appropriate – and the effects on their interpersonal relationships may be wide-ranging and long-lasting. Figure 6 summarises the difference between negative reinforcement and punishment.

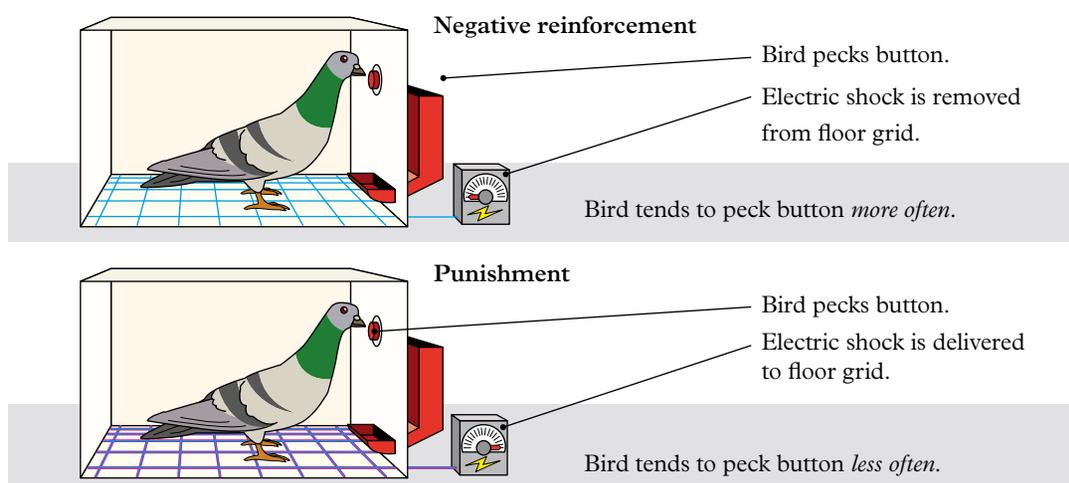


FIGURE 6 In B. F. Skinner's research, the pigeons were negatively reinforced to peck the button more to stop the unpleasant shocks from the floor. In a different scenario, the pigeons were punished with an electric shock, so they wouldn't press the button as much.

Punishment can also have unintended outcomes. Administering the punishment may be an outlet for the frustrations of the punisher. Sometimes punishment is administered because it makes the punisher feel better, not because the person being punished deserves it.

Effective punishment needs to be brief, immediate and linked to the undesired behaviour in the mind of the person (or animal) being punished. It is only effective if a positive behaviour can be developed to replace the negative behaviour.

effective punishment
punishment administered in such a way that it reduces the likelihood of the behaviour recurring

Identifying the elements of operant conditioning

Figure 7 is a flowchart that will help you identify the elements of operant conditioning.

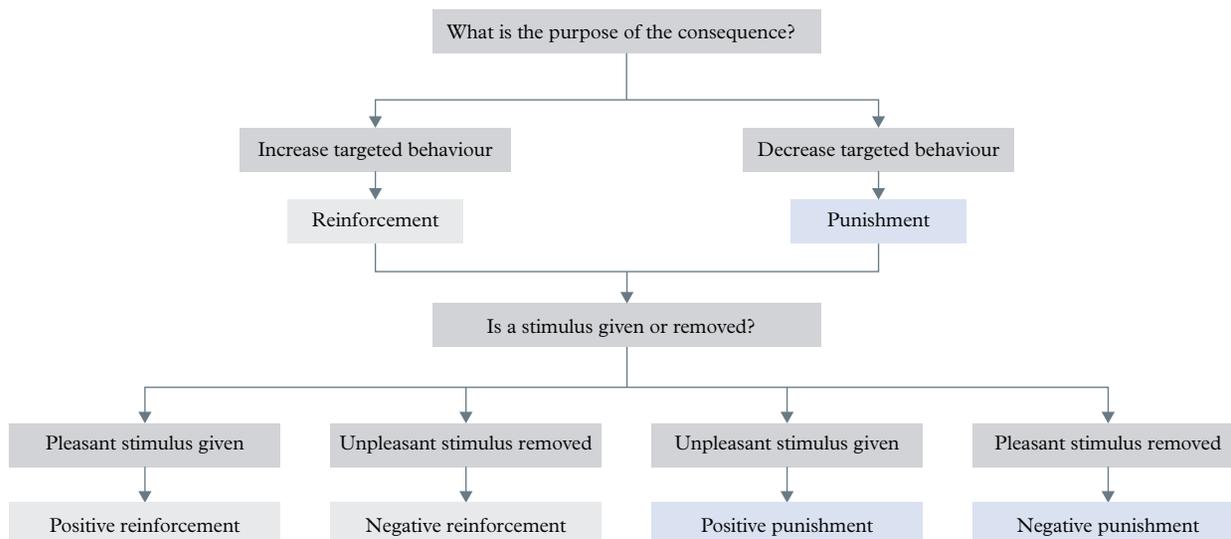


FIGURE 7 Use this flowchart to identify the elements of operational conditioning.

Stimulus generalisation and discrimination

stimulus generalisation

in operant conditioning, when a behaviour is displayed because of a discriminative stimulus that is similar to the original

stimulus discrimination

in operant conditioning, when a behaviour stops being applied to similar situations and only to the discriminative stimulus

In operant conditioning, the terms **stimulus generalisation** and **stimulus discrimination** refer to the antecedent (the discriminative stimulus).

Stimulus generalisation is where a behaviour is elicited as a result of a discriminative stimulus that is similar (but not identical) to the original. For example, your dog, who normally comes running when the electric can opener is used, might come running at the sound of the blender. Soon, if there is no reinforcement when responding to this noise, the dog will no longer act in this way with the blender, only with the can opener – the dog has learnt stimulus discrimination. An example of stimulus discrimination is the ability of sniffer dogs who have been trained to discriminate between illicit drugs and the smell of other items (e.g. clothing).

Extinction and spontaneous recovery

Extinction is when the conditioned response disappears over time after reinforcement has ceased. For example, a child might learn that their use of a bad word causes the adults around them to laugh. They continue this behaviour for weeks, until the child's mother tells the adults to stop laughing and ignore the bad behaviour.

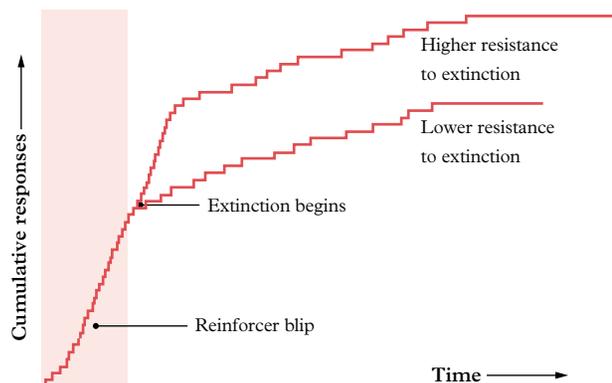


FIGURE 8 Extinction in operant conditioning

After another few weeks, the child no longer says the bad word for attention. The child has learnt a behaviour, which has later become extinct because they are no longer receiving reinforcement. Figure 8 shows the relationship between time, reinforcement of a behaviour and extinction.

Spontaneous recovery might occur if the child from the previous example starts to use that same bad word after a break, regardless of it not getting a reaction from adults.

Spontaneous recovery shows that extinction of a behaviour is not “unlearning”. Even though a behaviour or response might not occur for a time, it does not mean that the response has been forgotten. The spontaneously recovered response will usually be stronger after a significant rest period rather than immediately after the extinction process.

Check your learning 9.3



Check your learning 9.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** operant conditioning. (1 mark)
- 2 **Identify** the antecedent (A), behaviour (B) and consequence (C) in the following examples.
 - a You are driving to work, and see that the traffic light is red. You stop the car (and therefore avoid a traffic accident). (3 marks)
 - b You are cold. You put on a jumper and feel warm. (3 marks)
 - c Your mobile phone rings so you select “answer” and talk to your friend. (3 marks)
- 3 **Identify** which elements of operant conditioning (positive or negative reinforcement, positive or negative punishment) are present in the following scenarios.
 - a You pat your dog on the head when he sits on command. (1 mark)
 - b You receive a high score on your exam. (1 mark)
 - c Your mobile phone is confiscated after it rings during class. (1 mark)
- 4 **Describe** what is meant by extinction and provide an example. (2 marks)

- 5 **Describe** spontaneous recovery. (1 mark)

Analytical processes

- 6 **Distinguish** between positive reinforcement and negative reinforcement. (1 mark)
- 7 **Differentiate** between negative punishment and positive punishment. (1 mark)
- 8 **Differentiate** between the potential positive and negative side effects of punishment. (1 mark)
- 9 **Determine** whether reinforcement or punishment was used in this scenario: Ollie is a very obedient dog. When Ollie is told to sit, and successfully sits, Ollie is fed a treat. When Ollie does not sit, he is not fed the treat. (1 mark)

Knowledge utilisation

- 10 **Predict** what would happen if you were to suddenly stop rewarding your dog Charlie, who is 5 years old, each time she sat. (1 mark)
- 11 **Discuss** whether the use of punishment or reinforcement would be more successful in getting a student to study hard for each Psychology test. (2 marks)

Lesson 9.4

Social learning theory

Key ideas

- Social learning is a cognitive process that takes place in a social context that affects people's thoughts and behaviours.
- Vicarious conditioning occurs by observing the behaviours of others and the consequences that follow.
- Modelling is the process of the model demonstrating the behaviour being observed. It is a key process of observational learning, where the observer learns by watching the modelling and imitating the behaviours of the model.
- Bandura and colleagues performed the "Bobo doll" experiments where children showed vicarious conditioning.



Learning intentions and success criteria

Introducing social learning theory

You learnt a little about social learning theory in Lesson 9.1. We will consider it more closely here. We can learn by observing others. Observational learning is a method of social learning, particularly in children, involving attention, retention, reproduction, motivation and reinforcement. Further explanations of two types of observational learning, modelling and vicarious conditioning, are covered in this lesson.

Social learning theory describes the process by which social influences alter people's thoughts, feelings and behaviour. **Observational learning** is defined as the means of acquiring this social learning. Children develop their attitudes by observing those expressed by other people who are important to them – such as parents and teachers – and by the consequences they observe for these people when they express these attitudes. When the observer demonstrates the learnt behaviour by imitating it, this is referred to as modelling (Bandura, 1977).

The four principles of observational learning are as follows:

- 1 Learning occurs by observing the behaviour of others and the consequences of those behaviours.
- 2 Learning can occur without there being an immediate change in behaviour – it can remain latent.
- 3 Cognition plays a role in observational learning because the learner has awareness and expectations of future reinforcements or punishments, and these can influence whether the learnt behaviour will be demonstrated.
- 4 Observational learning is a link between the behaviourist theories of learning (classical conditioning and operant conditioning) and cognitive learning theories.

The process of observational learning

In observational learning, as in operant conditioning, the learner plays an active role in the learning. There are five key processes that are necessary for observational learning: attention, retention, reproduction, motivation and reinforcement.

observational learning

where a person learns by watching the behaviour demonstrated by another

Attention

Attention must be paid to the **model's** behaviour and its consequences. This is a cognitive aspect of observational learning. For example, a child (learner) might concentrate on a parent (model) making pancakes for breakfast if they want to learn to do this for themselves (Figure 1). Attention can be influenced by characteristics of the learner (observer) such as their attention level, age and cognitive developmental stage. It is also important to consider characteristics of the model – if the learner likes the model and wishes to be like them, the learner is likely to pay careful attention. The observational learning process can also be influenced by characteristics of the event. For example, if the consequence of the behaviour of making pancakes is enjoyment from eating them, then the child is more likely to pay close attention to learning the cooking process.



FIGURE 1 Children learn by imitation. This child is learning to make pancakes by watching her father.

Retention (in memory)

The learnt behaviour must be stored in memory as a **mental representation** (understanding of what to do in the mind of the learner) so that the observed learning can be utilised at a later time. This is also a cognitive aspect of observational learning because the memory must be stored and later retrieved to reproduce the behaviour. For example, the child might remember the ingredients and procedure for making pancakes.

model
someone we respect or look up to (e.g. a parent, teacher, friend or loved one)

mental representation
a cognitive process where information is stored in memory for later retrieval and use

Reproduction (of the behaviour)

Note that the learner does not necessarily perform this behaviour at this time. Reproduction simply means that they have the physical and intellectual ability to convert these mental representations into actions. For example, the child must be old enough to be able to use the kitchen equipment for making pancakes.

Motivation

The learner must want to imitate the learnt behaviour. This will depend on whether the learner believes that there will be a desirable consequence (reinforcement) for reproducing it.

Reinforcement

When there is the prospect of a positive result for imitating the behaviour (that is, a reward for the learner), it is more likely that the learner will do so. In contrast, if there is a prospect of punishment for reproducing the learnt behaviour, it is less likely that the behaviour will be imitated. For example, the child must perceive that praise will be given for making the pancakes or that there will be pleasure in eating the pancakes.

Reinforcement influences the likelihood that a learner will imitate an observed model's behaviour. The expectation of reinforcement or punishment influences the cognitive processes of the learner (observer) and this affects how well the learner pays attention to and retains the memory of the model's behaviour. Reinforcement for imitating the model's behaviour can come from several sources:

- The model: A parent (the model) praises the child for imitating the parent's behaviour.
- A third person: The learner (observer) might have imitated the behaviour of another person, such as a television personality or leader, but receives praise for the behaviour from a parent or teacher.

vicarious reinforcement

a theory that individuals are more likely to engage in a behaviour or activity if they witness another individual being rewarded for that activity or behaviour

- Personal: The learner (observer) receives satisfying consequences as a result of imitating the model's behaviour.
- **Vicarious reinforcement:** Positive consequences received by the model increase the likelihood of the learner (observer) imitating the model's behaviour, whereas negative consequences for the model's behaviour decrease the likelihood of the learner imitating the model's behaviour.

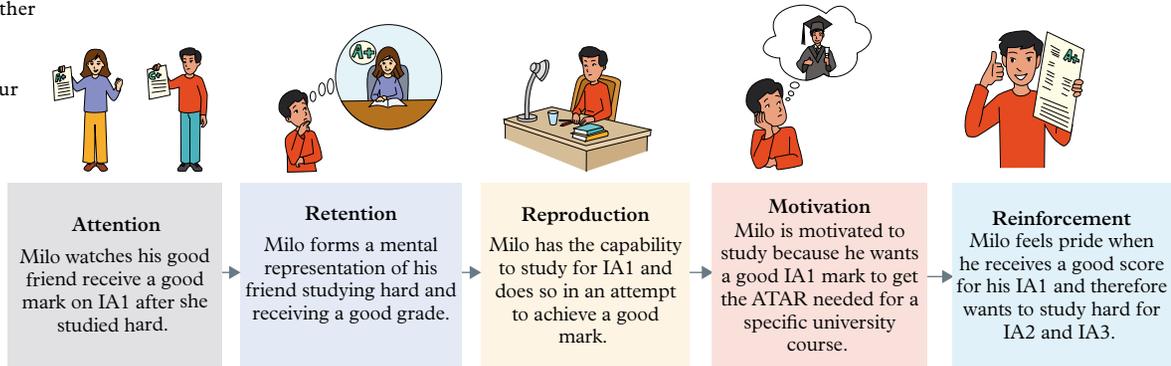


FIGURE 2 The key stages of observational learning using an example

Challenge**Monkey see, monkey do**

This common saying can be applied to observational learning. Have you ever been told that you did something just like your mother, father, older sibling or best friend? Use your understanding of observational learning to **develop** an explanation for this and **create** a research question to explore observational learning.

Challenge**Neurons and observational learning**

Research has indicated that, for observational learners, some of the same neurons are active when observing the learning of others as when the observer is conducting the same behaviour themselves. When a model receives conditioned reinforcers for a behaviour, similar neurons in the observer's brain also strengthen (Carlson et al., 2007). **Explain** the process of observational learning in learning to ride a bike.

Modelling

modelling

the process of the model demonstrating a behaviour that is being observed

In observational learning, a model is someone who we respect or look up to; this can be a parent, teacher, friend or loved one. **Modelling** is the process of the model demonstrating a behaviour that is being observed. This is often described as a learning technique, when a person copies the behaviour or attitude demonstrated by the model. For example, most people learn to use cutlery by observing other people using it. Similarly, it is common for children to spend many years as a passenger in a car observing their parents' driving. Unlike traditional learning theories that emphasise direct reinforcement, social learning theory highlights the importance of observational learning.

Vicarious conditioning

Vicarious conditioning is a form of social learning theory that occurs through observing the consequences of others' actions. Unlike direct conditioning, where a person experiences the consequences of their own actions, vicarious conditioning involves learning from the observed outcomes of another person's behaviours. For example, if you see your sibling being rewarded for completing their homework, you may be more likely to do your own homework to receive similar rewards (Figure 3). Conversely, if you observe your sibling losing access to their phone for not doing their homework, then you are less likely to not complete your homework.



FIGURE 3 If you see your sibling rewarded for completing homework, you may be more likely to complete your own.

vicarious conditioning
a type of learning that occurs through observing the behaviours and consequences experienced by others

Vicarious reinforcement

Vicarious reinforcement is the idea that we are more likely to engage in a behaviour or activity if we see someone being rewarded for that behaviour. It also states that we are less likely to engage in an activity or behaviour if we see someone being punished for that behaviour. There are two types of vicarious reinforcement: **positive vicarious reinforcement** and **negative vicarious reinforcement**.

For example, while you and your best friend are conducting an experiment, you start to be lazy and let your best friend do all the work. Your teacher notices this, and rather than telling you off for not doing the work, your teacher praises your friend for the great work they are doing. From watching this happen, you learn that participating in the experiment will make your teacher compliment you, so you start to participate in the activity. In this instance, you have experienced positive vicarious reinforcement.

Alternatively, you and your best friend might be sitting at the back of the class playing on your phones. Your teacher catches your best friend and tells them off (Figure 4). You see this happen, and before you can get caught too, you learn that this is not acceptable and so you put your phone away. In this scenario you have experienced negative vicarious reinforcement.

Vicarious reinforcement is successful because it allows us to have an expectation for the result of our behaviour before we engage in it. We are more likely to imitate someone who we respect and look up to, or someone who has a characteristic that we would like to have, such as having lots of friends, or doing really well on every test at school.



FIGURE 4 If you see your friend being told off for using their phone in class, you are likely to stop using yours in class too.

positive vicarious reinforcement

an individual witnesses another being rewarded for a behaviour and decides to act in the same way

negative vicarious reinforcement

an individual witnesses another being punished for a behaviour so discontinues that behaviour themselves

Vicarious conditioning and the “Bobo doll” experiments

Background

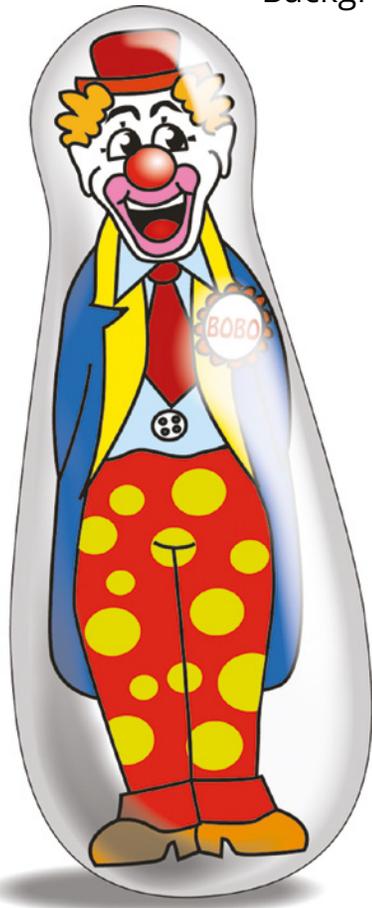


FIGURE 5 The Bobo doll is an inflatable toy about 1.5 metres tall, designed to spring back upright when knocked over.

In the 1960s, psychologist Albert Bandura and his colleagues conducted a series of experiments where they observed that children appeared to learn by watching the behaviour of others. Bandura’s experiments have become classic studies and are known as the “Bobo doll” experiments because they involved a large, inflatable plastic doll named Bobo that was about 1.5 metres high and designed to spring back upright when knocked over. In these experiments, the children were shown an adult (the model) behaving aggressively to a Bobo doll – hitting it, throwing it, sitting on it, etc. The children were then placed in a room alone with a Bobo doll and their behaviour was observed. There was evidence that learning had occurred when the children behaved aggressively to the Bobo doll, just as they had observed the model doing.

The results of the Bobo doll experiments led Bandura to develop social learning theory, in which he acknowledged the importance of classical conditioning and operant conditioning in learning, but added that learning also occurred through direct observation or observational learning (Bandura, 1977).

Albert Bandura and his colleagues, Dorrie and Sheila Ross (Bandura, 1977; Bandura et al., 1961, 1963a, 1963b), conducted a series of experiments at Stanford University that revolutionised the field of research in learning and aggression.

They hypothesised that children learn from the behaviour of trusted adults. Bandura and colleagues identified three primary models of observational learning: live models, where an actual person demonstrates a behaviour; verbal instructional models, where behaviours are described or explained; and symbolic models, where behaviours are depicted in media such as books, films or television. One of these experiments (Bandura, 1965) is outlined.

Bandura’s 1965 experiment

This experiment involved a similar experimental design and procedure to the earlier Bobo doll studies, but explored how different consequences for the model’s behaviour affected the children’s imitation of aggression. In this study, the conditions were that each group of children was shown one of three films. Each film showed an adult punching, kicking and verbally abusing the Bobo doll.

- Group 1: The aggressive model was rewarded with lollies, soft drink and praise from another adult.
- Group 2: The aggressive model was punished by spankings and verbal criticism from another adult.
- Group 3: The aggressive model received no consequences whatsoever.

After viewing their film, each child was placed alone in a room with a one-way mirror and observed by the researcher. Some children were offered rewards as incentive for imitating the aggressive behaviour while others were offered no reward or incentive.

The children who watched the aggressive model either being reinforced (Group 1) or experiencing no consequences (Group 3) imitated the model’s aggressive behaviour more than the children who had watched the aggressive model being punished (Group 2). However, when a reward was offered to the children as incentive, even those who saw the model punished tended to imitate the model’s behaviour. This study highlighted the

powerful influence of observed consequences on behaviour – vicarious conditioning – reinforcing the idea that children learn not only by observing others but by also considering the outcomes of those behaviours.

Application of social learning

Observational learning means that role models (both fictional and real) are powerful sources of influence on the behaviour of others, especially impressionable people, including children. This helps to explain why physical punishment might lead to aggressive behaviour on the part of those who were punished; for example, parents who physically punish their children may unintentionally be modelling aggressive behaviour that their children will imitate. Another SLT application is the potential of children learning aggressive behaviours from various media sources, such as the game Fortnite. Players of this game see violence as a means to win, and children may mimic this behaviour in real life to gain social status among peers. Examples where models can influence the positive behaviour of observers include parents reading to their children, demonstrations of problem-solving, moral thought and behaviour, and appropriate social behaviour.



FIGURE 6 In Bandura's 1965 experiment, children were more likely to imitate the aggressive model when it was rewarded or when there was no consequence.

Real-world psychology

Role models

Adolescence is a critical period when young people search for their identity, often turning to social media to find role models they admire and imitate. According to Robert Merton, a role model exemplifies how a behaviour associated with a certain role is successfully performed (Morgenroth et al., 2015). Research indicates that teenagers seek out role models with positive identities or appealing images (Hurd et al., 2009; Johnson et al., 2016; Struchen & Porta, 1997). They often choose role models who share similar goals and aspirations, especially if these role models demonstrate behaviours that lead to success. Role models do not need to be perfect; they can inspire by sharing their personal stories of overcoming adversity and achieving their dreams. For instance, Queensland Paralympian snowboarder Simon Patmore (Figure 7), who won Australia's first Winter Paralympics gold medal in 16 years at the 2018 Winter Paralympics, and surfer Sean Pollard, who competed in the 2018 Winter Paralympics after losing his left arm and right hand, both serve as powerful examples of resilience and determination.

Role models can also come from a young person's immediate social and family circles, such as parents, siblings, teachers or coaches. Australian research has shown that older siblings can influence younger siblings' attitudes towards drinking and sexual practices (Burton et al., 2018). This process, known as vicarious conditioning, is a form of social learning where individuals learn by observing the consequences of others' behaviours. Public figures, such as sports people, political figures, actors or musicians, can also serve as role models. For example, an Indigenous sporting group in Victoria identified senior players as role models who demonstrated respect, responsibility and resilience (O'Brien et al., 2009). Retired NRL player Johnathan Thurston is another role model for Indigenous youth, actively supporting educational initiatives like Deadly Kindies, which promotes early childhood education and health for Aboriginal and Torres Strait Islander children. Through their actions and stories, role models can significantly influence teenagers' aspirations, goals and lifestyle choices.

Apply your understanding

- 1 **Define** “role model”. (1 mark)
- 2 **Describe** an example of vicarious conditioning. (1 mark)
- 3 **Explain** why role models might have positive influences on teenagers’ behaviour. Give an example to illustrate. (2 marks)



FIGURE 7 Simon Patmore won gold at the 2018 Winter Paralympics.

Check your learning 9.4



Check your learning 9.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Explain** social (observational) learning theory. (2 marks)
- 2 **Describe** modelling and give an example. (2 marks)
- 3 **Describe** vicarious conditioning and give an example. (2 marks)
- 4 **Explain** how Bandura’s concept of social (observational) learning contributes to our understanding of behaviour acquisition. (2 marks)

Analytical processes

- 5 **Compare** modelling and vicarious conditioning. (2 marks)
- 6 **Differentiate** positive vicarious reinforcement and negative vicarious reinforcement. (1 mark)
- 7 **Contrast** observational learning and operant conditioning. (1 mark)

Knowledge utilisation

- 8 **Assess** the role of modelling in social learning theory. (2 marks)

Lesson 9.5

Comparing learning theories

Key ideas

- Classical conditioning, operant conditioning and social learning share similarities, but each also has unique features.
- Classical conditioning is a behaviourist learning theory involving an association of a stimulus with a learnt response.
- Operant conditioning is a behaviourist learning theory where a behaviour becomes controlled by its consequences.
- Social learning theory involves observational learning and describes the way in which people learn behaviours by observing models.



Learning intentions and success criteria

Learning as a lifelong process

As a child, learning is often considered in the context of learning new skills and gathering new information about our world. As we get older, learning is often considered as a purely academic pursuit. However, psychologists view learning as a lifelong process that reflects any change in our behaviour or response that is enduring in nature (Burton et al., 2018). Learning on any level involves the processing of different kinds of information, whether it be in response to triggers in our environment, or as a consequence of our behaviour and experiences.

Our social environment and the context of the learning experience are also important to how we learn. As students, parents, teachers, coaches and even as consumers, it is important that we can differentiate between the different forms of learning and decide which form best suits the context of our learning. In this section we will compare the three forms of learning we have discussed in this module: classical conditioning, operant conditioning and social (observational) learning.



FIGURE 1 Learning is a lifelong process. The role of the learner, and the type of learning, changes with age.

Comparing the different theories

Although classical conditioning and operant conditioning share similarities (i.e. learning is based on associations between a behaviour and an event in the environment), the major difference is whether the response is involuntary (a reflex) or voluntary (the learner has control over the response). The order of the stimulus and response, and whether the stimulus is pleasurable or not, are also important for the learning outcome (i.e. whether the behaviour is repeated or avoided). The role of the learner also varies between the different approaches to learning. The motivation of the learner and their previous social experiences can also influence social learning. We explore the similarities and differences between the three learning approaches – classical conditioning, operant conditioning and social learning – in Table 1.

TABLE 1 A comparison of classical conditioning, operant conditioning and social learning theories

| Learning theory | Classical conditioning | Operant conditioning | Social (observational) learning |
|------------------------------------|--|---|---|
| Key researcher | Ivan Pavlov | B. F. Skinner | Albert Bandura |
| Basic learning process | Learning through association | Learning through consequences | Learning through observation and/or imitation |
| Acquisition | By pairing of a neutral stimulus (NS) with the unconditioned stimulus (UCS) | By reinforcing a behavioural response | By observation of a model |
| Extinction | By conditioned presentation of the conditioned stimulus (CS) alone | Occurs when the behaviour does not receive reinforcement | Occurs when the behaviour being observed no longer receives attention, praise or the desired outcome |
| Stimulus generalisation | Conditioned response (CR) occurs when a stimulus similar to the conditioned stimulus (CS) is presented | Refers to discriminative stimulus (antecedent condition): when the behaviour occurs in an environment similar to that which led to reinforcement | |
| Stimulus discrimination | After several trials when a stimulus similar to the CS is presented but never associated with the UCS – CR only occurs with CS | When the behaviour is never reinforced in environments that are similar to the discriminative stimulus; eventually, the behaviour occurs only when the discriminative stimulus is present | |
| Spontaneous recovery | When CR has been extinguished and after a time delay, CS is presented and again elicits CR | After the response has been extinguished and after a time delay, if discriminative stimulus occurs, behaviour will again be shown | |
| Role of the learner | Passive: (reflexive) behaviour occurs without any deliberate action from the learner | Active: the behaviour must be initiated by the learner | As with operant conditioning |
| Timing of stimulus/response | Stimulus occurs before response (reflexive behaviour) | The closer in time the reinforcement or punishment follows the behaviour, the stronger the association | With no reinforcement and no further modelling for several trials, the environment will not elicit the response |
| Nature of response | Reflexive: the learner has no control over the behaviour (involuntary) | Voluntary: the responses are intentional actions | Active: the behaviour must be initiated by the learner |
| Strengths | Explains how certain automatic responses are learnt | Effective in behaviour training and modification through reinforcement and punishment | Recognises the role of cognitive processes and social influences in learning |
| Limitations | Limited to automatic, reflexive behaviours and neglects the cognitive, emotional and social factors of learning | Neglects the cognitive, emotional and social factors of learning | Unable to fully explain learning without direct observation |
| Underlying theory | Behaviourism | Behaviourism | Social and cognitive psychology |

Differences between the theories

Direct versus indirect learning

While operant conditioning emphasises the importance of the organism's direct experience when learning, social (observational) learning suggests that learning can occur indirectly through observation. For example, an employee who sees a colleague receive a promotion for hard work might also begin to work harder to receive a promotion.

Observable versus unobservable evidence of learning

Unlike operant conditioning, in social (observational) learning there is a distinction between learning and performance. In social learning, learning can occur but is not necessarily demonstrated or observed unless there is a motivation for the organism to demonstrate the learnt behaviour. There are many examples where people have learnt through observation but never actually performed the learnt behaviour. Therefore, a distinction is made between the acquisition and performance of a behaviour that has been learnt through observation.

The role of cognition in learning

Unlike operant and classical conditioning, social (observational) learning includes the role of cognition (thinking and memory) in the learning process. In observational learning, the learner must attend to a model's behaviour and its consequences, and then store a mental representation of it. Classical conditioning is a passive process where a neutral stimulus becomes associated with an unconditioned stimulus to elicit a conditioned response. This type of learning also deals with automatic, reflexive responses such as salivation and fear, whereas social learning theory highlights the role of cognition and social context.

Similarities between the theories

Active learning: The role of the learner

Social (observational) learning is similar to operant conditioning in that the learner is active in both of these learning processes. For example, the employee who observes a colleague being rewarded with a promotion for hard work will deliberately work hard or change their working habits so that they might also be rewarded with a job promotion.



FIGURE 2 The learner is active in both operant conditioning and social learning.

Reinforcement

As with operant conditioning, in social (observational) learning it is reinforcement rather than the learning itself that influences the likelihood of the observed behaviour being imitated. If the learner observes a model receiving a favourable consequence for the behaviour, the learner will be more likely to imitate their behaviour. This is known as vicarious conditioning, where an observer learns the consequences of a behaviour by observing its consequences for another.

However, what is more important to the likelihood of the behaviour being imitated is the learner's perception that imitation will result in a positive reinforcer. The employee who observes a hard-working colleague receiving a promotion would be more likely to reproduce the same hard-working behaviour as the colleague if they thought there was a chance to also receive a promotion.

Stimulus and response

Social learning theory (SLT) and classical conditioning share several similarities despite having different mechanisms. Both emphasise the role of the environment in shaping behaviour and support the idea that behaviour can be learnt through experience rather than being purely innate.

Both learning theories involve the concept of stimulus and response, with classical conditioning through direct associations between stimuli, and SLT through observed consequences of others' actions.

TABLE 2 Comparing social (observational) learning, classical conditioning and operant conditioning

| | Classical conditioning | Operant conditioning | Social (observational) learning |
|--|--|---|---|
| Direct versus indirect learning | Direct | Direct | Indirect |
| Observable versus unobservable evidence of learning | Observable | Observable | Not observable unless the organism is motivated by a stimulus to display the learning that has occurred via observation and retention |
| The role of cognition in learning | No cognition (reflexive) | Cognition is not always necessary | Cognition is necessary |
| Active learning: the role of the learner | Passive | Active | Active |
| Reinforcement of the learner | Increases likelihood of the learner associating two stimuli (e.g. bell and food) | Increases likelihood of the learner repeating the learnt behaviour to obtain a positive outcome | Increases likelihood of the learner repeating the learnt behaviour to obtain a positive outcome |

Challenge

What is the best type of learning?

Now that you have learnt about classical conditioning, social (observational) learning and operant conditioning, consider whether one is the “best” type of learning. You will need to consider if each learning theory serves a different purpose or if they achieve the same goal. For example, you may want to think about how you learnt to open doors, sit down, use a pen, use cutlery and what not to do. **Construct** a brief argument that determines if one theory is better than the others or if they are all equally important.

Check your learning 9.5



Check your learning 9.5: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** classical conditioning. (1 mark)
- 2 **Describe** operant conditioning. (1 mark)
- 3 **Describe** social learning theory. (1 mark)

Analytical processes

- 4 **Compare** classical conditioning and operant conditioning. (2 marks)
- 5 **Contrast** classical conditioning and social (observational) learning theory. (1 mark)
- 6 **Critique** Pavlov’s study and Bandura’s Bobo doll experiments. (4 marks)
- 7 **Discriminate** between operant conditioning and social (observational) learning theory. (1 mark)

Knowledge utilisation

- 8 Your psychology teacher is introducing the new concept “bystander intervention” to your class in a few weeks’ time. She uses a variety of methods to support your learning: a lecture with slides; a practical where students tested a hypothesis by collecting primary data to process and analyse; a group discussion to reflect on their findings; and a quiz at the end of the week. **Discuss** the methods of learning used and how they link to the different learning theories. (4 marks)
- 9 **Predict** which type of learning would best help someone learn to use cutlery. (1 mark)

Lesson 9.6

Review: Learning

Summary

- 9.1
- Behaviourism emphasises the role of environmental factors in shaping behaviour.
 - Classical and operant conditioning are behaviourist approaches to learning.
 - Social and cognitive psychology are ignored in behaviourism and contribute to the social learning theory.
- 9.2
- Classical conditioning is a three-phase process through which a neutral stimulus becomes involuntarily associated with an unconditioned stimulus, leading to the development of a conditioned response.
 - Learnt behaviours acquired through conditioning can be extinguished if the conditioned stimulus is repeatedly presented without the unconditioned stimulus.
 - Previously extinguished behaviours can spontaneously recover if the conditioned stimulus is presented again after some time, although usually weaker.
 - Stimulus generalisation occurs when an organism responds to stimuli that are similar to the original conditioned stimulus, whereas stimulus discrimination is the ability to discern and respond to only the conditioned stimulus and not similar stimuli.
 - A learnt fear response is a reaction to a perceived threat that has been conditioned through past experiences.
- 9.3
- The three-phase model of operant conditioning involves: the **A**ntecedent that makes the conditions right for the **B**ehaviour to follow and be reinforced (or extinguished) by its **C**onsequences.
 - The elements of operant conditioning involve reinforcers and punishers.
 - Stimulus generalisation and stimulus discrimination are part of the antecedent phase of operant conditioning.
 - The “Skinner” box was used in training animals to perform certain voluntary behaviours.
- 9.4
- Social learning is a cognitive process that takes place in a social context that affects people’s thoughts and behaviours.
 - Vicarious conditioning occurs by observing the behaviours of others and the consequences that follow.
 - Modelling is the process of the model demonstrating the behaviour being observed. It is a key process of observational learning, where the observer learns by watching the modelling and imitating the behaviours of the model.
 - Bandura and colleagues performed the “Bobo doll” experiments where children showed vicarious conditioning.
- 9.5
- Classical conditioning, operant conditioning and social learning share similarities, but each also has unique features.
 - Classical conditioning is a behaviourist learning theory involving an association of a stimulus with a learnt response.
 - Operant conditioning is a behaviourist learning theory where a behaviour becomes controlled by its consequences.
 - Social learning theory involves observational learning and describes the way in which people learn behaviours by observing models.

Review questions 9.6A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

1 Who first described classical conditioning?

- A Carl Jung
- B Ivan Pavlov
- C B. F. Skinner
- D Sigmund Freud

2 “Before conditioning” involves a response to a stimulus that has not yet been conditioned. This can also be referred to as

- A the neutral stimulus that results in the unconditioned response.
- B the unconditioned stimulus that results in the conditioned stimulus.
- C the unconditioned response that results in the unconditioned stimulus.
- D the unconditioned stimulus that results in the unconditioned response.

3 After classical conditioning, learning not to respond to a stimulus that is similar but not identical to the conditioned stimulus is called

- A response generalisation.
- B stimulus generalisation.
- C response discrimination.
- D stimulus discrimination.

4 In classical conditioning, what is it called when the organism shows the conditioned response to a stimulus that is neither the original unconditioned stimulus nor the conditioned stimulus?

- A Response generalisation
- B Stimulus generalisation
- C Response discrimination
- D Stimulus discrimination

5 In the process of classical conditioning, which of the following is likely to occur when the conditioned stimulus and unconditioned stimulus are no longer paired?

- A The rate of responding will immediately decline.
- B The rate of responding will decline at first and then remain steady.
- C The rate of responding will remain constant for a few trials and then decline.
- D The rate of responding will become erratic at first and then show steady decline.

6 According to operant conditioning, extinction occurs

- A if reinforcement is discontinued.
- B if there is a change in reinforcement.
- C over time, even with continual reinforcement.
- D for the same period of time as that spent learning the behaviour.

7 Which of the following is a similarity between classical and operant conditioning?

- A Learning involving observation
- B A model is required for learning to take place
- C Associating stimulus with reward and punishment
- D An acquisition process whereby the response is conditioned or learnt

Use the following information to answer questions 8 to 11.

One day when Jimmy was 2 years old, his mother took him to the supermarket. Jimmy saw some chocolate frogs and started screaming, “Want frog! Want frog!” After 5 minutes of trying to ignore him, his mother went to the checkout and bought a chocolate frog, which she gave to Jimmy. Jimmy sat quietly in the trolley and ate the chocolate.



8 What will Jimmy receiving the chocolate frog likely lead to?

- A Jimmy will scream the next time he sees a chocolate frog.
- B Jimmy will scream for a frog next time they go to a supermarket.
- C Jimmy’s mother will feel stressed the next time she has to go shopping.
- D Jimmy will behave better on the next visit to a supermarket, hoping to be rewarded with a chocolate frog.

9 In terms of operant conditioning, what has Jimmy’s mother experienced?

- A Punishment for the action of taking Jimmy to the supermarket
- B Positive reinforcement for the action of giving Jimmy the chocolate frog
- C Negative reinforcement for the action of giving Jimmy the chocolate frog
- D Reinforcement for the action of taking Jimmy to the supermarket

- 10 The next week, Jimmy and his mother went shopping at a hardware store. As soon as he was put in the child seat in the trolley, Jimmy started screaming, “Want frog! Want frog!” In terms of operant conditioning, what was Jimmy exhibiting?
- A Response generalisation
 - B Stimulus discrimination
 - C Response discrimination
 - D Stimulus generalisation
- 11 When Jimmy and his mother went shopping at the hardware store, the entrance to the shop and being put in a trolley acted as a(n)
- A antecedent.
 - B predictive stimulus.
 - C generalised response.
 - D behavioural consequence.
- 12 A Grade 2 teacher has set up a star chart for her whole class. There is a long list of behaviours for which children can earn a star; and at the end of each day, they can exchange their stars for treats.
- A This system is a form of behaviour therapy and the stars are positive rewards.
 - B This system is a form of operant conditioning and the stars are positive reinforcers.
 - C This system is a form of operant conditioning and the stars are negative reinforcers.
 - D This system is a form of behaviour management and the stars are negative rewards.
- 13 Which of the following best describes vicarious conditioning?
- A Learning through repeated practice and reinforcement
 - B Learning through direct experience and personal consequences
 - C Learning by associating a neutral stimulus with an unconditioned stimulus
 - D Learning by observing the behaviours and consequences experienced by others
- 14 Which of the following best describes when a model is most effective in influencing an observer's behaviour?
- A Models are most effective when they are perceived as male by the observer.
 - B Models are most effective when they are perceived as similar or successful by the observer.
 - C Models are most effective when they are perceived as similar or male by the observer.
 - D Models are most effective when they are perceived as similar or female by the observer.
- 15 Which is the correct sequence for observational learning?
- A Attention, retention, reproduction, motivation, reinforcement
 - B Attention, retention, motivation, reproduction, reinforcement
 - C Attention, retention, reinforcement, reproduction, motivation
 - D Attention, retention, reproduction, reinforcement, motivation
- 16 Which of the following might be a definition of observational learning?
- A A form of learning in which the learner passively observes an action being performed
 - B A form of learning in which the learner watches another person perform a task and receive reinforcement for it
 - C A form of learning in which the learner observes another person performing a task and forms a mental representation of the action
 - D A form of learning in which the learner observes another person performing a task and later imitates the behaviour when appropriate

Review questions 9.6B Short response

Retrieval and comprehension

- 17 **Describe** the three-phase model of classical conditioning. (1 mark)
- 18 **Explain** what is meant by “extinction” in operant conditioning. **Use** an example in your response. (2 marks)
- 19 **Summarise** social learning theory. (2 marks)
- 20 **Explain**, using the language of classical conditioning, how Pavlov's dogs were conditioned to salivate at the sound of a bell. (2 marks)

21 Dorothy is teaching her cat, Whiskers, to stop scratching the furniture. Every time Whiskers scratches the furniture, Dorothy sprays him with water. However, when Whiskers sits calmly on his scratching post instead, Dorothy stops spraying him.

- a **Identify** the form of conditioning being used. (1 mark)
- b **Identify** the form of reinforcement being used. (1 mark)

22 For operant conditioning, **use** an example to show

- a stimulus generalisation (1 mark)
- b stimulus discrimination (1 mark)
- c spontaneous recovery. (1 mark)

23 **Explain** the following processes involved in observational learning using examples

- a retention (2 marks)
- b reproduction. (2 marks)

24 **Use** the diagram to show how an advertising firm could use classical conditioning with the unconditioned stimulus of a famous celebrity to help sell a new sports car. (4 marks)

Before conditioning

| | |
|-----------|-----------|
| NS _____ | |
| UCS _____ | UCR _____ |

During conditioning

| | |
|-----------|-----------|
| NS | |
| + | |
| UCS _____ | UCR _____ |

After conditioning

| | |
|----------|----------|
| CS _____ | CR _____ |
|----------|----------|

Analytical processes

- 25 **Distinguish** between positive and negative punishment. (1 mark)
- 26 **Consider** how watching glorified violence on television may impact a child's behaviour. (2 marks)
- 27 Gustav sometimes experiences headaches for which he takes paracetamol tablets. These work well and the headaches become much less severe. One day, he takes tablets and his headache clears as usual, but he later finds that he took sugar pills rather than paracetamol. **Determine**, using the language of classical conditioning, why Gustav's

headache may have been cleared by the familiar action of taking a tablet. (1 mark)

- 28 Mary wants to stop chewing her pencils. She wears a thick rubber band on her wrist and every time she feels that she is about to chew her pencil, she snaps the rubber band. This causes a sharp pain that makes her feel anxious. After a few weeks, she does not think about chewing her pencils as the thought is unpleasant for her. **Determine** how Mary has successfully used classical conditioning to help her stop chewing her pencils, and provide the term for this type of therapy. (2 marks)
- 29 **Differentiate** between social learning and operant conditioning. (1 mark)
- 30 **Compare** classical conditioning and operant conditioning. (2 marks)
- 31 **Explain** the concept of negative punishment using an example. **Consider** how this could be confused with negative reinforcement. (3 marks)

Knowledge utilisation

- 32 **Design** a method for training a dog to bark using the three-phase model of operant conditioning. (3 marks)
- 33 Negative reinforcement and positive punishment are often confused.
 - a **Identify** two ways in which negative reinforcement and positive punishment are different. (2 marks)
 - b **Demonstrate** these differences by giving an example of negative reinforcement and an example of positive punishment. (2 marks)
 - c **Discuss** the effectiveness of each for learning a new task. (2 marks)
- 34 Nuria wants to use social learning theory to teach her 5-year-old daughter Luciana how to tie her shoelaces. **Propose** how Nuria can use this learning theory to teach her daughter. (3 marks)
- 35 The "Little Albert" experiment breached some significant ethical guidelines. **Identify** what guidelines need to be used today, and **propose** an alternative method of conducting this research that does not breach any of them. (2 marks)

Data drill

Effectiveness of conditioning to train working dogs

Dr Smith wanted to test the effects of using classical conditioning and operant conditioning on training working dogs. An equal numbers of dogs (10 per condition) were randomly allocated to either an experimental group or a control group that received no formal training. Each experimental group learnt the same behaviours (e.g. rolling over on command, coming to heel when called, sit and lie on command).

After 3 months of training, the working dogs were tested on how well they completed the behaviours when asked to perform them by the trainer, and given a score out of 20. The results of each working dog group are shown in Table 1.

TABLE 1 Raw data of behaviours performed on demand by the dogs

| Experimental group A: Classical conditioning | Experimental group B: Operant conditioning | Control group C: No formal training |
|--|--|-------------------------------------|
| 17 | 16 | 8 |
| 19 | 17 | 8 |
| 18 | 15 | 10 |
| 17 | 15 | 9 |
| 17 | 16 | 8 |
| 17 | 14 | 12 |
| 18 | 15 | 11 |
| 19 | 15 | 8 |
| 20 | 16 | 9 |
| 19 | 16 | 10 |

TABLE 2 Mean score and standard deviation of each working dog group

| | Group A | Group B | Group C |
|--------------------|---------|---------|---------|
| Mean score | 18.1 | 15.5 | 9.3 |
| Standard deviation | 1.1 | 0.8 | 1.4 |

Apply your understanding

- 1 **Calculate** the range for Group B. (1 mark)

Analyse data

- 2 **Identify** one characteristic of the data that makes it appropriate to use the standard deviation as the measure of dispersion. (1 mark)
- 3 **Sequence** the standard deviation scores of the three groups from least reliable to most reliable. (1 mark)

Interpret evidence

- 4 **Draw a conclusion** from the results on the most effective training method for working dogs. **Justify** your conclusion with evidence. (2 marks)



Module 9 checklist: Learning

Topic 4 review

Multiple choice

(1 mark each)

- 1 Operant conditioning occurs when learning is acquired through
 - A rewarding desired behaviour.
 - B associating a NS with a UCS.
 - C modelling or observing behaviour.
 - D reinforcing behaviour through consequences.
- 2 In a classical conditioning experiment, if the UCS is no longer presented after a response is conditioned, what may occur?
 - A Extinction
 - B Stimulus generalisation
 - C Spontaneous recovery
 - D Stimulus discrimination
- 3 Classical conditioning involves the pairing of
 - A the CS and UCS.
 - B the UCS and UCR.
 - C the CS and the CR.
 - D the CS and the NS.
- 4 An important difference between negative reinforcement and punishment is that
 - A negative reinforcement strengthens a response, whereas punishment weakens a response.
 - B negative reinforcement weakens a response, whereas punishment strengthens a response.
 - C negative reinforcement always involves a pleasant consequence, whereas a punishment always elicits a response.
 - D negative reinforcement always involves an unpleasant consequence, whereas a punishment does not necessarily elicit a response.
- 5 If you teach a dog to sit at the sound of a bell but it also sits at the sound of a buzzer, this is called
 - A stimulus reflex.
 - B stimulus guessing.
 - C stimulus discrimination.
 - D stimulus generalisation.
- 6 The purpose of John Watson's "Little Albert" study was to show that
 - A latent learning can occur in children.
 - B a fear response could be classically conditioned.
 - C a phobia could be produced and also extinguished.
 - D operant and classical conditioning could achieve the same results.
- 7 Ivan Pavlov's theory of how people learn through association is called
 - A modelling.
 - B operant conditioning.
 - C classical conditioning.
 - D positive reinforcement.
- 8 An unpleasant stimulus that weakens behaviour by its removal is known as
 - A positive punishment.
 - B negative punishment.
 - C positive reinforcement.
 - D negative reinforcement.
- 9 Which of the following best describes vicarious conditioning?
 - A Learning through trial and error
 - B Learning through repeated practice
 - C Learning through direct reinforcement
 - D Learning through observing the consequences of others' behaviour
- 10 Operant conditioning and classical conditioning are similar because both
 - A involve learning through observation.
 - B require a model in order for learning to occur.
 - C involve associating stimulus with reward and punishment.
 - D involve an acquisition process whereby the response is learnt or conditioned.

- 11 B. F. Skinner's theory of learning by consequence is called
- A modelling.
 - B operant conditioning.
 - C classical conditioning.
 - D positive reinforcement.
- 12 According to the social learning theory, what is the process through which individuals learn by observing others?
- A Modelling
 - B Reinforcement
 - C Operant conditioning
 - D Classical conditioning
- 13 Which of the following scenarios best illustrates the concept of modelling in social learning theory?
- A A child learns to solve maths problems by practising repeatedly.
 - B A person learns to cook by reading a recipe book and following the instructions.
 - C An employee improves their performance by receiving feedback from their manager.
 - D A student learns to play the piano by watching tutorial videos and imitating the instructor's hand movements.
- 14 Which of the following statements best differentiates behaviourism from social and cognitive psychology?
- A Behaviourism focuses on internal mental processes, while social and cognitive psychology emphasise observable behaviours.
 - B Behaviourism and social psychology both ignore the role of reinforcement in learning, while cognitive psychology focuses solely on reinforcement.
 - C Behaviourism emphasises learning through environmental interactions, while social and cognitive psychology consider both environmental and cognitive factors.
 - D Behaviourism and cognitive psychology both prioritise the study of unconscious motivations, while social psychology focuses on conscious thought processes.

Short response

- 15 Much to his parents' despair, Shin loves to empty the kitchen cupboards whenever he is left alone in the kitchen. Each time his mum returns to the kitchen to find the mess her young son has created, she places him on a mat in the corner for 5 minutes.
- a **Identify** the type of conditioning Shin's mum is using in an attempt to change his behaviour. (1 mark)
 - b **Identify** the three components of the conditioning used in this scenario for Shin. (3 marks)
- 16 On Christmas Eve in 1974, Tropical Cyclone Tracey, one of the most destructive cyclones in Australia's history, struck Darwin. People sought shelter in the smallest room of their house because it was thought to be the strongest structurally. Therefore, many families huddled together in bathrooms as the cyclone destroyed the area. After the cyclone, some young children feared going to the bathroom. These children had learned to associate going into the bathroom with the occurrence of a cyclone.
- a **Identify** the following components of the classical conditioning described in the scenario.
 - i UCS (1 mark)
 - ii UCR (1 mark)
 - iii NS (1 mark)
 - iv CS (1 mark)
 - v CR (1 mark)
 - b **Describe** the process of extinction and suggest how long it may take for extinction to occur for these children. (2 marks)
 - c **Describe** stimulus generalisation and **identify** another stimulus that may trigger fear in the given scenario. (2 marks)
- 17 **Explain** stimulus discrimination in classical conditioning and provide an example. (2 marks)

- 18 Identify** whether each of the following scenarios describes positive punishment, negative punishment, positive reinforcement or negative reinforcement. Use your knowledge of operant conditioning principles.
- a** Students are given a free bottle of chocolate milk when they wear the correct uniform. (1 mark)
 - b** Sophie's mobile phone is taken away every time she swears in front of her parents. (1 mark)
 - c** Tom is grounded for a week by his parents because he arrived home after curfew. (1 mark)
 - d** Sarah is always sore after cross-country training in the morning. Ms McIvor suggests she does 10 minutes of light stretching after the run. Sarah does this and finds that by recess time she no longer feels sore. (1 mark)
 - e** Zach studies hard to avoid his parent nagging him over his poor grades. (1 mark)
- 19 Describe** the operation of the "Skinner box" used in an example of an operant conditioning study. (2 marks)
- 20** Many species of birds can be conditioned to avoid predators (animals that are likely to eat them) by pairing the sound of the predator with an unpleasant stimulus, such as a small electric shock. Over time, the birds learn that the sound of the predator alone (no shock) is dangerous.
- a Identify** the behaviourist approach to learning discussed in this scenario. (1 mark)
 - b Describe** the specific process of conditioning used to train the birds to avoid predators. (1 mark)

- 21 Describe** learnt fear responses and give an example of this from the "Little Albert" experiment. (2 marks)
- 22 Distinguish** between stimulus generalisation as described in operant conditioning and classical conditioning. Provide an example of each. (3 marks)
- 23 Distinguish** between modelling and vicarious conditioning. Give an example of each. (3 marks)
- 24 Contrast** negative and positive punishment and give an example of each. (3 marks)
- 25 Compare** operant and classical conditioning. (2 marks)
- 26 Compare** operant conditioning and social learning theory, and **discuss** their underlying theories of behaviourism, and social and cognitive psychology. (5 marks)
- 27 Discuss** classical conditioning and its underlying learning theory. (4 marks)

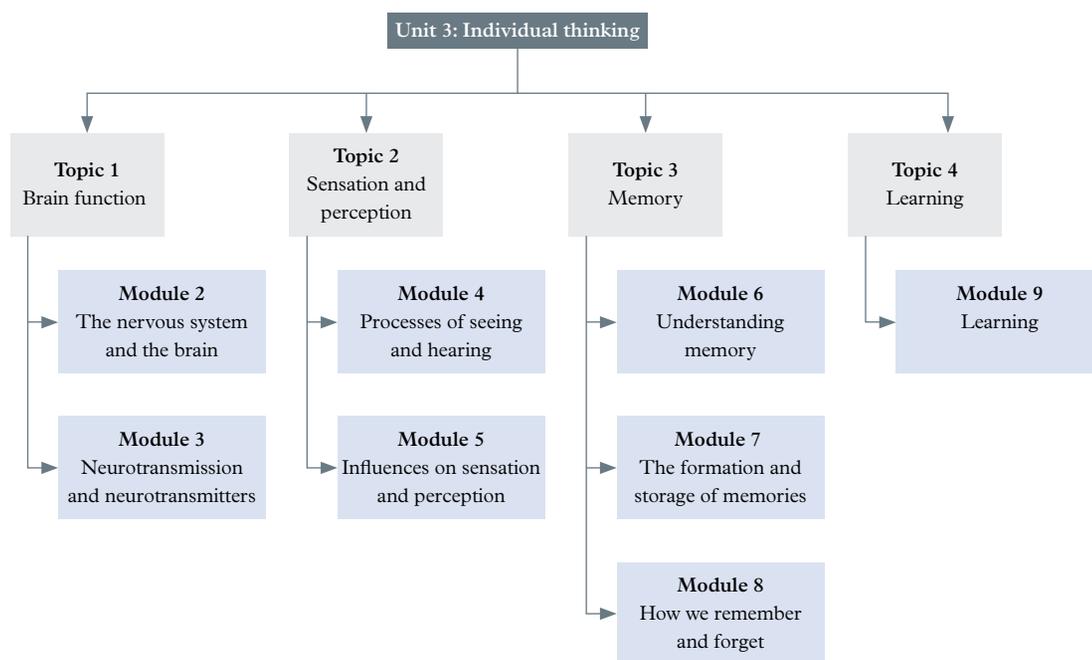
TOTAL MARKS
/60 marks

UNIT 3 Review

This unit review is designed to help you revise your understanding of key concepts for all the content covered in Unit 3, learn some expert tips for answering exam questions, and practise your skills answering a range of exam-style questions.

PART A: Revisit and revise

Part A of the Unit review asks you to reflect on your learning and identify areas in which you need more work. The chart shows all the topics in Unit 3 and where you can find information about them in your *Psychology for Queensland Units 3 & 4 Second edition* resource.



PART B: Exam essentials

Now that you've completed your revision for Unit 3, it's time to learn and practise some of the skills you'll need to answer exam questions like a pro! To help you, our expert authors have created the following advice and tips to help you maximise your results on the end-of-year examination.

Exam tip 1: Use evidence from the question.

Exams will include questions with additional information or data about an investigation or everyday scenario. It is important that you explicitly refer to the information provided.

See it in action

Read the practice exam question and see how the tip has made a difference between a complete and an incomplete response.

Question 1 (2 marks)

Dr Smith is conducting a study to compare the effectiveness of the working memory model. In her experiment, she presents participants with a list of 20 words. After a brief distraction task, participants are asked to recall as many words as they can. Participants who used rehearsal strategies recalled an average of 12 words and participants who used visualisation strategies recalled an average of 18 words.

Explain the results of the experiment using the working memory model.

Complete response

Explains the visuo-spatial sketchpad from the working model of memory [1 mark]

The working memory model explains that visualisation strategies engage the visuo-spatial sketchpad, which can enhance memory by creating more vivid and organised mental representations. This is why participants who used visualisation strategies recalled more words (18 words) compared to participants who used rehearsal strategies (12 words).

Uses evidence from the question to support explanation [1 mark]

Incomplete response

Explains the visuo-spatial sketchpad from the working model of memory [1 mark]

The working memory model explains that visualisation strategies engage the visuo-spatial sketchpad, which can enhance memory by creating more vivid and organised mental representations as seen in the experiment.

Does not explicitly refer to the information provided in the question [0 marks]

Think like an assessor

To maximise your marks on an exam, it can help to think like a QCAA assessor. Consider how many marks each question is worth and what information the assessor is looking for.

A student has given the following response in a practice exam. Imagine you are a QCAA assessor and use the marking guide to mark the response.

Question 2 (4 marks)

Dr Johnson is conducting a study to investigate the effectiveness of the multi-store model of memory. In her experiment, participants are presented with a list of 20 words. Half of the participants are instructed to repeat the words aloud (rehearsal group), while the other half simply read through the list silently (non-rehearsal group). After a 30-second delay filled with a counting task, participants are asked to recall as many words as they can. The results show that participants in the rehearsal group recalled an average of 15 words, while participants in the non-rehearsal group recalled an average of only seven words.

Explain the results of this experiment using the multi-store model of memory. In your answer, refer to the roles of the short-term memory and the long-term memory.

The short-term memory (STM) has a limited duration of about 18-30 seconds and a small capacity, so information can be lost quickly without rehearsal. In the experiment, the non-rehearsal group recalled an average of only 7 words because they did not repeat the words aloud, causing the information to decay or be displaced from STM. Long-term memory (LTM) has a larger capacity and longer duration, and rehearsal helps transfer information from STM to LTM for better recall. The rehearsal group, who repeated the words aloud, recalled an average of 15 words. This demonstrates that rehearsal helped transfer more words into LTM, improving recall performance.

Marking guide

Question 2

- Describes the role of short-term memory (1 mark)
- Uses evidence from the results of the investigation to demonstrate the role of short-term memory (1 mark)
- Describes the role of long-term memory (1 mark)
- Uses evidence from the results of the investigation to demonstrate the role of long-term memory (1 mark)

Fix the response

Consider where you did and did not award marks in the response. How could the response be improved? Write your own response to the same question to receive full marks from a QCAA assessor.

Exam tip 2: Avoid restating the question.

When answering questions in an exam, it's important to get straight to the point. Instead of repeating the question, start your response with a direct answer or key point. This saves time and shows the examiner that you understand the question and can provide a relevant answer.

See it in action

Read the practice exam question and see how the tip has made a difference between a complete and an incomplete response.

Question 3 (2 marks)

Describe a physical and psychological function of serotonin.

Complete response

Correctly describes a physical function of serotonin [1 mark]

Physically, serotonin helps control bowel movements and function. Psychologically, serotonin is crucial for mood stabilisation and is often linked to feelings of wellbeing and happiness.

Correctly describes a psychological function of serotonin [1 mark]

Incomplete response

No need to restate the question

Correctly describes a psychological function of serotonin [1 mark]

The physical and psychological functions of serotonin play key roles in regulating mood, appetite and sleep. Psychologically, serotonin is crucial for mood stabilisation and is often linked to feelings of wellbeing and happiness. It promotes relaxation, helping improve sleep quality, and is involved in memory formation, learning and maintaining focus.

Does not supply a physical function of serotonin [0 marks]

Additional psychological functions not needed

Think like an assessor

To maximise your marks on an exam, it can help to think like a QCAA assessor. Consider how many marks each question is worth and what information the assessor is looking for.

A student has given the following response in a practice exam. Imagine you are a QCAA assessor and use the marking guide to mark the response.

Question 4 (2 marks)

Compare classical conditioning and operant conditioning.

Classical conditioning involves learning through association, where a neutral stimulus becomes associated with an unconditioned stimulus to elicit a conditioned response. In contrast, operant conditioning involves learning through consequences, where behaviours are strengthened or weakened by rewards or punishments.

Marking guide

| | |
|------------|--|
| Question 4 | <ul style="list-style-type: none"> Identifies a similarity in learning between classical conditioning and operant conditioning (1 mark) Identifies a difference in learning between classical conditioning and operant conditioning (1 mark) |
|------------|--|

Fix the response

Consider where you did and did not award marks in the response. How could the response be improved? Write your own response to the same question to receive full marks from a QCAA assessor.

Exam tip 3: Use dot points to answer questions.

Using dot points helps you structure your answer clearly and makes it easier for the examiner to see that you've addressed all parts of the question. This is particularly useful for questions with multiple marks, because each dot point should be awarded one mark.

See it in action

Read the practice exam question and see how the tip has made a difference between a complete and an incomplete response.

Question 5 (4 marks)

Discuss arguments for and against interleaving as a strategy to improve memory.

Complete response

Correctly describes one argument for [1 mark]

Arguments for:

- *Helps improve memory retention by forcing the brain to continuously retrieve information, enhancing learning and understanding*
- *Encourages cognitive flexibility by requiring the brain to switch between different tasks or topics*

Arguments against:

- *Can cause initial confusion and frustration as learners adjust to switching between topics*
- *May be more complex to implement compared to focused study sessions*

Correctly describes another argument against [1 mark]

Correctly describes another argument for [1 mark]

Correctly describes an argument against [1 mark]

Incomplete response

Interleaving involves mixing different topics or subjects during study sessions. It helps improve memory retention by forcing the brain to continuously retrieve information. However, it can cause initial confusion and frustration as learners adjust to switching between topics.

Only describes one argument for [1 mark]

Only describes one argument against [1 mark]

Think like an assessor

To maximise your marks on an exam, it can help to think like a QCAA assessor. Consider how many marks each question is worth and what information the assessor is looking for.

A student has given the following response in a practice exam. Imagine you are a QCAA assessor and use the marking guide to mark the response.

Question 6 (4 marks)

Discuss the underlying theory of social and cognitive psychology, with reference to social learning theory.

- *Social psychology focuses on how individuals' thoughts, feelings and behaviours are influenced by others and the social environment.*
- *Cognitive psychology focuses on internal mental processes such as perception, attention, memory and learning.*
- *Social learning theory (SLT) aligns with social psychology as it emphasises the role of social interactions and observing others in shaping behaviour. For example, individuals may adopt aggressive behaviours if they observe others being rewarded for aggression.*
- *SLT also connects with cognitive psychology because it involves mental processes like attention, memory and motivation. For example, an individual must first pay attention to the model's behaviour, remember it and then decide whether to imitate it based on expected outcomes.*

Marking guide

| | |
|------------|--|
| Question 6 | <ul style="list-style-type: none"> • Explains the role of social psychology (1 mark) • Explains the role of cognitive psychology (1 mark) • Links SLT to social psychology (1 mark) • Links SLT to cognitive psychology (1 mark) |
|------------|--|

Fix the response

Consider where you did and did not award marks in the response. How could the response be improved? Write your own response to the same question to receive full marks from a QCAA assessor.

Practice makes perfect

Now that you know all these tips, it's time for you to move on to Part C: Exam practice, to put them into practice.

PART C: Exam practice

Now it's time to put the tips and advice you've learned into practice while you complete these exam-style questions! You will complete two papers as part of your external examination: Paper 1 tests you on multiple choice and short response questions, and Paper 2 tests you on more complex, multi-part short-response questions. The questions here, in Part C, give you practice at these types of questions.

Multiple choice

(1 mark each)

- What are the components of the peripheral nervous system?
 - The spinal cord, brain and cerebellum
 - The spinal cord, motor neurons, interneurons and sensory neurons
 - The spinal cord, somatic nervous system, sympathetic nervous system and brain
 - The somatic nervous system, autonomic nervous system, sympathetic nervous system and parasympathetic nervous system
- Which neurotransmitter is primarily involved in muscle contraction and is also crucial for memory and learning?
 - Serotonin
 - Dopamine
 - Acetylcholine
 - Norepinephrine
- Light is absorbed by photoreceptors in the retina, and converted into electrochemical impulses in a process known as
 - perception.
 - transduction.
 - transmission.
 - electromagnetic energy.
- Soldiers wear camouflage gear to avoid detection. The absence of which visual perception principle allows camouflage to work?
 - Closure
 - Proximity
 - Size constancy
 - Figure-ground organisation
- The memory store that holds information for approximately 3 seconds is known as
 - echoic memory.
 - working memory.
 - sensory memory.
 - short-term memory.
- A grandmother is teaching her granddaughter to knit. She finds it easier to show her how to knit instead of explaining what to do. She also recalls her own grandmother teaching her how to knit when she was young. What types of memory are involved in this scenario?
 - Procedural and episodic
 - Episodic and declarative
 - Declarative and procedural
 - Short-term memory and long-term memory
- Operant conditioning occurs when learning is acquired through
 - rewarding desired behaviour.
 - associating a NS with a UCS.
 - modelling or observing behaviour.
 - reinforcing behaviour through consequences.
- Emma loves ice cream from a specific shop. Whenever she hears the shop's jingle, her mouth starts to water. Initially, the jingle had no effect on her. Over time, the jingle played every time she ate ice cream, and now just hearing it makes her salivate. Which of the following correctly identifies the components of classical conditioning in this scenario?
 - UCS: Ice cream, UCR: Salivation, NS: Jingle, CS: Jingle, CR: Salivation
 - UCS: Ice cream, UCR: Jingle, NS: Salivation, CS: Jingle, CR: Ice cream
 - UCS: Salivation, UCR: Ice cream, NS: Jingle, CS: Salivation, CR: Jingle
 - UCS: Jingle, UCR: Salivation, NS: Ice cream, CS: Ice cream, CR: Salivation
- Which of the following brain regions is correctly matched with its primary function?
 - Frontal lobe – visual processing
 - Parietal lobe – voluntary motor control
 - Occipital lobe – language comprehension
 - Temporal lobe – processing auditory information
- Which of the following best explains the concept of distributed brain functions?
 - All brain functions are localised to a single specific region.
 - Brain functions are only associated with the cerebral cortex.
 - The brain operates with no overlap or interaction between regions.
 - Certain brain functions, such as explicit memory storage, rely on multiple interconnected regions.

- 11 A patient suffers damage to the cerebellum. Which of the following is the most likely consequence?
- A Impaired auditory processing
 - B Impaired explicit memory storage
 - C Loss of visual processing abilities
 - D Difficulty forming implicit memories, such as motor skills
- 12 A researcher finds that damage to the amygdala affects a person's ability to remember emotionally charged events but not neutral ones. What does this suggest about the role of the amygdala in explicit memory storage?
- A The amygdala only stores neutral memories.
 - B The amygdala plays no role in explicit memory storage.
 - C The amygdala is essential for all explicit memory storage.
 - D The amygdala specialises in storing emotional aspects of memories.
- 13 When a blurry image of an object is shown, participants are more likely to identify it as food when they are hungry. Which psychological factor influences their perception?
- A Context
 - B Motivation
 - C Emotional state
 - D Past experience
- 14 Which of the following is a treatment approach for Alzheimer's disease that aims to increase acetylcholine levels in the brain?
- A Antipsychotics
 - B MAO inhibitors
 - C Dopamine agonists
 - D Acetylcholinesterase inhibitors
- 15 A driver judges the distance of objects on the road based on how large or small they appear. Which type of depth cue is the driver using?
- A Relative size
 - B Motion parallax
 - C Binocular disparity
 - D Linear perspective
- 16 What does the levels of processing (LOP) model suggest about long-term memory?
- A Long-term memory is independent of encoding methods.
 - B Memory storage relies solely on repetition and rehearsal.
 - C Information is best remembered when rehearsed repeatedly.
 - D The deeper the level of processing during encoding, the stronger the memory trace.
- 17 Emma studied her material in small increments over several weeks instead of cramming the night before her exam. What memory improvement strategy did she use, and why is it effective?
- A Chunking; it organises material into manageable units.
 - B Maintenance rehearsal; it relies on repeated exposure to material.
 - C Spacing; it reduces interference and strengthens long-term retention.
 - D Elaborative rehearsal; it strengthens encoding through deep processing.
- 18 A patient is experiencing heightened anxiety and muscle tension. Upon examination, it is found that there is an imbalance in their neurotransmitter levels. Which of the following neurotransmitter imbalances is most likely contributing to the patient's symptoms?
- A Increased levels of glutamate (Glu)
 - B Decreased levels of glutamate (Glu)
 - C Increased levels of gamma-aminobutyric acid (GABA)
 - D Decreased levels of gamma-aminobutyric acid (GABA)
- 19 The neo-cortex is primarily involved in which aspect of memory?
- A Formation of implicit memories
 - B Short-term memory processing
 - C Initial encoding of emotional memories
 - D Long-term storage of explicit memories
- 20 Which of the following functions is associated with the basal ganglia in the context of voluntary movement?
- A Storing procedural memories
 - B Initiating voluntary movements
 - C Fine-tuning motor activities and balance
 - D Regulating the intensity and smoothness of movements
- Short response**
- 21 **Describe** neurotransmission, with reference to action potentials and synaptic transmission. (2 marks)
- 22 **Describe** the role of the spinal cord in the human nervous system, with reference to monosynaptic and polysynaptic spinal reflexes. (2 marks)
- 23 **Describe** the processes of seeing or hearing, with reference to reception, transduction and transmission. (3 marks)

- 24 Contrast** recall and relearning, using an example. (2 marks)
- 25 Compare** the multi-store model of memory and the working memory model. (2 marks)
- 26 Distinguish** between stimulus generalisation and discrimination in classical conditioning. (1 mark)
- 27 Distinguish** between modelling and vicarious conditioning. (1 mark)
- 28 Discuss** the underlying theory of behaviourism, with reference to classical conditioning. (3 marks)
- 29 Explain** how the perception of pitch is related to the frequency of sound waves. (2 marks)
- 30 Explain** the role of Geschwind's territory in language processing. (2 marks)
- 31** The following questions refer to the investigation by de Bruine, Vredeveltdt and van Koppen (2018).
- a Describe** the main findings of the investigation regarding cultural influences on visual perception. (2 marks)
- b Explain** how the hippocampus is involved in the formation and storage of memories with reference to the investigation. (2 marks)
- c Explain** how classical conditioning could play a role in developing culturally specific responses to certain visual stimuli. (2 marks)
- 32** A teacher is explaining the concept of vicarious conditioning to a group of students. They use the famous "Bobo doll" experiments conducted by Bandura and colleagues as an example to illustrate how children learn aggressive behaviours by observing others.
- a Explain** the concept of vicarious conditioning and how it was demonstrated in the "Bobo doll" experiments. (2 marks)
- b Describe** the role of the prefrontal cortex in regulating the emotional responses and decision-making processes of children who observe aggressive behaviours. (2 marks)
- c Explain** how the concept of perceptual set could influence a child's interpretation of the aggressive behaviours observed in the "Bobo doll" experiments. (2 marks)
- 33** A psychology student is conducting an experiment using a "Skinner box" to study the behaviour of rats. The experiment aims to understand how different types of reinforcement and punishment affect the rats' behaviour.
- a Distinguish** between positive reinforcement and negative reinforcement, providing an example of each from the experiment. (3 marks)
- b Explain** the process of extinction and how it might occur in this experiment. (2 marks)
- c Explain** how classical conditioning principles could also be applied in the context of the "Skinner box" experiment. (2 marks)
- 34** A psychology professor is teaching a class about different learning theories and uses the "Little Albert" experiment to illustrate learnt fear responses.
- a Describe** the concepts of unconditioned stimulus (UCS), unconditioned response (UCR), neutral stimulus (NS), conditioned stimulus (CS) and conditioned response (CR) using examples from the "Little Albert" experiment. (5 marks)
- b Compare** classical conditioning and operant conditioning. (2 marks)
- c Explain** how social learning theory could be used to understand the development of fear responses. (2 marks)
- 35** A patient has suffered a stroke that has affected their ability to form new explicit memories. They can still recall events from their distant past but struggle with recent events.
- a Identify** the brain region that is most likely damaged in this patient. (1 mark)
- b Explain** the role of this brain region in memory formation. (2 marks)
- c Describe** how this damage could affect the patient's daily life. (1 mark)
- 36** A psychology class is conducting a modified version of the experiment by Grant and colleagues (1998) to investigate the context-dependency of memory. Ten participants are asked to study a list of words in a noisy environment and 10 participants are asked to study a list of words in a quiet environment. All participants are later tested in a quiet environment using 20 multiple-choice questions. The results of the experiment are shown in the table.
- | Condition | Mean | SD |
|-------------------------|------|-----|
| Noisy study environment | 12 | 3.4 |
| Quiet study environment | 15 | 2.5 |
- An unpaired *t*-test was used generating a *p*-value of 0.076.
- a Identify** the condition with the greatest variability. (1 mark)
- b Draw a conclusion** about context-dependent memory with reference to the *p*-value. (2 marks)
- c Explain** the results of the experiment using a memory model. (2 marks)



UNIT

4

The influence of others

Unit 4 overview

In Unit 4, we explore the different ways that our thoughts, feelings and behaviours are influenced by others. The way we interact and our relationships with our parents, siblings, friends, teachers and family all contribute to our socialisation. This unit focuses on how we as individuals can learn many things from the people around us.

Social processes reflect the ways in which individuals and groups interact. We learn to modify our behaviours through our social interactions with others and we continue to adjust and readjust our behaviours as we learn more about the rules, beliefs, values and expectations of the society in which we live. We will discuss the differences between gender and sex, and how these are influenced by society. Further, we will look at the influence of interpersonal processes, and understand why people sometimes act antisocially, and also prosocially. This unit will also discuss the influence of the media on identity and behaviour. After understanding the influence of others on the individual, we will explore human attraction – how do people know if they've found their soul mate? We will also explore attitudes, and whether these are directly related to behaviours.

This unit will also cover how stereotypes, prejudice and discrimination are influenced by others. Finally, it will look at how culture influences our behaviours and mental processes. In Unit 4, you will develop an appreciation for the interactions between humans, and how this determines behaviours, attitudes, beliefs and actions.

Unit 4 objectives

- 1 Describe ideas and findings about social psychology, interpersonal processes, attitudes and cross-cultural psychology.
- 2 Apply understanding of social psychology, interpersonal processes, attitudes and cross-cultural psychology.
- 3 Analyse data about social psychology, interpersonal processes, attitudes and cross-cultural psychology.
- 4 Interpret evidence about social psychology, interpersonal processes, attitudes and cross-cultural psychology.
- 5 Evaluate processes, claims and conclusions about social psychology, interpersonal processes, attitudes and cross-cultural psychology.
- 6 Investigate phenomena associated with social psychology, interpersonal processes, attitudes and cross-cultural psychology.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Unit 4 topics

| Topic | Module | |
|--------------------------------------|------------------|---|
| Topic 1 Social psychology | Module 10 | Social psychology |
| | Module 11 | Status and power in groups |
| Topic 2 Interpersonal processes | Module 12 | Prosocial behaviour |
| | Module 13 | Aggression |
| | Module 14 | Attraction and relationships |
| Topic 3 Attitudes | Module 15 | Attitudes and bias |
| | Module 16 | Stereotypes, prejudice and discrimination |
| Topic 4 Cross-cultural psychology | Module 17 | Community and culture |
| | Module 18 | Cultural diversity |

MODULE

10

Social psychology

Introduction

Social psychology is the scientific study of how our thoughts, feelings and behaviours are influenced by the presence of others (Allport, 1998). We are impacted by social influences that can be real, imagined or implied. Social psychology bridges the gap between psychology and sociology, helping us understand how individuals are shaped by their social environments. For example, while we are watching television or shopping for the latest fashion trends, we are being socialised to conform to the norms of our society. Socialisation is the process through which individuals learn and internalise the values, beliefs and norms of their society. This process is crucial for our development as social beings and helps us navigate the world around us.

Our social interaction can also influence the way our gender roles are formed. Gender is a multifaceted concept that goes beyond the binary notion of male and female. It encompasses gender identity, which is how individuals perceive themselves, and gender roles, which are the societal expectations associated with being male or female. Gender formation is a complex process that can be understood through multiple perspectives including biological, cognitive and social factors that interact to shape our gender identities and roles. Another important area of social psychology is group social influence, which examines how our thoughts, feelings and behaviours are shaped by the groups we belong to or interact with. Understanding group social influence helps us see why we sometimes conform to group norms and how our social environment impacts our actions.

In this module we will examine how socialisation occurs through primary (family) and secondary (e.g. schooling, media and peers) influences. We will discuss how biological, cognitive and social theories influence our perceptions, beliefs and attitudes towards gender. Finally, we will explore how the social groups and networks we are connected to can influence and change our attitudes, beliefs and behaviours.

Prior knowledge



**Prior
knowledge
quiz**

Check your understanding of concepts related to social psychology before you start.

Subject matter

Science understanding

- Explain the difference between primary (i.e. family) and secondary (e.g. media, schooling) socialisation.
- Describe gender and compare social learning, cognitive developmental and biological theories of gender role formation.
- **Science as a human endeavour**
- Appreciate that the presence of others affects the way we behave.
- Appreciate that research in social psychology is conducted in the context of cultural and historical movements and events, and that this affects both the relevance of the research and the perspective of the researchers.
- Explore the relative contributions of different factors to gender role formation.
- Discuss whether, and to what extent, social media is changing the nature of relationships.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify, research and construct questions for investigation
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to explain findings
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- use data and reasoning to discuss and evaluate the reliability and validity of evidence.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 10.1

Socialisation

Key ideas

- Socialisation is the process by which people learn the beliefs, customs and appropriate ways of behaving within a particular group or society.
- Primary socialisation occurs during the early stages of life and is typically learnt from primary caregivers such as parents and close family members.
- Secondary socialisation occurs from early childhood into adulthood as children learn from teachers, extended family and friends, and from media sources.
- An agent is a person or group that facilitates socialisation, such as a family group, peers, school or the media.



Learning intentions and success criteria

socialisation

the process of how people learn the beliefs, customs and appropriate behaviours of a society or group

primary socialisation

the process of learning the beliefs, customs and appropriate behaviours of a group during the early stages of life, typically from parents and close family members

secondary socialisation

the process of learning the beliefs, customs and appropriate behaviours of a group via teachers, extended family, friends and the media

agent

a person or group that facilitates the process of socialisation; could be parents, family, peers, school or the media

vicarious learning

witnessing a type of behaviour in another and establishing whether this is acceptable or not based on the observation; involves watching others and learning from the consequences of their actions, whether they are rewarded or punished

Introducing socialisation

An individual's personality and identity are not fixed at birth, rather they continue to develop consistently throughout the lifespan. **Socialisation** refers to the process by which an individual learns the norms, customs and beliefs of a group or society, which provides them with the necessary skills for participating in that group or society.

The process of socialisation begins at birth, and continues into adulthood. This section will focus on two key forms of socialisation: **primary socialisation** and **secondary socialisation**. Primary socialisation is the process of learning beliefs, customs and behaviours that are appropriate during the early stages of life. Typically, people learn these from parents and close family members, such as grandparents or siblings. Secondary socialisation is the process of learning beliefs, customs and behaviours that are considered appropriate from extended social networks including teachers, extended family, friends and the media.

During socialisation it is also important to consider the role of the **agent**. Agents of socialisation are those who facilitate the learning of values and behaviours such as family, friends, school and the media.

Primary socialisation

Primary socialisation is the basis for all future socialisation. It occurs when a child begins to learn the attitudes and values of those who are closest to them, and learns to convey these attitudes and values through appropriate behaviour.

For children, particularly infants, socialisation occurs through parents and very close family members, such as siblings or perhaps grandparents. In Unit 3, theories of development were discussed, including social learning theory and modelling. Modelling is a form of **vicarious learning**, where a person learns to behave in a certain way based on the rewards or punishment that another person experiences. For children, their first role models are typically their parents. Because of this, children learn to model their behaviour on their



FIGURE 1 Children learn how to behave from what their parents show them.

parents. For example, if a child is exposed to racist or discriminatory language and thoughts from their parents, they may also begin to express these thoughts and feelings.

Children also learn gender roles and stereotypes from their parents. For example, if a child sees their mother always doing the laundry or the cooking, they may assume that all women are responsible for cooking and laundry.

During primary socialisation, parents act as agents for socialisation and children become self-aware.

Challenge

How were you socialised?

Think about your own life and the people who have influenced you. **Identify** two primary and two secondary agents, and consider how these have affected your beliefs, behaviours and attitudes.

Describe these influences in a paragraph, and then **propose** how you could study this – you will need to consider study designs, methods of collecting data and the sample size, as well as any ethical implications.

Secondary socialisation

Study tip

To help you distinguish between primary and secondary socialisation, try to associate agents from your own life with each (e.g. primary = your parents; secondary = your friends).

Secondary socialisation is the continuing process of socialisation into adulthood. It is the process of learning how an individual fits into larger society when they are free from the confines of their primary caregivers and agents (their parents).

Through secondary socialisation, individuals learn how they should behave and act when they are outside of the home. For example, if a child at home is exposed to discriminatory values, when they attend school they may learn that this is not acceptable.

Unlike primary socialisation, which requires direct interaction with an agent, secondary socialisation does not require direct interaction with an agent. This can be seen via the influence of mass media on children, adolescents and adults.

Secondary socialisation through media

Television can provide children and adolescents with the feeling that they are interacting, despite the fact that they are not. Several studies have demonstrated that television can influence children's behaviour and opinions: individuals can learn about the social and cultural expectations for their daily life. For example, by watching the television show *Grey's Anatomy*, individuals may learn about the roles of a doctor, a surgeon and a nurse. While this may be a basis for understanding, if an individual limits their assumption about nurses and doctors to *Grey's Anatomy*, they may have misleading information. If they had watched *RPA*, which focuses on the daily running of the Royal Prince Alfred Hospital in Sydney, they may have a better understanding, as *RPA* documents actual medical events at the major hospital. Through television, individuals are also exposed to societal stereotypes and bias. You will learn more about stereotypes and bias in Module 16.

Further, the media can influence our perception of an ideal image of self. When young women are exposed to images of toned, slender women in media, like Victoria's Secret models or the Kardashians, these images may influence young women to think that they should look the same. This can also be seen in the way young men are highly influenced by athletic, muscular men in media, such as Valentine Holmes and Chris Hemsworth. This influence can teach adolescents what they should look like and how they should behave, which is a process of secondary socialisation.



FIGURE 2 (A) The Kardashians have built a media empire that can influence young women who may aspire to be like them, whereas (B) Valentine Holmes, a prominent rugby star, can influence young men who may aspire to be like him.

Skill drill

Developing a research question and rationale

Science inquiry skill: Understanding the scientific method (Lesson 1.3)

Media in many forms has dominated our lives in recent years and, because of that, social interactions have changed. How the present exposure to media has changed from the past is a current field of research in psychology, and it is vital because many teens and even adults rely heavily on media to function. The media is affecting the way people think, and it needs to be further explored to ensure that the media is being used safely.

A claim is a statement that can have a degree of truth to it. In social psychology there are many claims that can be made, one of which is: Media influences behaviour.

Let's create a research question. The first step is to define all the key terms, in this case "media", "influence" and "behaviours".

The second step is to break down the key words:

- "Media" is a very broad term that can be split into different categories, such as video games, television, advertising and social media. Choose one of these categories before you move on or, if you want to challenge yourself, choose a category not mentioned here.
- "Influence" indicates swaying someone's actions in a particular way. This can include, but is not limited to, compliance, conformity and internalisation.



FIGURE 3 The media is thought to influence behaviour, values and beliefs.

- Behaviours can indicate a lot of actions. In social psychology this can be aggression, prosocial behaviours, peer pressure, racism, prejudice, compliance, conformity or even social identity.

Practise your skills

Choose one option from each of these media, influence and behaviour categories.

Now that you have narrowed down the categories to make them more specific (e.g. social media and conformity), the third step is to conduct research. See what you can find online using Google Scholar or other reputable websites. Find five studies that are relevant to conformity and social media. (Hint: you can type in “Social media + conformity” and see what comes up.)

Read the abstracts of the studies you find and, if they are indeed related to social media (e.g. TikTok, Instagram, Snapchat) and conformity (or a type of it), then write down the titles or URLs.

- 1 Write down relevant URLs from your search.

Take the five studies you have found and see whether there is a common theme. For example, is all the research focused on one particular type of social media or on a particular age group? If so, add these keywords to your search.

- 2 Write down these new keywords.

Search again and include the new keywords (e.g. “Instagram + conformity + teenagers”).

- 3 Write down three relevant sources from your search.

- 4 **Create** your research question using one of the three key starters: “To what extent ...”, “Can ...” or “Does ...”. Remember you need to make it as specific as possible. For example: To what extent does the use of Facebook influence conformity in teenagers?

Your research question needs to be specific so that you can answer the question within the allotted 2,000 words for this internal assessment.

- 5 Finally, you need to write a rationale. The rationale should
 - introduce the broad topic under investigation (e.g. media and conformity)
 - define key terms of the claim
 - clearly explain how you have developed your research question from your claim using relevant theories/investigations.

The end of your rationale should be narrow and point to your research question.

Study tip

The rationale in a research investigation is used to explain how you were able to narrow down the claim to the research question. The process you followed in the Skill drill will help you to write this section. Make sure you explain clearly what led you to narrow down the claim and how the claim could help support or refute the research question.

Check your learning 10.1



Check your learning 10.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Explain**, using an example, what is meant by
 - a primary socialisation (2 marks)
 - b secondary socialisation. (2 marks)
- 2 **Identify** the agent in the following scenarios.
 - a Charlie’s mother works as a lawyer and usually leaves the house in business clothes with heeled

shoes on. Charlie’s school teacher tends to wear more relaxed clothing. Charlie has started to walk around their home in heels. (1 mark)

- b Yong watches movies that feature people who hate cheese. Yong’s girlfriend loves cheese, and Yong’s parents have always liked cheese. Recently, Yong has begun to express how he doesn’t like cheese. (1 mark)

- 3 **Describe** why primary and secondary socialisation is important for human development. (1 mark)
- 4 **Define** “modelling”. (1 mark)
- 5 **Use** socialisation to **explain** the influence of media personalities on teenagers in Australia. In your response, you could refer to the effects on self-esteem, body image, career goals and gender stereotypes. (3 marks)

Analytical processes

- 6 **Compare** the roles of primary socialisation and secondary socialisation. (2 marks)
- 7 **Differentiate** between socialisation from a parent and a celebrity. (1 mark)

Knowledge utilisation

- 8 **Predict** what could happen if someone only experiences primary socialisation. (1 mark)

Lesson 10.2

Sex and gender

Key ideas

- Sex is biologically determined and expressed through genitals and reproductive organs. It is typically set at birth.
- Gender is a socially constructed idea of what males and females are. It can change according to which ideas an individual identifies with.



Learning intentions and success criteria

Introducing sex and gender

There are obvious physical and biological differences between males and females. At birth, biological sex is one of the first things observed. As children grow and mature, they will learn to identify as male or female, as a boy or a girl, but this identification is not necessarily caused by their biological sex. Rather, it is determined by which gender they identify with. Despite the existence of predetermined biological differences between males and females, there are not necessarily psychological differences between men and women, or girls and boys, particularly before puberty.

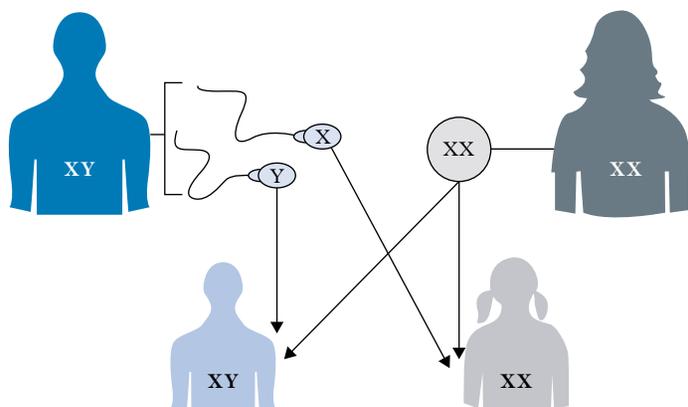


FIGURE 1 X and Y chromosomes determine sex: XX is female, XY is male.

sex

determined by the biological chromosome make-up expressed through an individual's reproductive organs, genitals and other physical characteristics

gender

a socially and culturally constructed idea of what male and female are; this can include, but is not limited to, personality traits, social behaviours and physical appearance

It is important to understand the difference between sex and gender. A person's **sex** is determined by biology, the presence of X and Y chromosomes, which is typically expressed with the individual's reproductive organs (you will learn more about this in Lesson 10.3). A person's **gender** is the sociocultural differences between being male and being female. Typically, sex is set at birth, and without medical intervention this cannot be changed; the gender an individual identifies with is continuous and can change for various reasons.

Gender is not rudimentary. For instance, males can display feminine behaviour and still remain male, and females can display masculine behaviour and still remain female. Transgender people have a gender identity that differs from their assigned sex. They may choose to undergo sex reassignment surgery to transition from one sex to another.

Currently in Queensland, only people who have undergone sex reassignment surgery can apply to have their birth certificates changed; however, transgender and intersex people (individuals who are born with physical sex characteristics that do not fit typical definitions of male or female) are pushing for the right to have their gender recognised on their birth certificate without having to undergo surgery.

Almost all cultures and societies expect differences in the behaviour of males and females, and this expectation typically begins at birth. For example, when a girl is born the parents may be primarily given pink clothing and dolls; a boy may receive blue clothing and toy trucks and cars. These are preconceived ideas about gender and sex.

Gender roles are expectations of how each gender "should" behave which are based on stereotypes and bias. The next sections in this module will discuss different theories on how these roles are formed, including biological, cognitive and social theories.



FIGURE 2 This image depicts traditional socially constructed ideas of what men and women do.

Challenge**Gender roles**

List five gender stereotypes or societal norms. **Propose** why each has become a norm and then **discuss** how this norm has changed or is changing in current society.

Check your learning 10.2

Check your learning 10.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** "sex". (1 mark)
- 2 **Explain** "gender". (2 marks)
- 3 **Explain** gender roles using an example. (2 marks)

Analytical processes

- 4 **Differentiate** between sex and gender. (1 mark)
- 5 **Analyse** how socialisation interacts with the development of gender identity. (3 marks)

Knowledge utilisation

- 6 **Investigate** a stereotypical male gender role. **Discuss** the development of this stereotype, and how it may be reinforced on a daily basis. In your discussion, you might want to consider if this role is as prevalent in your generation as it has been in previous generations. (4 marks)

Lesson 10.3

Biological theories of gender role formation

Key ideas

- Biological theories of gender formation are based on the idea that gender is determined by biological sex.
- The evolutionary theory suggests that natural selection requires males and females to have different biological and psychological traits to ensure reproduction and survival.
- Biological difference theories suggest that male and female gender roles are taken on by males and females due to chromosomal and hormonal differences.
- The biosocial theory suggests that gender roles develop through the interaction of socialisation and biological factors, and that people are born gender neutral.



Learning intentions and success criteria

Introducing biological theories of gender formation

In Lesson 10.2, the differences between gender and biological sex were identified. Despite society beginning to recognise that gender and sex are different, psychologists are still seeking answers to the way that gender roles are developed. This lesson will review the **biological theories of gender role formation**.

The biological theories of gender role formation offer several explanations for how children develop their gender identity and gender role. Each approach is based on the assumption that biological sex will influence and determine the gender role that an individual acquires. The biological theories do not differentiate between sex and gender. According to the theories, if you are born with female chromosomes and reproductive organs, your gender will be female; likewise if you are born with male chromosomes and reproductive organs, your gender will be male. In biological theories, gender is always the same as biological sex, and any gendered behaviour will be a result of an individual's hormones and chromosomes.

biological theory of gender role formation

a theory that an individual's gender is predetermined by their biological sex: their genitals and reproductive organs

Evolutionary theory psychology

Evolutionary theory psychology attempts to explain and justify human behaviour on the basis of natural selection and what gave humans an advantage as a species. In this sense, an evolutionary explanation for gender roles is that natural selection required males and females to possess different biological and psychological traits to increase human reproduction, and continue the survival of the human race.

According to evolutionary psychology, stereotypically male traits, such as aggression and competitiveness, evolved because this increased the likelihood of a male attracting a female partner and, as a result, the likelihood of being able to reproduce. Evolutionary psychology also theorises that women evolved to be more nurturing so that they were able to attract a partner who was able to protect the family by being aggressive and competitive, leaving women with time to raise children. When humans were living in hunter-gatherer societies, being able to protect and defend each other was of great importance.

Theorising about human evolution requires assuming that people evolved to live a certain way because it provided survival advantages at the time. The evolutionary theory offers an explanation as to why people developed to have these traits, but it does not offer an explanation for why these gender roles are still formed and maintained. The theory has also been criticised because it does not state that these differences were genetically determined, rather that society has evolved this way as a result of the pressures each gender experiences.



FIGURE 1 Knowledge about human evolution is based on assumptions. This drawing could make people assume that men were hunters.

Biological theory differences

Males and females have biological differences. For example, men typically possess greater physical strength than women. Sex is determined by biological make-up; males have the chromosomal structure XY and women have XX. Intersex is when an individual is born with a different XY pattern, which may include XXY or differences on the X and Y chromosomes.

During fetal development, sex hormones are released, and it is the presence of androgens (male sex hormones) that will determine if an embryo will develop male or female genitalia and male or female reproductive organs.

Theories that are based on biological differences assume that if a child is born with male genitalia, they will take on masculine gender roles, and if a child is born with female genitalia, they will take on feminine gender roles.

Human karyotype

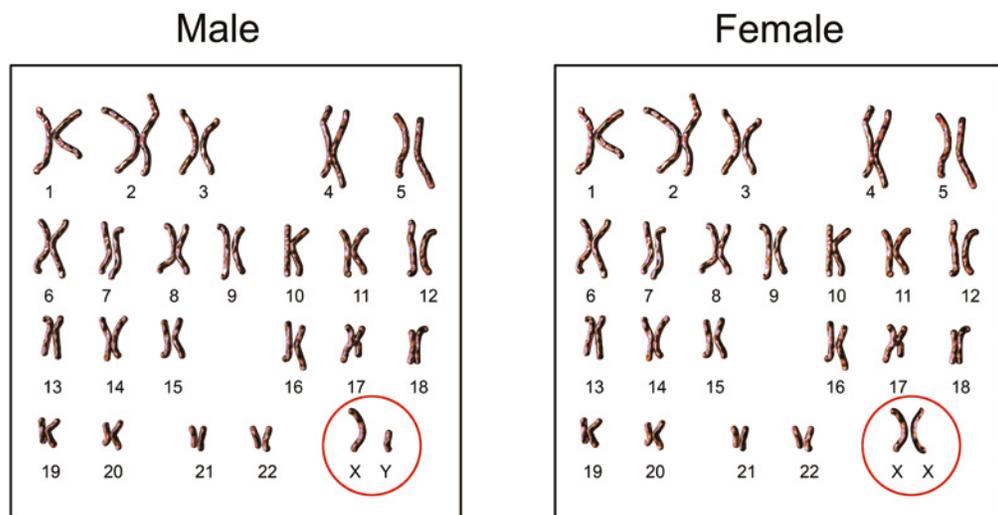


FIGURE 2 This is the female and male chromosome karyotype. Sex is determined as male XY or female XX.

biosocial theory

a biological theory that states that gender roles are developed as a result of interaction between biological sex and socialisation

Biosocial theory

In 1972, Money and Ehrhardt developed the **biosocial theory**, which was based on a study that suggested that the development of gender roles was the result of interaction between socialisation and biological factors. This theory states that when a child is born, they are gender neutral, and that their socialisation will be based around the genitalia they show.

This theory was developed after Money and Ehrhardt observed **intersex** people (those born with both or ambiguous genitalia). By observing intersex people, Money and Ehrhardt determined that children born intersex could have surgery to assign them a biological sex, and that they would then grow up to assume the sex they were biologically given through surgery.

When this theory was introduced it was very popular and drew great public interest. However, over time, concerns were raised and it was acknowledged that there was more to gender than the genitals and reproductive organs that people had.

intersex
an individual who is born with both male and female, or ambiguous, genitals and reproductive organs

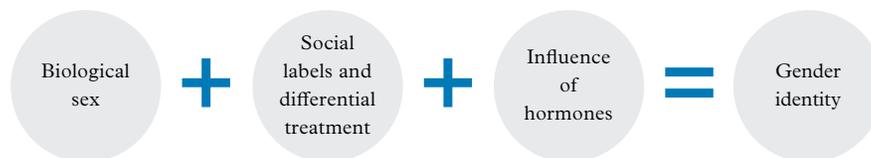


FIGURE 3 Interactions between biological sex and social labels are the basis of biosocial theory.

Real-world psychology

David's experience

At the peak of Money and Ehrhardt's research and theory, a couple gave birth to twin boys: Brian and Bruce. The boys developed a urinary difficulty that was to be corrected with surgery. During the surgery, Bruce's genitalia suffered irreversible damage. Based on Money and Ehrhardt's theory, Bruce's parents consented to gender reassignment surgery, and began to raise Bruce as Brenda.

Growing up, Brenda always felt strange engaging in activities typically associated with "girlhood" such as wearing dresses and playing with dolls, and experienced difficulty identifying as a girl. When Brenda reached the age of 14, Brenda's parents revealed that Brenda was born male. After learning this, Brenda chose to assume the identity of a boy, David.

David underwent gender reassignment surgery (now sex reassignment surgery) again, and took hormone replacements. He married and became an adoptive father, but later took his own life.

David's lived experience is highly relevant to the discussion about gender and sex, including children

Apply your understanding

- Describe** how Money and Ehrhardt's theory influenced the decision made by Bruce's parents. (1 mark)
- Explain** the role of societal expectations in David's struggle with gender identity. (2 marks)
- Discuss** two ethical considerations involved in making medical decisions for intersex children. (2 marks)

who are born intersex. Prior to David's death, he gave interviews about his life in the hope that no other child would have to go through what he went through. New research recommends enabling intersex children time to form a gender identity prior to any surgical or hormonal interventions.



FIGURE 4 Intersex individuals highlight the diversity of human biology, emphasising the need for understanding and respect for each person's unique journey.

The role of hormones

Biological theories suggest that males and females are born with innate psychological abilities. Prior to puberty, boys and girls typically have similar levels of hormones. At the onset of puberty, these levels change, with boys experiencing an increase in androgens, and girls experiencing an increase in oestrogens. These physiological changes have been implicated in male and female cognition. For example, males typically possess increased visuospatial awareness, while women often display increased language ability.

A study by Shaywitz and colleagues (1995) demonstrated that women tended to use both sides of their brains for language, whereas men tended to just use the left. However, more recent research by Sommer and colleagues (2004) suggests that there is no significant difference in brain usage between males and females.

Related research by Van Goozen and colleagues (1995) demonstrated that when transgender men (female at birth) undergo male hormone replacement therapy, they experience an increase in male mental abilities, including an increase in visuospatial awareness and an increase in aggression. More recent research examining the effects of exogenous testosterone on multiple mental health indicators in female-to-male (FTM) transgender people replicated this spatial intelligence finding: spatial performance substantially increased over time for the FTM transgender people compared to the controls (Colton Meier, 2012). Overall, Colton Meier showed that FTM transgender people were psychologically healthier after undergoing 3 months of exogenous testosterone treatment, with effects maintained 1 year later.



FIGURE 5 Studies have shown that an increase in male hormones, such as testosterone, can cause an increase in visuospatial awareness and aggression – typically masculine traits.

Real-world psychology

Competing in sports

Most sporting bodies have separate divisions for men and women on the basis of physiological differences, specifically because men typically possess increased physical strength compared with women.

Over the past century, there have been several instances where females who are intersex or have hyperandrogenism (characterised by excessive levels of male hormones such as testosterone) have been involved in sporting controversies.

Hannah Mouncey was born male, and played sports competitively including handball and AFL, before undergoing sex reassignment surgery. Hannah possesses higher levels of testosterone than other female AFL players, though this is still within the limits set by the AFLW (Australian Football League Women's). Despite this, Mouncey was deemed ineligible to play AFLW, but still permitted to play VWFL (Victorian Women's Football League). Mouncey is tall by any standards, and at 6 feet, 2 inches (1.88 metres) her body muscle mass is also high compared to many female players.

Mouncey's experiences with the AFLW have echoed past experiences of athletes who are transgender, intersex, hyperandrogenous or in some other way possess increased male hormones. Women who possess increased levels of male hormones, such as testosterone, are not guaranteed to win against other women. However, there is much debate about whether these athletes possess greater strength, speed or endurance, and the impact of this advantage on competition.



FIGURE 6 Hannah Mouncey has been restricted from playing in certain sports leagues due to her gender assignment.

Apply your understanding

- 1 Describe** how physiological differences between men and women justify the separation of sporting divisions. (1 mark)
- 2 Explain** the possible psychological impact on athletes who are deemed ineligible to compete due to their hormone levels. (2 marks)
- 3 Discuss** the ethical implications of excluding athletes like Hannah Mouncey from certain sports leagues. (2 marks)

Study tip

As you think about gender role formation, remember that the ideas presented here are theories. You should be mindful of this as you continue your study of psychology and consider the empirical evidence that supports and refutes theories.

Summary of biological theories of gender formation

The biological approach offers an understanding of the traits that each gender possesses that can be attributed to hormonal and chromosomal influence on gender. As can be seen in each of the theories that this module discusses on gender role formation, the biological approach offers an explanation for why men and women display certain behaviours and differences, though it doesn't offer an explanation for the maintenance of these gender roles.

Check your learning 10.3



Check your learning 10.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** the overarching idea of biological theories of gender role formation. (1 mark)
- 2 Explain** the evolutionary approach to gender role formation. (2 marks)

Analytical processes

- 3 Analyse** the role of hormones and chromosomes in gender role formation. (2 marks)

Knowledge utilisation

- 4 Evaluate** the biological theory of gender role formation. (4 marks)

Lesson 10.4

Cognitive theories of gender role formation

Key ideas

- Kohlberg's cognitive theory of gender states that children pass through three stages of gender development: gender identity (2 to 3 years of age), gender stability (3 to 4 years of age) and gender constancy (5 years of age).
- Gender schema theory refers to how gender roles form over time and provides information on how males and females should behave.
- Gender scripts refer to the scripts children build about how males and females should act, based on their observations.



Learning intentions and success criteria

Introducing cognitive theories of gender role formation

Cognitive psychologists seek to understand the relationship between our thought processes and the behaviour that we present. Unit 1 covered some of the different theories of cognitive development. This section will consider Kohlberg's cognitive developmental theory and how this relates to gender role formation. Kohlberg's theory poses that children's gender understanding increases with age, and, as a result of this, so does their gender identity. We will also discuss gender schema theory.

Kohlberg's cognitive theory of gender

Kohlberg's theory states that children go through three stages: **gender identity**, **gender stability** and **gender constancy**.

gender identity

where a child recognises and labels themselves as a boy or a girl, achieved around 2 to 3 years of age

gender stability

where a child realises that their sex will not change over time, achieved around 3 to 4 years of age

gender constancy

where a child realises that sex is a fixed state that will not change; they also realise that if someone's appearance or behaviour changes, this does not make them a member of the opposite sex, achieved at the age of 5

Gender identity

According to Kohlberg's theory, children will begin to think about gender as soon as cognition begins. Around 2 to 3 years of age, children are typically able to understand if they are male or female and will actively try to guess the sex of other people. Despite understanding if they are male or female, children will not understand what makes them that sex, and instead they associate each gender/sex with certain behaviours or attributes. For example, children may associate being female with wearing dresses.

Further, children at this stage are also unable to understand that their sex will not change, and has not changed since birth. They are unlikely to realise that they were always this sex, and a boy may believe that he was once a girl and that he could be a girl again in the future. This should not be mistaken for confusion about gender identity; rather, it is the limits of a child's understanding at this age. Children at this stage will also not realise that their biological sex is determined by genitals. For this reason they may assume that if a man is wearing a dress he is a girl, despite having other clues that would suggest otherwise, such as having a typical male name or having a beard.

Gender stability

During this stage (generally between 3 and 4 years of age), children begin to understand that their sex will not change over time. While children may understand that their own sex won't change, they are unable to apply this to others. Much like gender identity, a child may assume that because their mother suddenly dresses like their father, their mother is now a man.

In this stage, children don't fully grasp the difference between sex and gender, and as a result are unable to maintain gender stability: the understanding that someone's sex is unlikely to change over time. During this stage children will realise that if all of their circumstances stay the same, their sex will too, but they will also believe that if their circumstances change, their sex could also change.

Gender constancy

Around the age of 5, children enter the final stage of Kohlberg's theory, gender constancy. Children will realise and understand that sex is constant over time for all people, not just themselves. They will identify as male or female by their genitals and they may even want to see others' genitals to confirm if that person is a girl or a boy.

At this stage, children also realise that just because someone changes their appearance to be more feminine or masculine, this doesn't mean that their sex changes. They are also able to acknowledge that just because a girl doesn't act like other girls, this doesn't make her a boy or not a girl.



FIGURE 1 Children in stage one of Kohlberg's theory would assume that this person is a girl.



FIGURE 2 A child in stage three of Kohlberg's theory would be able to recognise that this boy is still a boy, despite playing with a stereotypically female toy.

Gender schema theory

gender schema

a mental representation of what it is to be male or what it is to be female, typically based on stereotypes

gender schema theory

a theory of gender role formation that people build over time that provides information about how a male or female should behave

gender script

gender roles and behaviours that children come to consider as normal, based on their observations of everyday life

People use schemas to create mental representations of an idea or a belief; this can make life easier. A **gender schema** is a mental representation of each gender, often based on gender stereotypes or preconceived ideas about what each gender is responsible for within society.

Gender schema theory assumes that cognitive processes influence gender role formation. As soon as children reach Kohlberg's gender identity stage, between 2 and 3 years of age, gender schema theory states that children will start to seek gender information. Once a child realises that they fit into a group as a boy or a girl, they will want to know more about the group that they have identified with. A boy will seek out information about being a man, and a girl will seek out information about being a woman.

When a child finds information about their group, they will form a schema. The schema that a child forms is usually quite basic, but also becomes the foundation that they will continue to build on throughout life. For example, it may include ideas that girls should play with dolls and wear dresses, and that boys should play with cars and wear pants.

Children will also build **gender scripts** for each gender. These scripts will help children decide how they should behave and predict how someone else will behave. These scripts are usually based on things that children see in their daily lives. For example, if a child sees their

mother going to work each day, they may assume that women go to work, and they will build their script around this; alternatively, if a child witnesses their mother cooking each day and looking after their home, the child may assume that women are supposed to take care of the home and will build this into their script. In this sense, the stereotypes that children are exposed to will influence their gender scripts, too.

Once a child has a script, they will focus on things that connect to their gender, and lose interest in things that, according to their script, do not fit their gender. As these scripts and schemas build they become less malleable; children will attend to and remember anything that matches their schema, and ignore anything that contradicts it.



FIGURE 3 Gender schema ideas may include that girls should play with dolls and boys with cars.



Strengths and limitations

Gender schema theory offers an explanation for why gender roles are stable within society and why they rarely change after middle childhood. Gender schema theory also recognises that children are not passive in their gender identity. It has a large focus on the individual, and neglects to focus on the social and cultural factors that influence gender role formation.

FIGURE 4 Gender scripts like this can help children determine how they should behave. For example, when referring to this script, a young girl may believe that she should not play cricket or have short hair – these beliefs are not necessarily correct, but they contribute to forming her identity.

Challenge**Write a new gender script**

As a child you are likely to have created gender scripts to help you decide how you were meant to interact with others and to help you predict the behaviour of others. As a young adult the gender

script you created as a child will have changed.

Create a brief gender script for males. **Consider** if this has changed since you were a child, and if you think it will change as you get older.

Check your learning 10.4

Check your learning 10.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Explain** Kohlberg's cognitive development theory. (3 marks)
- 2 **Describe** the gender schema theory. (1 mark)
- 3 **Explain** what a gender script is using an example. (2 marks)

Analytical processes

- 4 **Compare** Kohlberg's theory and gender schema theory. (2 marks)

Knowledge utilisation

- 5 **Predict** the role of stereotypes on gender scripts. (1 mark)
- 6 Think about the beliefs that you hold about gender roles. **Evaluate** the role of gender schemas on your beliefs. (3 marks)

Lesson 10.5**Social learning theory of gender role formation****Key ideas**

- Social learning theory suggests that people learn gender roles through the observation of the behaviour of others.
- Vicarious reward occurs when children observe people of the same sex being rewarded for engaging in certain behaviours.
- Vicarious punishment occurs when children observe people of the same sex being punished for engaging in certain behaviours.



Learning intentions and success criteria

Introducing social learning theory of gender role formation

Module 9 introduced the social learning theory proposed by Albert Bandura in the 1970s. Social learning theory suggests that people develop their identity and who they are by vicarious learning and modelling. When applied to gender role formation, social learning

theory states that children learn how to behave by watching their parents and other people, and that they are affected by the differential treatment received by boys and girls.

In general, people are more likely to pay attention to people who are the same sex as they are, attractive, successful or who have a similar or higher social status. Children are also influenced by these factors and will learn vicariously through people who meet these criteria. For this reason, girls are more likely to copy their mothers, and boys to copy their fathers. As children grow and mature, they will be exposed to further role models such as teachers, friends and the media, which could include famous celebrities or sports stars. Children will continue to model their behaviour on these people, assuming gender roles and behaviour that is presented to them.

Social learning theory of gender role formation is based on the assumption that there are no innate psychological differences between the sexes, and that any gendered behaviour is learnt as a child through socialisation. This socialisation means that children will adopt the gendered behaviour that is appropriate to their gender based on what they witness in their culture or society.



FIGURE 1 Social learning theory suggests that a young boy may learn to love watching sports or cooking, depending on the behaviours and attitudes of key male role models such as his father. These behaviours are not influenced by sex or gender norms, but through looking up to someone an individual identifies with.

vicarious reward

when a child observes another person's behaviour being rewarded

vicarious punishment

when a child observes another person's behaviour being punished

Social learning theory

Children may witness people of the same sex as them receiving a reward (**vicarious reward**) for behaving in a gender-appropriate manner. For example, a girl may witness her mother being told how lovely she looks in a skirt; the same girl could witness her sister being told that she shouldn't want to play football, an example of **vicarious punishment**. Through vicarious learning, the girl could learn that women get rewarded for wearing skirts, and punished for wanting to participate in stereotypically male activities. Alternatively, a boy may see his friend crying and being told, "Boys don't cry", which could lead the boy to learn that society doesn't think he should cry.

Cultural and societal stereotypes and expectations vary between countries, and also over time. Blue was once regarded as a feminine colour and pink was considered masculine; today, this is not the case. Media can play a significant role in shaping and reinforcing gender stereotypes by portraying certain behaviours, roles and appearances as appropriate for men or women. For example, advertisements, movies and TV shows often depict women in nurturing roles and men in leadership positions, which can influence public perceptions and expectations of gender roles.



FIGURE 2 Today, people would automatically assume that the pink shoes belong to a girl, and the blue shoes to a boy, but this was not always the case. Blue was once considered to be a feminine colour and pink a masculine colour.

These beliefs about behaviour and stereotypes will lead to a child modelling what they think is appropriate for their gender or sex. In a study by Fagot (1985), it was found that children were more critical of their peers when male children displayed female behaviours and when female children displayed male behaviours. The children could become “gender police” for each other, and tell each other how they should behave. The study also found that while girls could be influenced by teachers and other girls, boys were most likely to be influenced by other boys. A study by Eccles (1987) found that the praise that teachers would give students was largely influenced by the gender of the student. Girls were more likely to be praised for their obedience and being tidy, while boys were more likely to be praised for their academic achievements. This was thought to stem from society’s belief that boys tend to be more mathematical.



FIGURE 3 Eccles (1987) found that boys were more likely to be praised by their teachers for academic achievements than girls.

Strengths and limitations

The benefits of looking at gender through social learning theory are that it acknowledges the influence of social and cultural factors and how these can shape gender roles. However, despite this being positive, social learning theory does not offer any explanation for the variation in conformity to gender roles and gender stereotypes; women do not always adopt stereotypically female behaviours and men also do not always conform to what society expects as male behaviour. Social learning theory suggests that gender is passively acquired, which research has demonstrated is not the case. Research shows that children actively participate in their socialisation.

Skill drill

Evaluating theories

Science inquiry skill: Evaluating evidence (Lesson 1.8)

You have explored multiple theories that explain gender role formation from biological, cognitive and social perspectives. You may be required to evaluate these theories in your student experiment, research investigation and external exam. For example, an exam question may require you to identify strengths and limitations for the social learning theory of gender role formation. You can use broad strengths and limitations of theories in psychology to answer these types of questions, as they can generally be applied to any theory in psychology.

Strengths

- Theories provide a structured framework for understanding complex psychological phenomena, helping to organise and interpret data.

- Well-established theories can predict future behaviours and outcomes, which is valuable for both research and practical applications.
- Theories guide the development of research questions and hypotheses, shaping the direction of scientific inquiry.
- Theories integrate various findings and observations into a coherent whole, making it easier to understand and communicate complex ideas.
- Theories can inform interventions and treatments, offering evidence-based strategies for addressing psychological issues.

Limitations

- Many theories are developed within specific cultural contexts and may not be universally applicable, potentially leading to biased interpretations.

- Some theories may oversimplify complex behaviours by focusing on specific aspects while ignoring others, leading to incomplete explanations.
- Psychological theories must adapt to new findings and changing societal contexts, which can sometimes make them seem outdated or incomplete.
- The interpretation of data and the development of theories can be influenced by researchers' subjective perspectives, potentially introducing bias.
- Theories based on specific populations or settings may not be generalisable to all individuals or contexts, limiting their applicability.

Practise your skills

- 1 **Identify** strengths and limitations for the social learning theory of gender role formation. (4 marks)
- 2 **Argue** for and against the gender schema theory. (2 marks)
- 3 **Discuss** the effectiveness of using biological theories to explain gender role formation. (2 marks)

Check your learning 10.5



Check your learning 10.5: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** social learning theory with reference to gender. (2 marks)
- 2 **Explain** how children learn gender roles through vicarious learning and modelling. (2 marks)
- 3 **Identify** a strength and a limitation of Kohlberg's cognitive theory in explaining gender. (2 marks)

Analytical process

- 4 **Compare** vicarious rewards and punishments. (2 marks)

Knowledge utilisation

- 5 **Discuss** how children are influenced by stereotypes in society, using examples. (4 marks)

Lesson 10.6

Review: Social psychology

Summary

- 10.1 • Socialisation is the process by which people learn the beliefs, customs and appropriate ways of behaving within a particular group or society.
- Primary socialisation occurs during the early stages of life and is typically learnt from primary caregivers such as parents and close family members.
- Secondary socialisation occurs from early childhood into adulthood as children learn from teachers, extended family and friends, and from media sources.
- An agent is a person or group that facilitates socialisation, such as a family group, peers, school or the media.
- 10.2 • Sex is biologically determined and expressed through genitals and reproductive organs. It is typically set at birth.
- Gender is a socially constructed idea of what males and females are. It can change according to which ideas an individual identifies with.
- 10.3 • Biological theories of gender formation are based on the idea that gender is determined by biological sex.
- The evolutionary theory suggests that natural selection requires males and females to have different biological and psychological traits to ensure reproduction and survival.
- Biological difference theories suggest that male and female gender roles are taken on by males and females due to chromosomal and hormonal differences.
- The biosocial theory suggests that gender roles develop through the interaction of socialisation and biological factors, and that people are born gender neutral.
- 10.4 • Kohlberg's cognitive theory of gender states that children pass through three stages of gender development: gender identity (2 to 3 years of age), gender stability (3 to 4 years of age) and gender constancy (5 years of age).
- Gender schema theory refers to how gender roles form over time and provides information on how males and females should behave.
- Gender scripts refer to the scripts children build about how males and females should act, based on their observations.
- 10.5 • Social learning theory suggests that people learn gender roles through the observation of the behaviour of others.
- Vicarious reward occurs when children observe people of the same sex being rewarded for engaging in certain behaviours.
- Vicarious punishment occurs when children observe people of the same sex being punished for engaging in certain behaviours.

Review questions 10.6A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 What does vicarious learning relate to?
 - A Biosocial learning theory – when children observe a behaviour of a person of the opposite sex being rewarded or punished
 - B Kohlberg’s cognitive theory – when children learn appropriate ways to behave and look based on observing how members of the same sex behave and look
 - C Social learning theory – when children observe a behaviour of a person of the opposite sex being rewarded or punished
 - D Social influence theory – when children observe a behaviour of a person of the opposite sex being rewarded or punished
- 2 What does primary socialisation refer to?
 - A Socialisation by family
 - B Socialisation in primary school
 - C Socialisation by teachers and peers
 - D Socialisation by media and schooling agents
- 3 Which of the following statements best describes socialisation?
 - A It only occurs during direct contact with other people.
 - B It is the process of learning how to fit into society outside the immediate family circle.
 - C It is the process by which children learn acceptable ways of behaving within certain groups and societies.
 - D It is a continuing process of learning social beliefs, customs and behaviours, occurring within both primary and secondary social environments.
- 4 Which of the following statements about gender and sex is true?
 - A Gender is socially determined, whereas sex is culturally determined.
 - B Gender is socially determined, whereas sex is biologically determined.
 - C Gender is biologically determined, whereas sex is socially determined.
 - D Gender is biosocially determined, whereas sex is biologically determined.
- 5 One strength of biological approaches to gender is that
 - A it offers an explanation of how gender roles are maintained.
 - B it offers an explanation of how gender roles are formed and maintained.
 - C it offers an explanation of the influence of chromosomes and hormones on gender traits.
 - D it offers an explanation of why gender roles are stable and rarely change in middle childhood.
- 6 A public change in attitudes and beliefs that a person does not hold in private is known as
 - A compliance.
 - B identification.
 - C internalisation.
 - D vicarious learning.
- 7 Kohlberg’s cognitive theory of gender includes the concepts of
 - A gender identity, gender fluidity and gender constancy.
 - B gender identity, gender dysphoria and gender stability.
 - C gender identity, gender stability and gender constancy.
 - D gender identity, gender normality and gender constancy.
- 8 Julia sees her mother going to work every day and assumes that her friends’ mothers also go to work every day. What is this an example of?
 - A Gender roles
 - B Gender theory
 - C Gender scripting
 - D Gender schematics
- 9 What is a gender schema?
 - A The process of learning the beliefs, customs and appropriate behaviours of a group
 - B Mental representations of each gender, based on stereotypes or preconceived ideas
 - C When a person identifies with someone and then is more likely to be influenced by them
 - D Vicarious learning experiences, where a person learns to behave in a certain way based on the rewards or punishment that they see another person receive

Review questions 10.6A Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 10 Describe** gender and sex, using examples. (2 marks)
- 11 Explain** what is meant by gender schema. (2 marks)
- 12 Explain** how the social and cultural expectations of children can be influenced by the media, with reference to secondary socialisation. (2 marks)
- 13 Explain** what vicarious reward refers to in social learning theory as related to gender. Provide one example from a male perspective and one from a female perspective. (3 marks)
- 14 Describe** how primary and secondary socialisation contribute to the way people form ideas about gender. (2 marks)

Analytical processes

- 15** Leroy spent most of his childhood going hunting with his father and grandfather. Leroy has just turned 15 and has discovered that his friends at school do not approve of hunting. Leroy has decided that he will become a vegetarian and will no longer go on trips with his father.
- a Identify** the agents in Leroy's life. (2 marks)
- b Apply** your understanding of primary and secondary socialisation to Leroy's life to **describe** the type of socialisation that has changed Leroy's attitude and why this has occurred. (2 marks)

- 16 Compare** the social learning theories and biological theories of gender role formation. (2 marks)
- 17** Talia is 3 years old and she has a younger brother, Graham, who is 2. Talia never wanted a brother, so she continually dresses Graham up in her princess costumes, and makes him play with her and her dolls. Talia is convinced that if she dresses Graham in girl's clothing Graham will not be a boy. **Determine** what stage of Kohlberg's theory Talia is in, using evidence to support your answer. (2 marks)
- 18 Distinguish** between the evolutionary and the biological differences theories of gender role formation. (1 mark)

Knowledge utilisation

- 19 Evaluate** the claim: "Gender is determined through biological sex." Use one theory of gender role formation to support your response. (3 marks)
- 20 Discuss** how socialisation has influenced gender stereotypes, with reference to a theory of gender role development. (3 marks)

Data drill

Gendered stories and development of gender stereotypes

Seitz and colleagues (2020) investigated how gendered information in stories affects preschool children's development of gender stereotypes.

Method: The study involved 40 preschool children who were read stories featuring either a male or female protagonist in congruent (matching) or incongruent (non-matching) gender contexts. The children were then asked to

associate unknown words with a gender and rate their interest in those words. Processed data is shown in Figure 1.

Results: The study found that children associated unknown words with the gender of the protagonist more strongly than with the context. Additionally, children were more interested in the words when the protagonist's gender matched their own. However, incongruent context information reduced these associations and interests.

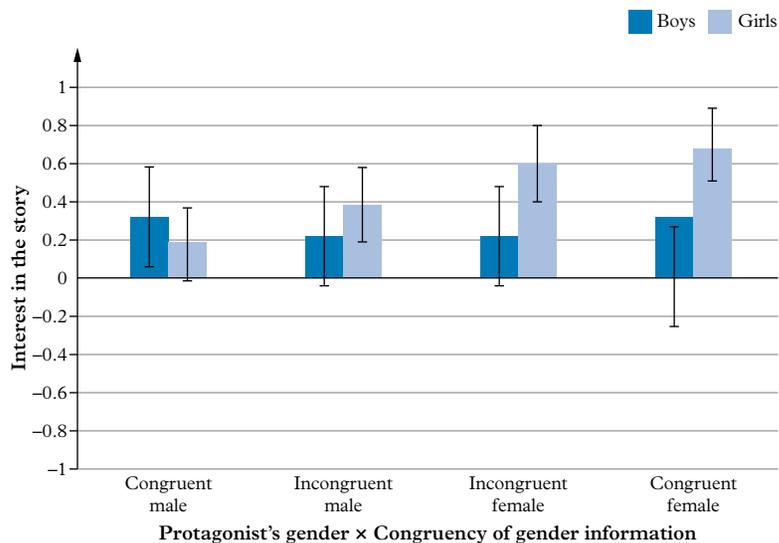


FIGURE 1 Interest ratings for boys and girls in congruent and incongruent contexts. Values range from -1 to $+1$. Negative values depict dislike; positive values depict liking. Bars represent standard errors.

Apply understanding

- 1 **Identify** the group with the highest level of interest in the story. (1 mark)
- 2 **Determine** the interest level for girls in the congruent male condition. (1 mark)

Analyse data

- 3 **Identify** which gender had the greatest variability in the incongruent condition. (1 mark)
- 4 **Distinguish** the interest level in the story for boys in the congruent and incongruent male conditions. (1 mark)

Interpret evidence

- 5 With reference to the error bars, **deduce** if there is a difference between boys and girls in the congruent female condition. Give a reason for your conclusion. (2 marks)
- 6 An inferential test was conducted to compare the interest level between boys and girls in the congruent female condition resulting in a p -value of 0.0245. **Draw a conclusion** based on these findings. (2 marks)



Module 10 checklist: Social psychology

MODULE

11

Status and power in groups

Introduction

Humans are social creatures. We live in and belong to many groups: families, tribes, villages, sports teams and peer groups. Understanding the dynamics of status and power in groups is crucial for comprehending social behaviour.

When we look at how status, roles and power influence our interactions within a group, we see that high-status individuals often have more influence and can shape group norms and decisions. Roles define our expected behaviours and responsibilities, while power dynamics can lead to varying degrees of control and compliance among group members, affecting overall group cohesion and performance.

Obedience, conformity and social norms are powerful forces that drive behaviour change. According to Cialdini and colleagues (2006), social norms guide our behaviour by providing a framework of acceptable actions within a group. Obedience involves following directives from authority figures, while conformity refers to adjusting our behaviours to align with group expectations. These mechanisms can lead to significant behaviour changes, often without us being fully aware of the influence exerted on us.

Historical social psychological research provides valuable insights into these phenomena. Asch's (1955) experiments on compliance demonstrated how we often conform to group pressure, even when it contradicts our own perceptions.

Milgram's (1963) studies on obedience revealed the extent to which we are willing to follow authority figures, even to the point of causing harm to others. Haney, Banks and Zimbardo's (1973) Stanford prison experiment highlighted the profound impact of assigned roles and power on behaviour, showing how quickly we can adopt behaviours consistent with our perceived status and authority. These studies reinforce the powerful effects of status, roles and power on social behaviour.

In this module, we will cover the effects of status, roles and power on social behaviour, explore how obedience, conformity and social norms lead to behaviour change, and delve into the findings of historical social psychological research, including the works of Asch, Milgram and Zimbardo.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to status and power in groups before you start.

Subject matter

Science understanding

- Describe group social influence, with reference to compliance, identification and internalisation.
- Describe the effect of status, roles and power on social behaviour.
- Explain how obedience, conformity and social norms (as described by Cialdini et al. 2006) lead to behaviour change.
- Describe the findings of historical social psychological research, with reference to
 - Asch's (1955) research on compliance
 - Milgram's (1963) research on obedience
 - Haney, Banks and Zimbardo's (1973) research on status, roles and power.

Science as a human endeavour

- Evaluate historical social psychological research, considering the ethical and procedural challenges involved in producing reproducible results when conducting research in social psychology, e.g. consider
 - critiques of the Stanford Prison Experiment with respect to demand characteristics, data collection issues and the experience of participants (Le Texier 2019)
 - the effect that Milgram's (1963) study of obedience had on ethical guidelines for psychological researchers.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and apply ethical principles, e.g.
 - withdrawal rights
 - informed consent procedures
- translate information between graphical, numerical and/or algebraic forms
- select, synthesise and use evidence to
 - explain findings
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Key studies



Key study summaries

Read summaries of the key studies for this module.

- Cialdini et al., 2006
- Asch, 1955
- Milgram, 1963
- Haney, Banks and Zimbardo, 1973

Lesson 11.1

Group social influence

Key ideas

- Kelman's (1958) social influence theory suggests three conditions under which people are more likely to change attitudes, beliefs and behaviours: compliance, identification and internalisation.
- Compliance is a change in a person's attitudes publicly, but not privately, so that they are more likeable in their group.
- Identification is a change in a person's attitude and behaviour because they are influenced by someone and relate to the content of the attitude.
- Internalisation is a change in a person's attitude and behaviour because they have taken on a new attitude into their belief system.



Learning intentions and success criteria

Introducing group social influence

Lesson 10.1 introduced the way that people are influenced by their social networks through primary and secondary socialisation. In this section, the concept of group social influence will be introduced, and Herbert Kelman's (1958) social influence theory will be summarised.

Have you ever said that you agreed with an attitude or an idea, even though you didn't? Perhaps your best friend goes for the Broncos, and around them you say you do too, but when you're at home with your family you support the Cowboys, because you've supported them for as long as you can remember. Perhaps you've even started to also support the Broncos. But have you wondered why you are able to say one thing and believe another?

People have a need to be right and a need to be liked by society. If an individual is able to meet both these needs simultaneously, this will make the person feel better.

Introducing social influence theory

During the 1950s in the United States, racial segregation was a strong political and social concern. Because of the social pressures, many psychologists began to investigate how attitudes were formed and maintained and how they could be changed. Herbert Kelman was interested in the changing of attitudes on the basis of group influence. In 1958 he presented his **social influence theory**. Social influence theory poses that the attitudes and beliefs of someone, and the behaviours that express these attitudes, are influenced by the people who an individual associates with, including family, friends, colleagues and their wider society. Social influence theory identifies three processes that an individual can go through to achieve attitude change: **compliance**, **identification** and **internalisation** (Figure 1).

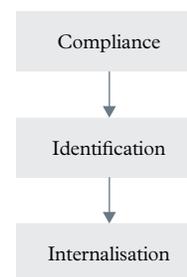


FIGURE 1 Social influence theory states that people must first comply with an attitude, then identify with the attitude, and finally they internalise the attitude.

social influence theory

a theory that suggests that an individual's thoughts, feelings and behaviours are shaped by the presence or actions of others; encompasses various forms of influence including compliance, identification and internalisation

compliance

a change in people's attitudes publicly, but not privately, so that they are more likeable in their group

identification

a change in people's attitude and behaviour because they are influenced by someone and relate to the content of the attitude

internalisation

a change in people's attitude and behaviour because they have taken on a new attitude into their belief system

Compliance

When people demonstrate compliance, they present themselves as agreeing with the attitudes or beliefs of others, and keep any contradictory attitudes or beliefs to themselves. People are likely to engage in compliant behaviour or attitudes because they believe that their social networks will like them and they may gain social benefits. Imagine a student named Alex who is part of a study group. The group decides to use a particular study method that Alex doesn't find effective. However, Alex agrees to use the method and pretends to support it because they want to fit in with the group and maintain good relationships with their peers. Even though Alex privately believes another method would be better, they comply with the group's decision to gain social acceptance and avoid conflict.



FIGURE 2 (A) Nutri-Grain cereal has been heavily involved in Iron Man competitions. (B) The Iron Man and Iron Women competitors are influential over young women and men.

Identification

When we identify with someone, we are likely to be influenced by them. Think about advertisements you have seen on television. Often, they will feature someone famous endorsing a product. A classic Australian example is the Nutri-Grain Iron Man advertisements. These advertisements use Iron Man champions to encourage viewers to believe that they too could be the same. These campaigns use the identification idea – that people will be influenced by someone who is liked and respected. This can be a friend, teacher or relative but can also be a famous celebrity or sports star.

People are likely to get satisfaction or reward from the act of conforming, rather than from the attitude that they are conforming to.

Internalisation

When a belief or attitude is accepted by a person and their behaviour reflects this, an attitude is said to be internalised. When someone has internalised an attitude, they will experience this both privately and in public. Imagine a student named Jamie who learns about the importance of environmental conservation in school. Jamie not only agrees with the principles of reducing waste and protecting nature but also adopts these practices in daily life. Jamie recycles at home, participates in community clean-up events, and encourages friends and family to be more environmentally conscious. This belief in environmental conservation is reflected in Jamie's behaviour both privately and publicly, demonstrating that the attitude has been internalised.

When people internalise a belief or attitude, they are likely to be rewarded by the actual belief they have adopted. They are no longer being rewarded by social benefits.

Challenge

Social influence theory

People are influenced by those around them. Consider social influence theory, and apply it to a belief or attitude you possess. **Determine** where this attitude or belief came from and how those around you encouraged or discouraged it.

Check your learning 11.1



Check your learning 11.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** what the following terms mean
 - a compliance (1 mark)
 - b identification (1 mark)
 - c internalisation. (1 mark)
- 2 **Explain** Kelman's social influence theory. (2 marks)

Analytical processes

- 3 **Compare** internalisation and compliance. (2 marks)

Knowledge utilisation

- 4 **Evaluate** social influence theory as a means for gender role formation. (3 marks)

Lesson 11.2

Groups and power

Key ideas

- A group is defined as two or more people who interact over a period of time, have influence on each other and share a common goal.
- Within a group, a person is said to have power over another if there is a reasonable expectation that the second person will behave in the way the first person desires, even against the second person's own wishes.
- Social influences include obedience, conformity and social norms, and they shape our actions and decisions (Cialdini et al., 2006).



Learning intentions and success criteria

Introducing groups

Consider the following scenarios and decide which of these describes a group:

- 1 Twenty people are travelling on a bus towards the Gold Coast.
 - 2 Three people are sharing a taxi to the airport.
 - 3 Two people are playing chess.
 - 4 The Broncos' cheer squad is making the banner for next week's game.
 - 5 Twenty people attend a school reunion.
 - 6 More than 35,000 Cowboys supporters attend the opening game of the season.
- There needs to be a certain set of rules to help us define a **group**:
- A group consists of two or more people.
 - Individuals in the group must interact with each other over a period of time.
 - Individuals in a group must influence each other.
 - Members of a group must have a common purpose.

group

two or more people who interact over a period of time, have influence on each other and share a common goal

We can decide whether the six scenarios represent groups by completing a table such as Table 1.

TABLE 1 Examples of groups

| Scenario | Number | Interaction | Influence | Common purpose | Group or non-group |
|----------|--------|-------------|-----------|----------------|--------------------|
| 1 | Yes | Slight | No | Slight | Non-group |
| 2 | Yes | Yes | Yes | Yes | Group |
| 3 | Yes | Yes | Yes | Yes | Group |
| 4 | Yes | Yes | Yes | Yes | Group |
| 5 | Yes | Yes | Yes | Yes | Group |
| 6 | Yes | Slight | Slight | Yes | Non-group |

Challenge

What makes a group?

You are part of many groups: your school year level, any sports teams that you play in, any clubs that you are part of, your family group, your friendship group, etc. Certain groups are innate, such as your family, and the sources of power within these groups are typically innate, too. Other groups, such as your friendship group, are more diverse and the sources of power in these are not predetermined.

Select a group that you belong to and **decide** what makes it a group. **Identify** any sources of power within that group.

Power within groups

power

a person has power if they can influence the thoughts or behaviour of others

A person is said to have **power** over another if there is a reasonable expectation that the second person will behave in the way the first person desires, even against the second person's own wishes. For example, a motor mechanic has power over a customer with little mechanical knowledge. However, the employer has power over the mechanic, who needs the job to remain employed.



FIGURE 1 Motor mechanics have a type of “expert” power over their customers due to the skills and knowledge they possess.

Sources of power

Where does power come from? Social psychologists have identified six sources of power, as described in Table 2.

TABLE 2 Types of power and their sources

| Type of power | Source of power | Example |
|-------------------|--|--|
| Reward power | Ability to provide a desired response | Teacher who can allow students to leave early |
| Coercive power | Ability to provide an unpleasant response | Teacher who can detain students after class |
| Information power | Having knowledge that others desire | Librarian who knows where all information is filed |
| Legitimate power | A higher authority, may be due to role or position | Police officer or coach of sports team who has authority |
| Expert power | Skills and depth of knowledge | Doctor or motor mechanic who has specific knowledge |
| Referent power | Another's desire to relate to the person | Sports star or a good friend who is admired |



FIGURE 2 If you are the captain of a sports team, your coach might have legitimate power, the team's best player might have expert power, and you, as the captain, might have reward power.



FIGURE 3 Police officers' power is given to them by the state and is an example of legitimate power.

In addition to the types of power identified in Table 2, a person's **status** within a group can provide them with a position of power. Status is defined as being the relative standing of a person within a social or professional group.

status

the position of an individual within a group

Styles of leadership

The possession of power is one thing; the ability to provide leadership is quite another. A distinguished experiment investigating leadership style was carried out by Lewin, Lippitt and White (1939). Boys were allocated to one of three groups, each with an adult leader. The leaders applied one of three different styles of leadership:

- **Democratic:** Tasks were negotiated with the children.
- **Authoritarian:** The leader made all the decisions and controlled the behaviour of the boys.
- **Laissez-faire:** The leader took no part in proceedings.

As predicted, the democratic group was happier and more productive than the other two. The authoritarian group was productive, but only when the leader was actively managing the process. The laissez-faire group was low in productivity and its members were less happy than members of either of the other groups.

Another study, by Blake and Mouton (1964), described a “managerial grid” with two dimensions: concern for people's wellbeing and concern for productivity (Figure 4). This enabled the researchers to identify five major styles of leadership and management. These are described in Table 3.

democratic

a style of leadership where the leader negotiates decisions with the group

authoritarian

a style of leadership where the leader actively makes all decisions and has control over the group

laissez-faire

a style of leadership where the leader does not actively make any decisions, and lets the group control themselves

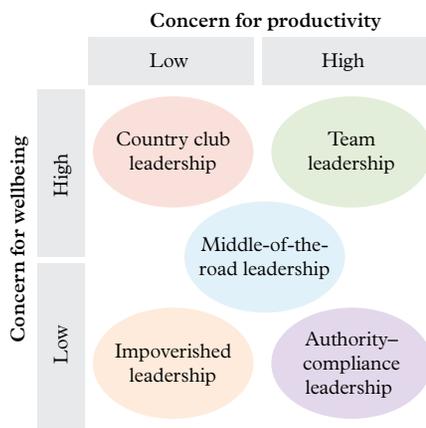


FIGURE 4 Blake and Mouton's leadership and management grid

TABLE 3 The five major leadership styles

| Leadership style | Description |
|--|---|
| Country-club leadership (low productivity/high wellbeing) | This style shows most concern about the needs and feelings of members of the team. Managers assume that as long as team members are happy and secure, then productivity will follow. This creates a work environment that is fun and relaxed, but productivity suffers because of lack of direction and control. |
| Authority-compliance leadership (high productivity/low wellbeing) | This style is also known as “produce or perish” leadership. Managers believe that employees are just a means to an end. Employees' needs are less important than the need for an efficient and productive workplace. Authoritarian leaders are very strict, have rigid work rules, policies and procedures, and use coercive power to motivate employees. |
| Impoverished leadership (low productivity/low wellbeing) | This style is ineffective. Such management results in a workplace that is disorganised, workers who are dissatisfied and a workforce lacking harmony. |
| Middle-of-the-road leadership (medium productivity/medium wellbeing) | This management style is a balance between the two dimensions. It looks like a good compromise, but in fact neither wellbeing of employees nor productivity is achieved to a satisfactory level. Leaders using this style settle for average performance. |
| Team leadership (high productivity/high wellbeing) | This is the ideal managerial style that values production needs and the needs of workers equally. It creates a team environment based on trust and respect, which leads to high satisfaction and motivation, and results in high productivity. |

Introducing the power of influence

Have you ever wondered why we often follow the crowd or listen to authority figures, even when we might not fully agree with them? In psychology, these behaviours are explained through concepts like obedience, conformity and social norms.

These social influences play a crucial role in shaping our actions and decisions (Cialdini et al., 2006). By understanding how these forces work, we can gain insights into why people behave the way they do in different social situations. These powerful influences lead to behaviour change, helping us better understand the dynamics of human interaction. We will explore the power of obedience, conformity and social norms.

Obedience

obedience

following direct orders or commands from an authority figure

Obedience involves following direct orders or commands from an authority figure. People tend to obey authority figures because they perceive them as knowledgeable and trustworthy (Cialdini et al., 2006). This perception is often ingrained from a young age, as we are taught to respect and follow authority because we perceive authority figures as knowledgeable and trustworthy.

Obedience may also occur because of the fear of the negative consequences of disobeying authority figures – we comply to avoid punishment. For example, imagine you work a part-time job, and your manager asks you to stay an extra hour to help clean up after a busy shift. Even if you had plans to meet friends afterward, you might agree to stay (Figure 5). This is because you see your manager as an authority figure who has the knowledge and authority to make such requests. Additionally, you've been taught to respect and follow the instructions

of your supervisors. There's also the fear of negative consequences, such as getting a bad performance review or losing your job, which motivates you to comply with the manager's request.

Conformity

Conformity involves adjusting our attitudes, beliefs and behaviours to align with group norms. We do this because we want to be liked and accepted by others (**normative influence**). For example, imagine you're at a new school and you notice that most students wear a particular style of clothing. Even if it's different from what you usually wear, you might start dressing similarly to fit in and be accepted by your peers. This is an example of normative influence, where you conform to group norms to be liked and accepted.

In other situations, we may look to others for guidance when we're unsure how to behave, assuming they know better. Think about a situation where you might be unsure how to act, like attending a formal dinner for the first time. You might look to others to see which fork to use or how to behave, assuming they know better (Figure 6). This is informational influence, where you conform because you believe others have more knowledge about the situation.

Conformity can significantly influence behaviour change and fundamental social motives, such as self-protection and mate attraction, and can drive individuals to conform or not conform strategically. When individuals feel a need for self-protection, they are more likely to conform to group norms (Cialdini et al., 2006). This is because aligning with the group can provide a sense of safety and security.

The desire to attract a mate can also lead to different conformity behaviours based on gender. For example, women tend to conform more to others' preferences when motivated by romantic goals, while men exhibit nonconformity to stand out and appear unique (Figure 7).

Conformity and nonconformity can also be used as a strategy for self-presentation. For instance, individuals may opt to exhibit nonconformity in areas where individuality is prized, yet display conformity in situations where there is a well-established standard. For example, in a maths class, students are likely to conform to the correct method of solving a problem because there is a clear, accurate way to get the right answer. In contrast, in a creative writing class, students might feel more comfortable expressing unique and individual styles, as there is no single "correct" way to write a story.

These findings suggest that conformity is not just about blindly following the crowd but can be a deliberate strategy influenced by underlying social motives. This strategic use of conformity can lead to significant behaviour changes as individuals navigate their social environments.



FIGURE 5 You may agree to staying an extra hour to help clean up after a busy shift, demonstrating obedience to authority and commitment to the job.

conformity
adjusting our attitudes, beliefs and behaviours to align with group norms

normative influence
a type of social influence that leads us to conform in order to be liked and accepted by others



FIGURE 6 You might rely on informational influence for guidance when you are in a new situation, such as attending a formal dinner for the first time.



FIGURE 7 Men tend to exhibit nonconformity to stand out when trying to attract a mate.

Real-world psychology

Social conformity in pandemics: How our behaviours spread faster than the virus itself

Human behaviours and actions are greatly influenced by those around them, as seen during the COVID-19 pandemic when practices like masking and social distancing varied widely based on social dynamics. Researchers from the University of Pennsylvania and Queen's University in Canada created a theoretical model to understand how social norms impact the adoption of non-pharmaceutical interventions (NPIs), such as masking and social distancing, during a pandemic.

Their study, published in the *Proceedings of the National Academy of Sciences*, indicates that social conformity creates a “stickiness” effect, where individuals are hesitant to change their NPI usage if it differs from what others are doing. This means that even with a high risk of infection, people may not adopt protective behaviours unless they observe others doing so. Conversely, once a behaviour like masking becomes widespread, people are slow to stop, even when the risk decreases.

The researchers' model takes into account the risk of infection, the cost of NPIs and the social cost of deviating from norms. It demonstrates that small changes in factors such as the effectiveness of NPIs

or the transmission rate can lead to significant shifts in population behaviour. This results in distinct waves of infection and NPI usage, rather than a smooth increase or decrease in disease spread.

The study demonstrates the complex relationship between social norms and disease transmission. For instance, if the cost of deviating from social norms is high, people delay adopting NPIs, leading to higher initial infection rates. However, once NPIs are adopted, they persist longer than they would if people were only considering their individual risks. This insight can help policymakers design better strategies for managing public health during pandemics.

Apply your understanding

- 1 **Explain** how social norms influence the adoption and persistence of non-pharmaceutical interventions during a pandemic. (2 marks)
- 2 **Identify** the factors the researchers considered in their model to understand the adoption of NPIs. (3 marks)
- 3 **Explain** the concept of “stickiness” in the context of social norms and NPI usage. (2 marks)
- 4 **Describe** how small changes in factors like the effectiveness of NPIs or the transmission rate can affect population behaviour. (1 mark)
- 5 **Explain** why people might delay adopting NPIs even when the risk of infection is high. (2 marks)



FIGURE 8 During the COVID-19 pandemic measures like masking and social distancing varied widely based on social dynamics.

Social norms

Social norms are the unwritten rules about how to behave in a particular social group or culture. **Descriptive norms** describe what most people do in a given situation, rather than what they believe they should do. **Injunctive norms**, on the other hand, are social rules and expectations about how people should behave in a given situation, based on what is perceived to be approved or disapproved by others.

For example, imagine you're at a high school party. A descriptive norm might be that most people are dancing and having fun because that's what everyone typically does at parties. You notice this behaviour and might join in because it's what most people are doing (Figure 9). An injunctive norm, on the other hand, would be the expectation that you should not drink alcohol if you're underage, as this is generally disapproved of by society and your peers (and it is illegal!). Even if some people are drinking, the social rule is that you shouldn't, and this influences your behaviours to avoid disapproval.

The study by Cialdini and colleagues (2006) aimed to understand how social norms influence behaviour. It investigated the impact of descriptive norms (what most people do) and injunctive norms (what people approve or disapprove of) on people's actions. The researchers placed signs in a public park and observed the behaviour of individuals who visited the park. The signs displayed either a descriptive norm message, "Most visitors have removed the petrified wood from the park, changing the state of the Petrified Forest" or an injunctive norm message, "Please don't remove the petrified wood from the park, in order to preserve the natural state of the petrified forest." The researchers measured the amount of petrified wood taken from the park after the signs were posted.

The study found that the descriptive norm message increased the amount of wood taken because it implied that taking wood was a common behaviour, whereas the injunctive norm message decreased the amount of wood taken because it conveyed social disapproval of the behaviour.

The study concluded that injunctive norms are more effective in reducing undesirable behaviours than descriptive norms. This is because injunctive norms communicate what is socially acceptable or unacceptable, influencing people to conform to these expectations to gain social approval or avoid disapproval. They are more effective in guiding behaviour towards socially acceptable actions. This study highlights the importance of carefully considering how messages are framed when trying to influence behaviour through social norms.



FIGURE 9 Some people dance at a party to conform to social norms.

social norm
an unwritten rule about how to behave in a particular social group or culture

descriptive norm
a typical behaviour, attitude or action that people engage in within a specific context or situation

injunctive norm
a social rule or expectation about how people should behave in a given situation

Study tip

Cialdini and colleagues' (2006) study is a key study in Unit 4. You will need to be able to recall the details of the study for the external exam in the context in which you learnt about the study. This means you need to be able to identify that this study demonstrated how obedience, conformity and social norms can lead to behaviour change.

Challenge

Think about an unwanted behaviour in your school, like littering or running in the hallways. Create a sign that uses an injunctive norm to discourage this behaviour. Remember, an injunctive norm communicates what is socially approved or disapproved. For example, you might write, "Please don't litter to keep our school clean and beautiful." **Explain** why you chose this message and how you think it will influence others' behaviour.

Check your learning 11.2



Check your learning 11.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** three features of a group. (3 marks)
- 2 **Describe** what a group is, using an example. (2 marks)
- 3 **Describe** how the desire to attract a mate can lead to different conformity behaviours in men and women. (2 marks)
- 4 **Identify** three different types of power. (3 marks)
- 5 **Describe** a situation where obedience to an authority figure might lead to behaviour change. (1 mark)
- 6 **Explain** the difference between descriptive and injunctive norms. (2 marks)

Analytical processes

- 7 **Compare** power and leadership. (2 marks)
- 8 **Distinguish** between coercive power and legitimate power. (1 mark)

Knowledge utilisation

- 9 **Propose** the best leadership style for happy employees by evaluating the five major leadership styles. (3 marks)
- 10 **Discuss** how social norms influence behaviour with reference to Cialdini and colleagues (2006). (2 marks)

Lesson 11.3

Effects of status and power within groups

Key ideas

- In the Stanford prison experiment, Zimbardo and his colleagues (1973) showed that the environment and roles assigned to people can have significant influences on behaviour.
- Deindividuation was identified as a significant influence, increasing the cruelty of the guards and the sense of powerlessness of the prisoners.



Learning intentions and success criteria

Study tip

When reading any study, especially historical research, take notes about the participant selection, methodology and ethics. This will help you find strengths and limitations of the study.

Introducing Zimbardo's Stanford prison experiment

In 1971, one of the most famous experiments in social psychology was performed at Stanford University by Philip Zimbardo and his colleagues (Haney et al., 1973).

To obtain participants for this experiment, an advertisement was placed in the university newspaper offering volunteers US\$15 per day (about \$120 today in Australian currency). All 70 of those who applied were interviewed and given personality tests. The 24 applicants who showed the highest levels of physical health and mental stability were selected. Eighteen of them were randomly allocated to be either “prison guards” or “prisoners”; the remaining six stayed on call to make up numbers if a participant dropped out during the experiment.

Method

Participants

The prison superintendent (high status) was Dr Philip Zimbardo.

The guards (high status) were given military-style uniforms and reflective sunglasses to disguise their individuality and cause them to have fewer inhibitions about the way they behaved (this process is called **deindividuation**), and whistles and batons to emphasise their authority.

The guards were instructed:

- to impose their will on the prisoners using psychological intimidation
- not to use physical violence on prisoners
- to blindfold prisoners when they needed to leave the prison to use the toilet
- to touch the prisoners with their batons if necessary, but not hit them.

The prisoners (low status) were given short, sack-like smocks to wear, with no underwear; hats made of ladies' stockings to cover their hair; a prison number; and a chain around the ankles, to ensure that they could never forget their status.

The prisoners were instructed:

- to obey all instructions from the guards
- to ask permission to use the toilet, smoke a cigarette or write a letter
- to refer to themselves by their prison number, not their name; together with their garments, this meant that deindividuation applied to the prisoners, with the effect of reducing their sense of self.

deindividuation

a sense of anonymity and loss of individuality that comes from being in a situation where individuals can't be identified personally; individuals are more likely to commit antisocial acts

The setting

The setting was the basement of the Psychology Department at Stanford University, which had no windows. Cells, 2 × 3 metres in size, opened off a corridor, which was boarded up at each end. Opposite the cells, a cupboard of 60 × 60 × 213 centimetres, tall enough to stand up in, was used as the solitary confinement cell.

Procedure

- 1 In the early hours of a Sunday morning, each prisoner was picked up at his home by genuine police officers, charged, warned of his legal rights, spread-eagled against the police car, searched and handcuffed, often in full view of amazed neighbours.
- 2 The police car then raced to the Palo Alto police station with sirens at full blast.
- 3 Each prisoner was taken inside, fingerprinted, blindfolded and left to wait.
- 4 The prisoners were transported in a prison van to the Stanford University "jail", where they were interviewed by the "superintendent" who told them of the serious nature of their offences.
- 5 The prisoners were stripped naked and sprayed with a de-lousing agent.
- 6 The prisoners were issued with prison clothing: a smock and a stocking hat.
- 7 The guards worked 8-hour shifts with three guards in each shift. Prisoners were three to each cell.



FIGURE 1 Student volunteers were assigned roles as guards or prisoners in the experiment.

- 8 At 2:30 am on the first night, and several times in each shift afterwards, the prisoners were woken with blasting whistles and shouts to attend roll-call.
- 9 Guards administered punishments, such as making prisoners do push-ups and perform humiliating acts (e.g. walking like Frankenstein's monster or telling other prisoners "I love you").

Challenge

The Stanford prison experiment

Dr Philip Zimbardo was an active participant in the Stanford prison experiment.

Identify two negative effects that this could have had on the results of the study and **propose** a solution for each of these. Go to Module 1 to help you meet this challenge!

Results

- Everything went smoothly for the first day and night, as all participants adjusted to their roles. On the second day, the prisoners protested and rebelled. The guards quickly stopped the rebellion by spraying freezing carbon dioxide (dry ice) from fire extinguishers on the prisoners.
- The guards then entered each cell, stripped the prisoners of their clothes, removed the beds from the cells and forced the leaders of the rebellion into solitary confinement. From this time on, the level of harassment of the prisoners by the guards increased and psychological abuse intensified.
- One of the cells was now labelled a "privilege cell", and the prisoners least involved in the rebellion were given their clothes and beds, allowed to wash and clean their teeth, and given special food to eat in front of the other prisoners, who received no food. This resulted in breaking down the solidarity of the prisoner group.
- After a few hours, the guards took some of these "good" prisoners and exchanged them for "bad" prisoners, who were put in the "good" cell, which unsettled all the prisoners who now thought that some of them must be informers. The prisoners became distrustful of each other. This tactic is used by real guards in real prisons to break prisoner solidarity.
- The rebellion produced greater solidarity among the guards, who now saw the prisoners as trouble-makers. The guards even refused to allow prisoners to go to the toilet, making them use a bucket in their cell and sometimes even refusing to allow them to empty the bucket.
- When one prisoner began to suffer severe emotional distress less than 36 hours into the experiment, the warden and superintendent would not let him leave. Eventually he became so distressed that they realised that they had gone too far with the "reality" of the prison and allowed him to withdraw.
- Over the next 2 days, two more prisoners were similarly released. One was so emotionally distressed that he developed a psychosomatic rash over his whole body.
- On day 3, friends and relatives of the prisoners were allowed to visit, so the cells were cleaned and polished, and the prisoners were showered, shaved and well fed to create a good impression. Some of the parents complained, but none insisted that their son should be released.
- Next, there was a rumour of an attempt to escape. This never happened, but the guards were so angered by the inconvenience they suffered that they increased the abuse further, making prisoners clean out toilets with their bare hands.

- By day 5, the guards had fallen into three categories; about one-third in each:
 - tough but fair guards who followed prison rules
 - good guys who did little favours for the prisoners and never punished them
 - aggressive and cruel guards who thought of creative ways to humiliate prisoners.
- On day 6, the project was abandoned, less than halfway through the proposed 14-day experiment. This occurred for two reasons:
 - Zimbardo and his colleagues realised, through watching closed-circuit television footage, that the guards were increasing their abuse of prisoners during the night when they thought no one was watching.
 - Christina Maslach, a recent doctoral graduate from Stanford who was dating Phillip Zimbardo at the time, came to the “prison”. She took one look at the degraded prisoners and soundly reprimanded Zimbardo, even telling him that if this was a true indication of the sort of person he was, there would be no hope for their relationship. (They were married for 52 years at the time of his death in 2024.)



FIGURE 2 The Stanford prison experiment became so real for participants that it had to be terminated prematurely due to emotional distress.

Skill drill

Applying ethical principles

Science inquiry skill: Considering safety and ethics (Lesson 1.5)

Criticisms of the Stanford prison experiment

- Violation of the “no harm” principle: The no harm principle in psychological research mandates that participants should not experience any physical or psychological harm. In the Stanford prison experiment, participants experienced significant psychological distress. Despite the provision of counselling, some participants reported negative effects even 40 years after the experiment.
- Violation of withdrawal rights: Participants in any psychological study must have the right to withdraw at any time without any negative consequences. In the Stanford prison experiment, when one of the “inmates” became distressed and wished to withdraw, he faced significant pressure to stay.

Positive outcomes from the experiment

Despite its ethical failings, the Stanford prison experiment did lead to some positive changes:

- Government review of youth detention: The experiment prompted a review of youth detention

practices in the United States, leading to reforms aimed at improving conditions and treatment of detainees.

- Career change and advocacy: One participant was so affected by the events he witnessed that he changed his university course to become a forensic psychologist. Over the past 40 years, he has dedicated his career to improving conditions for prisoners in US jails.

Practise your skills

- 1 **Describe** how the no-harm principle was violated in the Stanford prison experiment. (1 mark)
- 2 **Explain** how the lack of informed consent impacted the validity and ethical standing of the psychological study. (2 marks)
- 3 **Identify** the information participants should be provided with to ensure informed consent is properly obtained. (2 marks)
- 4 **Identify** one positive outcome from the Stanford prison experiment. (1 mark)

Status, roles and power within groups

The Stanford prison experiment demonstrated the interactions within a group, especially with regard to status, roles and power. The guards and prisoners were assigned their roles and rapidly fulfilled them, going beyond “playing their part”, despite knowing there were no legitimate prisoners.

Check your learning 11.3



Check your learning 11.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the key variable that Zimbardo and his team controlled in the Stanford prison experiment. (1 mark)
- 2 **Describe** the effects of power imbalance between the guards and prisoners in the Stanford prison experiment. (1 mark)
- 3 **Define** “deindividuation”. (1 mark)
- 4 **Explain** the types of power that the guards exerted over the prisoners. (2 marks)

Analytical processes

- 5 **Distinguish** between the role of the guards and the role of the prisoners. (1 mark)
- 6 **Deduce** how power operates in a group with reference to the Stanford prison experiment. (2 marks)

Knowledge utilisation

- 7 **Discuss** this statement: “The prison warden could have exerted more power over the guards to change the result of the Stanford prison experiment.” (3 marks)
- 8 **Consider** the study design used in the Stanford prison experiment. **Predict** if the results would have been different had a double-blind procedure (where neither the participants nor the experimenters know the specific roles assigned to each participant) been used. **Justify** your response. (2 marks)
- 9 **Discuss** the validity and reliability of Zimbardo’s study. (3 marks)

Lesson 11.4

Milgram’s experiment and obedience

Key ideas

- Obedience is when an individual or group behaves in a certain way based on orders or rules provided by a figure of authority.
- Authority is the power to order individuals to behave in a particular way.
- Milgram’s (1963) experiment provided evidence that people would obey someone with perceived authority, despite feeling bad about it.



Learning intentions and success criteria

Introducing Milgram's obedience experiment

One of the most horrific examples of obedience was the genocide of the Jews during the Second World War, when an estimated six million Jewish men, women and children were murdered by the Nazis between 1939 and 1945.

Obedience is when an individual complies with an order or request when directed by someone with perceived or legitimate authority. Someone in a position of **authority** has the power, or the right, to make decisions on behalf of others and order others around.

In 1961, an American social psychologist at Yale University, Stanley Milgram, set out to discover whether there was a special characteristic that made Germans more obedient to authority than other races. This was a popular theory in the United States and Europe in the years after the Second World War.



FIGURE 1 Nazi party rallies demonstrated obedience to authority.

Challenge

Obedience and the Nazi party

Hitler's Nazi regime relied on the status and power of Hitler and high-ranking Nazi officials alongside the concurrent obedience of Nazis with lower paramilitary ranking. Many of the atrocities committed by the Nazis were strongly influenced or directly caused by lower ranking members being commanded by higher ranking members. Based on your understanding of status and power, **propose** an explanation for why this obedience occurred.

obedience

following direct orders or commands from an authority figure

authority

the power to order individuals to behave in a certain manner

Milgram's experiment

Aim

The aim was to investigate the extent to which individuals would obey an authority figure, even when the orders given were morally questionable and involved causing harm to another person. Milgram sought to understand whether ordinary people could be compelled to commit acts against their conscience under the influence of an authoritative figure.

Background

Milgram's interest in obedience was sparked by the atrocities committed during the Second World War, particularly the Holocaust. He wanted to explore the psychological mechanisms that could lead individuals to participate in such horrific acts.



FIGURE 2 Stanley Milgram with his experimental "teaching machine"

The prevailing question was whether the perpetrators were inherently evil or if they were simply following orders from authority figures. Milgram's experiment was designed to shed light on this issue by simulating a situation where participants were asked to perform actions that conflicted with their personal morals.

Method

Participants

The experiment involved 40 male participants aged between 20 and 50, recruited through newspaper advertisements and direct mail. The participants came from various occupational backgrounds, including unskilled workers, professionals and businessmen. They were told they would be participating in a study on learning and memory and were compensated \$4.50 for their time, which was a reasonable amount at the time. In 1961, this amount would have covered the week's grocery bill for a family in Australia. Participants were told that they would keep the money even if they did not complete the experiment.

Materials

The materials used in the experiment:

- Shock generator: A device with 30 switches labelled with voltage levels ranging from 15 volts to 450 volts. The switches were also labelled with terms like "Slight Shock", "Moderate Shock" and "Danger: Severe Shock". This was used by the "teacher".
- Electrodes: These were attached to the learner's (actor's) wrists to simulate the administration of electric shocks.
- Scripts and prods: Pre-determined phrases were used by the experimenter to encourage the participant to continue administering shocks.
- Rooms: Two separate rooms were used, one for the learner and one for the teacher and experimenter.

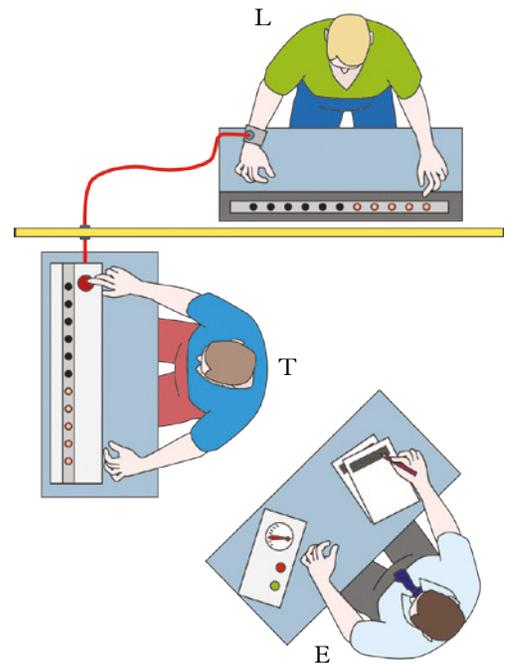


FIGURE 3 The Milgram experiment set-up. The experimenter (E) orders the teacher (T), the subject of the experiment, to give what the latter believes are painful electric shocks to a learner (L), who is actually a confederate (actor) planted by the experimenter.

Procedure

- 1 Participants were introduced to another "participant", who was actually a confederate (an actor). The participants and the confederate picked slips of paper to decide who would be the "teacher" and who would be the "learner", but the draw was rigged so that the real participant was always the teacher, and the confederate was the learner.
- 2 The learner was strapped to a chair with electrodes attached to their wrists in one room. The teacher and the experimenter were in another room with the shock generator.
- 3 The teacher was instructed to read a list of word pairs to the learner and then test their memory by asking them to recall the correct pair. For every incorrect answer, the teacher was instructed to administer an electric shock, increasing the voltage with each mistake.

The shocks were not real, but the teacher believed they were. The learner would react with increasing discomfort and pain as the shocks intensified, eventually pleading for the experiment to stop.

- 4 Milgram used a series of standardised prompts, or “prods”, to encourage the teacher to continue administering electric shocks to the learner whenever they hesitated or expressed a desire to stop. The prods were designed to exert authority and pressure the teacher to comply with the instructions. These were the four main prods used:
- i “Please continue.” This was the initial, mild prompt to encourage the participant to proceed with the task.
 - ii “The experiment requires that you continue.” This prod suggested that continuing was necessary for the success of the experiment, adding a sense of obligation.
 - iii “It is absolutely essential that you continue.” This stronger prod emphasised the importance of the participant’s role in the experiment, increasing the pressure to comply.
 - iv “You have no other choice; you must go on.” This was the most forceful prod, implying that the participant had no alternative but to follow the instructions.

If the participant still refused to continue after all four prods, the experiment was terminated. However, if they complied, the experiment continued until the maximum voltage was reached or the participant refused further.

These prods were crucial in demonstrating the power of authority and how it can influence individuals to act against their own moral judgments. The experimenter’s calm and authoritative demeanour, combined with these prods, created a compelling pressure for participants to obey, even when they were uncomfortable with the actions they were taking.

Results

- Obedience levels: 65 per cent of participants (26 out of 40) continued to the maximum voltage of 450 volts, despite the apparent distress of the learner.
- Distress and discomfort: Many participants showed signs of extreme stress and discomfort, including sweating, trembling, stuttering, biting their lips and even nervous laughter. Some participants experienced uncontrollable seizures.
- Defiance: Although a significant majority obeyed the experimenter, some participants did refuse to continue at various points, demonstrating a conflict between their moral beliefs and the authority’s commands.

TABLE 1 Results of obedience tests in Milgram’s 1963 experiment

| Voltage level | Label | Number of obedient participants | Participant obedience (%) |
|---------------|-------------------------|---------------------------------|---------------------------|
| 15–60 | Slight shock | 40 | 100 |
| 75–120 | Moderate shock | 40 | 100 |
| 135–180 | Strong shock | 40 | 100 |
| 195–240 | Very strong shock | 40 | 100 |
| 255–300 | Intense shock | 40 | 100 |
| 315–360 | Extreme intensity shock | 34 | 85 |
| 375–420 | Danger: severe shock | 26 | 65 |
| 435–450 | XXX | 26 | 65 |

Conclusion

Milgram's experiment led to several important conclusions about human behaviour:

- **Power of authority:** The experiment demonstrated that people are highly likely to follow orders from an authority figure, even when those orders conflict with their personal morals and cause harm to others.
- **Situational factors:** The findings suggested that situational factors, such as the presence of an authority figure and the setting of the experiment, play a crucial role in determining obedience levels.
- **Moral conflict:** The experiment highlighted the intense moral conflict experienced by participants, as they struggled between obeying authority and adhering to their own ethical standards.
- **Implications for society:** Milgram's findings have profound implications for understanding how ordinary people can be influenced to commit atrocities under authoritative pressure, shedding light on historical events and informing contemporary discussions on obedience and authority.

Milgram performed many other versions of this experiment. These versions validated the original results (Table 2).

Study tip

When reviewing older research, keep in mind that ethical considerations may not have existed, and that this can impact results and future modifications.

TABLE 2 Levels of obedience in various versions of the Milgram experiment

| Version | Description | Participant obedience (%) |
|---------|---|---------------------------|
| | Initial study | 65 |
| 1 | Where two other teachers (actors) continued to 450 volts | 73 |
| 2 | With women as participants | 65 |
| 3 | With verbal feedback from learner | 62.5 |
| 4 | In a low-prestige setting (a shabby office in Connecticut) | 48 |
| 5 | Where the teacher and the learner were in the same room | 40 |
| 6 | Where the teacher had to physically force the learner's hand onto a metal plate to administer the shock | 30 |
| 7 | Authority figure not in the room with teacher | 21 |
| 8 | Non-authority figure providing the prods | 20 |
| 9 | Two other teachers (both actors) refusing to obey | 10 |
| 10 | Actor administering the shocks while the teacher read the questions | 7 |
| 11 | The teacher able to nominate the level of shock to be used | 2.5 |
| 12 | Experimenter says "Stop"; learner asks to continue | 0 |

Real-world psychology

Revisiting the results of a famous experiment

Researchers from SWPS University in Poland revisited the Milgram experiment in 2024 and found that people are more likely to obey when the experimenter is close by, and the learner is far away. In this study, 160 participants were divided into

four groups, each with 20 men and 20 women. The researchers used an "obedience lite" procedure, stopping the experiment when participants followed the experimenter's 10th command, which involved pressing a button labelled 150 volts.

Conditions tested:

- Condition 1: The participant (teacher) and the experimenter were in the same room, while the learner was behind a wall.
- Condition 2: The participant, experimenter and learner were all in the same room.
- Condition 3: Each individual was in a different room.
- Condition 4: The participant and learner were in the same room, while the experimenter was in an adjacent room.

Findings:

| Condition | Participants following all instructions | Total participants | Participant obedience (%) |
|--|---|--------------------|---------------------------|
| Experimenter in the same room as participant | 69 | 80 | 86.25 |
| Experimenter absent | 59 | 80 | 73.75 |
| Learner in the same room as participant | 57 | 80 | 71.25 |
| Learner absent | 70 | 80 | 87.50 |

The highest obedience rate was observed when the participant and experimenter were in the same room, and the learner was in another room, reaching a maximum score of over 9.8 out of 10 in obedience.

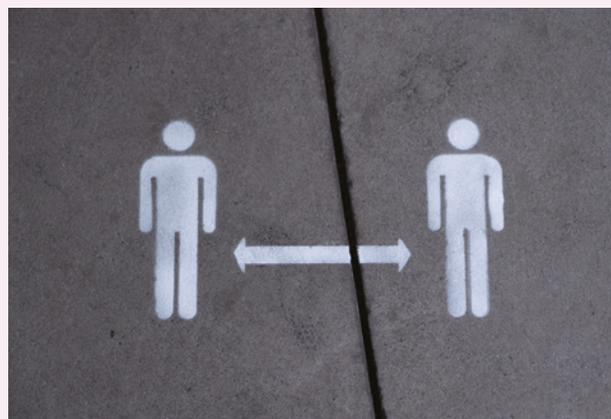


FIGURE 4 The distances between the participant, learner and experimenter can collectively affect participant behaviour.

Participants were more likely to avoid hurting the learner when the learner was physically present, especially if the experimenter was not in the same room. The study highlighted the importance of considering the distances between the participant, learner and experimenter, as these distances collectively affect participant behaviour.

Apply your understanding

- 1 **Identify** the number of participants involved in the study. (1 mark)
- 2 **Describe** the “obedience lite” procedure used in the study. (1 mark)
- 3 **Identify** the highest obedience rate observed, and in which condition it occurred. (2 marks)
- 4 **Explain** how the presence of the learner and experimenter affected participants’ obedience. (2 marks)
- 5 **Distinguish** between the results of the study and Milgram’s original experiments. (1 mark)

Criticisms of the experiment

Milgram’s studies have been criticised for many flaws in their designs and the way they were carried out.

Ethical issues

Milgram’s experiment raised significant ethical concerns, which have been widely debated in the field of psychology.

- **Informed consent:** Participants did not provide fully informed consent, as they were not aware of the potential psychological stress they would experience.
- **Psychological harm:** The experiment caused significant emotional and psychological distress to participants, leading to questions about the ethical treatment of research subjects.

- **Withdrawal rights:** The prompts used by the experimenter to ensure that the experiment continued even though participants expressed the desire to stop were a direct violation of participants' rights. Participants must be allowed to withdraw at any stage without any attempt to prevent them from doing so.
- **Deception:** Participants were deceived about the purpose of the experiment as well as by the procedures used. It is unlikely that this design had received approval from an ethics committee; indeed, it is unlikely that ethics committees existed when the first of these experiments took place in 1961.
- **Debriefing:** Milgram debriefed participants after the experiment, explaining the true nature of the study and ensuring they understood that the shocks were not real. However, the ethical implications of the stress caused during the experiment remain a point of contention.

Procedural issues

Critics of Milgram's experiment also had concerns about the validity of the procedures.

- **Sampling:** The sample was not representative of the population about which Milgram wished to draw conclusions (adult Americans). The sample contained males only and they were all white Americans.
- **Setting:** The experiment (and the majority of later variations) was conducted in a laboratory. There is no evidence that similar results would be found outside a formal laboratory setting.

Replication of the studies

Despite the ethical controversies, Milgram's experiment remains a landmark study in psychology. It has inspired numerous replications and variations, contributing to our understanding of obedience, authority and human behaviour.

Milgram's studies have been reproduced many times in many countries. It is interesting that the figure of between 60 and 65 per cent total obedience has been the result for all studies following Milgram's original procedure – even in Australia, where we are renowned for our tendency to rebel against authority!

In one particularly appalling study, 13 men and 13 women administered real shocks to inflict pain on a helpless live puppy. Six male participants refused to shock the puppy to maximum level, but seven men (54 per cent) and 100 per cent of the female participants obeyed and administered shocks to the maximum level, although several of the women were distressed and openly crying as they did so (Sheridan & King, 1972).

In all these studies, the percentages of those who were willing to harm an innocent victim are quite startling.

Milgram's research continues to be relevant in various fields, including social psychology, ethics and even organisational behaviour. It provides profound insights into the power of authority and the conditions under which individuals are likely to obey commands that conflict with their personal morals. The study's ethical concerns have led to important discussions and reforms in research practices, ensuring the protection and wellbeing of participants in psychological studies.

Public announcement

We will pay you \$4.00 for one hour of your time
Persons Needed for a Study of Memory

We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

Each person who participates will be paid \$4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come.

No special training, education, or experience needed. We want:

Factory workers, businessmen, construction workers, city employees, clerks, salespeople, laborers, professional people, white-collar workers, barbers, telephone workers and others.

FIGURE 5 The wording of the original advertisement for participants in Milgram's experiment

Check your learning 11.4



Check your learning 11.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Define** the following terms
 - a obedience (1 mark)
 - b authority. (1 mark)
- 2 **Describe** the type of power that the “teacher” had over the “learner” in Milgram’s study. (1 mark)

Analytical processes

- 3 **Distinguish** between the roles of the experimenter and the teacher. (1 mark)
- 4 **Deduce** the effect of the experimenter’s prompts on the results of the experiment. (1 mark)

Knowledge utilisation

- 5 **Discuss** the ethical implications of Milgram’s study. (3 marks)
- 6 **Evaluate** the study design used by Milgram to research obedience. (2 marks)
- 7 During an excursion the class teacher, Mr Smith, instructed all students that they were not allowed to touch anything or leave the group. When students went to touch an exhibit, Mr Smith reminded them that they were not allowed. **Explain** Mr Smith’s use of authority and the students’ obedience with reference to Milgram’s study. (2 marks)
- 8 **Discuss** the validity and reliability of Milgram’s initial study. (3 marks)

Lesson 11.5

Factors affecting conformity

Key ideas

- Conformity is when behaviour, beliefs, attitudes or actions are adjusted to be in line with a group’s behaviour, beliefs, attitudes and actions.
- Asch (1955) conducted research that found that individuals in a group will conform with majority opinion, even when the majority opinion is different from theirs, or incorrect.
- There are several reasons that people may be more or less likely to conform, including normative influence, culture, informational influence, group size, unanimity, deindividuation and social loafing.



Learning intentions and success criteria

Introducing Asch’s conformity experiment

Humans are highly sociable beings. We like to belong to a group and share our personal experiences with friends and family.

Sometimes people will behave in strange ways just to fit in with the group. For example, Kalat (2008) reported that in Koversada (a small town in Croatia) people only wear clothes if they are going out to dinner at a restaurant. If a person enters the town fully clothed, other people stare at them and openly express disapproval – visitors to the town quickly learn that they feel more comfortable if they are naked in public!

As we saw in the previous lesson in relation to Milgram's work on obedience, the presence of one or two other people, and their responses, can have considerable influence on the way a person behaves. Milgram expected this, because he was aware of earlier research performed by Solomon Asch in 1955.

The presence of others can encourage people to behave in the same manner, and show similar interests and beliefs (Figure 1). This is called conformity.



FIGURE 1 Some people like to conform to a group and this may influence what they do, what they wear and even how they speak.

Challenge

Conformity

As you will soon learn, Asch's study provided evidence for conformity. Participants gave the same answer as confederates despite knowing that the answer was wrong, or not what they originally thought. Write something that you have conformed to, despite disagreeing with it. **Discuss** whether you think conformity plays a role in peer pressure.

Asch's experiment

Aim

The aim was to investigate the effect of group pressure on individual opinions and judgments, and how social forces influence people's decisions and behaviours.

Participants

Groups of seven to nine college students from various institutions were used, with only one true subject in each group. The rest were confederates (actors that researchers planted to provide predetermined responses). The participant would be seated at the end of the row, which meant they would be asked to respond last, after the confederates gave their answers.

Materials

The visual judgment task used two large white cards, one with a single vertical black line (standard) and another with three lines of varying lengths.

Procedure

The procedure was as follows:

- 1 Experimental set-up: Participants were asked to match the length of the standard line with one of the three lines on the second card.
- 2 Initial trials: All participants gave correct answers in the first few trials.
- 3 Manipulated trials: In subsequent trials, all but one participant (the true subject) were instructed to give incorrect answers.
- 4 Public declaration: Participants announced their answers publicly, increasing the pressure on the true subject.
- 5 Variations: The size of the opposing group and the presence of a supporting partner were varied to study their effects.

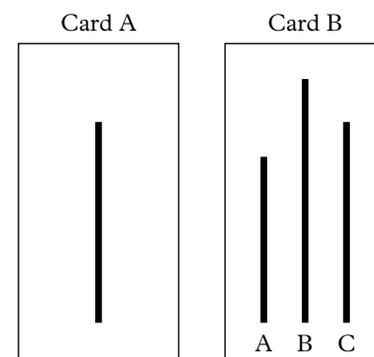


FIGURE 2 Participants in Asch's experiment were presented with images like this to test conformity.

Results

The results were as follows:

- Conformity: About 36.8 per cent of the true subjects conformed to the incorrect majority at least once.
- Independence: Around 25 per cent of the subjects remained completely independent, never conforming to the majority.
- Group size: Conformity increased with the size of the majority up to three people, after which additional numbers had little effect.
- Unanimity: The presence of a single supporting partner significantly reduced conformity.
- Partner influence: The effect of a partner was stronger if they remained consistent; if they switched to the majority, the true subject's errors increased.

Conclusions

- Group pressure can significantly influence individual judgments, even against clear evidence.
- Some individuals can resist group pressure, but many conform to avoid conflict or out of self-doubt.

Variation in conformity

To discover which factors influence conformity, Asch performed several variations of his original experiment. Other researchers have repeated the experiment in many different countries and the degree of conformity has been shown to be affected by different factors. Bond and Smith (1996), of Sussex University in the UK, conducted a meta-analysis of 133 studies from 17 countries that had used a similar procedure to Asch's. The aim of this analysis was to find the moderator variables that caused variation in levels of conformity.

A meta-analysis is research that examines the results of many other studies and combines the results and findings of many other studies. This means that the researchers can have increased confidence in the conclusions because the results support each other, effectively increasing the size of the sample used and making statistical procedures more rigorous.

Of course, there are some difficulties with this, as not all researchers have used exactly the same procedures or methods of reporting. For example, Bond and Smith (1996) wanted to discover whether there were any gender effects: “Are men more likely to conform than women?” But of the 133 studies examined, 22 did not report which participants were male and which were female.

Among the most significant moderator variables, Bond and Smith (1996) found the following:

- normative influence
- culture
- informational influence
- group size
- unanimity
- deindividuation
- social loafing.

We will look at each of these variables in turn.

Normative influence

Normative influence refers to a person’s tendency to go along with the group so that they will fit in and gain the approval of other group members.

It has been found that if group members are very similar to each other (such as in age, race and gender), there will be greater normative influence, increasing the pressure towards conformity. Almost all studies replicating Asch’s experiments have used college students as participants, which has been a significant factor.

If other group members are people from whom the participant wants to gain approval – possibly teachers, family members or friends – the tendency towards conformity is further increased.

Culture

In studies undertaken in Asian countries, the level of conformity has been found to be significantly higher than in Western cultures. In the United States, the level of conformity has been found to be decreasing since the 1950s.

Australians tend to follow social norms, such as supporting the underdog and disliking people who are openly self-promoting or who appear arrogant or conceited. We conform to the norms of a community and protect our mates and isolate those who take offence or complain.

It has been argued that the reason for this difference in conformity lies in the cultural differences between individualist and collectivist cultures.

- An **individualist culture** is one in which individuality and independence are highly valued, and it is considered important for people to achieve their individual goals.
- A **collectivist culture** is one in which the individual’s goals are less important than group goals, and each person is encouraged to consider the needs of the group to be more important than their individual requirements.

individualist culture

the importance of oneself achieving goals is prioritised over the needs of society

collectivist culture

priority of society’s goals as a whole are emphasised above personal goals

There is a tendency towards individualist culture in Western societies and collectivist culture in Eastern societies (Figure 3), but there could be other explanations for the difference in the level of conformity. For example, in Eastern cultures it is considered impolite to point out another person's mistakes, even indirectly. Therefore there is a tendency to conform in order for the other group members to save face (Takano & Osaka, 1999).

Informational influence

Informational influence refers to the increased tendency to conform when the participant wants to provide a correct response but is not certain of their ability to do so, believing that others are more capable of making accurate judgments. This is a very common cause of conformity.

For example, if you are cooking a new dish for dinner and you are not certain which spices to use, you could ask a friend's opinion. If you believe your friend has good judgment in this area, you conform and follow their advice.

Group size

Asch varied the number of confederates from one to 15. He found that conformity rates increased to a maximum with three or four confederates, and then remained approximately the same

Unanimity

If one of the confederates did not conform with the group, but gave the correct answer, the conformity rate dropped from the average of 4 out of 12 to 1 out of 12. Asch believed that there were three factors influencing this significant difference:

- 1 The participant observed that the majority did not criticise or make fun of the dissenting confederate.
- 2 There was now social pressure in two directions – from the dissenter as well as the majority.
- 3 The dissenter increased the participant's belief that the majority were wrong.



FIGURE 3 Conformity is higher in collectivist cultures where the individual is considered less important than the group. Eastern cultures are more likely to be collectivistic than Western cultures.

informational influence

a type of social influence where we look to others for guidance in uncertain situations, believing that they have more accurate information

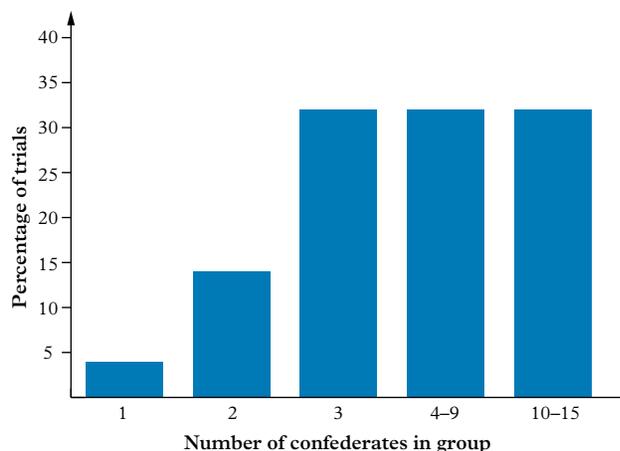


FIGURE 4 The percentage of trials in Asch's study where participants conformed with unanimous majorities (various sizes); conformity reached a maximum with a group size of three, then remained fairly constant.

Deindividuation

We discussed deindividuation earlier in this module when Philip Zimbardo deliberately removed the individual identifying characteristics of the Stanford prison guards and prisoners.

A form of deindividuation, in which the participant cannot be identified by other group members, has also been used in variations of the Asch experiment, when groups of participants were placed in individual booths and given false feedback about the responses of the other group members. There is evidence that the level of conformity is higher in face-to-face groups than in simulated groups (Bond & Smith, 1996).

In studies where the participants believed that only the experimenter would have access to their responses, participants were much less likely to conform to the majority of responses.

Social loafing

social loafing
an individual puts in less effort when in a group than they do individually

Social loafing is the tendency of an individual to reduce their effort when working in a group, compared with when they are working alone.

In terms of conformity, when a task requires some effort (e.g. if the lines in the Asch stimuli are similar in size and require careful scrutiny in order to distinguish the correct answer), the participant may conform with the majority simply to avoid the effort involved in making a personal judgment.

Check your learning 11.5



Check your learning 11.5: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** conformity, using an example from everyday life. (2 marks)
- 2 **Explain** one factor that influences conformity, with reference to Asch's study. (2 marks)
- 3 **Explain** how social norms affect conformity. (2 marks)

Analytical processes

- 4 **Compare** the impact of conformity when it relates to culture with when it relates to group size. (2 marks)

- 5 **Distinguish** between how deindividuation was demonstrated in Zimbardo's study and Asch's study. (1 mark)

Knowledge utilisation

- 6 **Discuss** one ethical consideration that arose in Asch's study. (2 marks)
- 7 **Evaluate** Asch's study in terms of the methodology used. (3 marks)

Lesson 11.6

Review: Status and power in groups

Summary

- 11.1 • Kelman's (1958) social influence theory suggests three conditions under which people are more likely to change attitudes, beliefs and behaviours: compliance, identification and internalisation.
 - Compliance is a change in a person's attitudes publicly, but not privately, so that they are more likeable in their group.
 - Identification is a change in a person's attitude and behaviour because they are influenced by someone and relate to the content of the attitude.
 - Internalisation is a change in a person's attitude and behaviour because they have taken on a new attitude into their belief system.
- 11.2 • A group is defined as two or more people who interact over a period of time, have influence on each other and share a common goal.
 - Within a group, a person is said to have power over another if there is a reasonable expectation that the second person will behave in the way the first person desires, even against the second person's own wishes.
 - Social influences include obedience, conformity and social norms, and they shape our actions and decisions (Cialdini et al., 2006).
- 11.3 • In the Stanford prison experiment, Zimbardo and his colleagues (1973) showed that the environment and roles assigned to people can have significant influences on behaviour.
 - Deindividuation was identified as a significant influence, increasing the cruelty of the guards and the sense of powerlessness of the prisoners.
- 11.4 • Obedience is when an individual or group behaves in a certain way based on orders or rules provided by a figure of authority.
 - Authority is the power to order individuals to behave in a particular way.
 - Milgram's (1963) experiment provided evidence that people would obey someone with perceived authority, despite feeling bad about it.
- 11.5 • Conformity is when behaviour, beliefs, attitudes or actions are adjusted to be in line with a group's behaviour, beliefs, attitudes and actions.
 - Asch (1955) conducted research that found that individuals in a group will conform with majority opinion, even when the majority opinion is different from theirs, or incorrect.
 - There are several reasons that people may be more or less likely to conform, including normative influence, culture, informational influence, group size, unanimity, deindividuation and social loafing.

Key studies

Cialdini et al., 2006

Asch, 1955

Milgram, 1963

Haney, Banks and Zimbardo, 1973

Review questions 11.6A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 Which of the following best describes a group?
 - A People who know each other and share many goals and interests.
 - B Two or more people who share a common goal and help each other to achieve it.
 - C Three or more people who interact and influence each other and share a common goal.
 - D Two or more people who interact and influence each other and share a common goal.
- 2 Power that derives from the ability of a person to provide pleasant consequences to reinforce a response is referred to as
 - A reward power.
 - B referent power.
 - C coercive power.
 - D recreational power.
- 3 The type of leadership characterised by high concern for both productivity and people is referred to as
 - A country-club style.
 - B impoverished style.
 - C team leadership style.
 - D middle-of-the-road style.
- 4 When Zimbardo and his colleagues set up the Stanford prison experiment in 1971, what was the key variable controlled in the experiment?
 - A The duration of the experiment
 - B The location of the experiment
 - C The treatment of the prisoners by the guards
 - D The role assigned to participants (prisoner or guard)
- 5 In the Zimbardo experiment, the guards wore military uniforms and dark glasses, and carried batons. What was the purpose of this?
 - A Detachment
 - B Desensitisation
 - C Deindividuation
 - D Depersonalisation
- 6 The best explanation of conformity is the tendency of a person to adjust
 - A feelings so that they match the expectations of another person or group of people.
 - B attitudes so that they match the expectations of another person or group of people.
 - C thoughts so that they match the expectations of another person or group of people.
 - D behaviours so that they match the expectations of another person or group of people.
- 7 Bond and Smith (1996) discovered seven factors that affected conformity. Which of the following is one of these factors?
 - A Group size
 - B Age of participants
 - C Cultural background
 - D Gender of participants
- 8 Milgram conducted his experiment with a number of variations. In which version was obedience the lowest?
 - A When the learner was in the room with the teacher.
 - B When the authority figure gave instructions by telephone.
 - C When the authority figure was in the room with the teacher.
 - D When the teacher had seen another teacher administer the high-level shocks.
- 9 In Milgram's experiment on obedience, what percentage of participants continued to administer shocks up to the maximum voltage of 450 volts, despite the apparent distress of the learner?
 - A 50 per cent
 - B 65 per cent
 - C 75 per cent
 - D 85 per cent
- 10 In other variations of his experiment, Milgram found which of the following?
 - A Obedience was lower when female participants were used.
 - B Obedience decreased if the experimenter was in the room with the teacher.
 - C Obedience decreased if the authority figure was not in the room with the teacher.
 - D Obedience decreased if other participants had already been observed to disobey.
- 11 Which overriding principle in ethical considerations for research with human subjects was breached by the Milgram experiment?
 - A Participants must volunteer.
 - B Confidentiality must be maintained.
 - C Informed consent procedures must be followed.
 - D No physiological or psychological harm may come to the participants.

- 12 Which of the following statements about the 1971 Stanford prison experiment is accurate?
- A The prison guards were given reward power, while the researchers had this form of power as well as referent power.
 - B The prison guards were given coercive power, while the researchers had this form of power as well as expert power.
 - C The prison guards were given legitimate power, while the researchers had this form of power as well as expert power.
 - D The prison guards were given legitimate power, while the researchers had this form of power as well as information power.
- 13 What is the main reason people tend to obey authority figures?
- A They enjoy following orders.
 - B They want to avoid being different.
 - C They want to be liked and accepted by others.
 - D They perceive authority figures as knowledgeable and trustworthy.
- 14 What does information power refer to?
- A Power due to having depth of knowledge.
 - B Power due to having skills and knowledge.
 - C Power due to having knowledge that others desire.
 - D Power due to having knowledge to provide the desired response.
- 15 Which of the following is an example of a descriptive norm?
- A Dressing similarly to peers to fit in
 - B Most students recycling their waste at school
 - C Following a teacher's instructions during class
 - D A sign saying "Please don't litter to keep our school clean"
- 16 Which of the following best describes power within groups?
- A A person has power if they can make another person agree with them.
 - B A person has power when they can make a person behave the same way they do.
 - C A person has power when it can be reasonably expected that another person will behave in the way they desire, and the other person comes to agree with behaving that way.
 - D A person has power if it can be reasonably expected that another person will behave in the way they desire, even if the other person does not agree with behaving that way.
- 17 How do social norms influence behaviour according to Cialdini et al. (2006)?
- A By reducing the importance of group dynamics.
 - B By encouraging people to ignore authority figures.
 - C By promoting individualism and unique behaviour.
 - D By providing a framework of what is considered acceptable or unacceptable within a group.
- 18 Which of the following statements is correct?
- A Asch's experiment tested obedience, whereas Zimbardo's experiment tested power, and Milgram's experiment tested conformity.
 - B Asch's experiment tested power, whereas Zimbardo's experiment tested conformity, and Milgram's experiment tested obedience.
 - C Asch's experiment tested conformity, whereas Zimbardo's experiment tested power, and Milgram's experiment tested obedience.
 - D Asch's experiment tested authority, whereas Zimbardo's experiment tested conformity, and Milgram's experiment tested obedience.
- 19 Which of the following best describes normative influence?
- A Ignoring social norms to stand out
 - B Following direct orders from an authority figure
 - C Looking to others for guidance when unsure how to behave
 - D Adjusting behaviour to align with group norms to be liked and accepted
- 20 Which of the following was a criticism of the Stanford prison experiment?
- A The experiment followed most ethical guidelines.
 - B The withdrawal rights of participants were violated.
 - C The participants were given adequate compensation.
 - D The results were universally accepted without controversy.
- 21 A judge's authority in a courtroom is an example of
- A expert power.
 - B referent power.
 - C legitimate power.
 - D professional power.

- 22 Which of the following is an example of informational influence?
- A Dressing similarly to peers to fit in
 - B Ignoring social norms to stand out
 - C Following a manager's request to stay late at work
 - D Looking to others at a formal dinner to see which fork to use
- 23 According to Cialdini and colleagues (2006), why might individuals conform to group norms?
- A To feel unique
 - B To avoid boredom
 - C To express individuality
 - D To gain a sense of safety and security
- 24 In what type of situation are individuals most likely to exhibit nonconformity?
- A When safety is a concern
 - B When individuality is prized
 - C When following group norms
 - D When there is a clear, correct answer

Review questions 11.6A Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 25 **Define** a group and provide an example. (2 marks)
- 26 **Explain** the source of each of these types of power
- a reward power (2 marks)
 - b coercive power. (2 marks)
- 27 **Identify** one of Bond and Smith's (1996) seven factors shown to have an effect on conformity to group opinion and the conditions under which conformity is most likely to occur. (2 marks)
- 28 **Identify** one of the nine factors that Milgram showed to have an effect on obedience to authority and the conditions under which obedience is more likely to occur. (2 marks)
- 29 **Explain** how normative influence affects behaviour using an example. (2 marks)
- 30 **Identify** an example of a descriptive norm and **explain** its impact on behaviour. (2 marks)
- 31 **Explain** how culture influences social loafing, and **provide** an example to illustrate this. (2 marks)
- 32 **Explain** what is meant by the term "referent power". Give an example of when this is most likely to be used. (2 marks)
- 33 **Explain** how self-protection can influence conformity according to Cialdini and colleagues (2006). (2 marks)
- 34 **Explain** how injunctive norms can be used to reduce undesirable behaviours, with reference to Cialdini and colleagues (2006). (2 marks)

- 35 **Explain** why people might conform to group norms even if they don't agree with them. (2 marks)
- 36 **Explain** why the wording of the advertisement for Milgram's experiment may have raised ethical concerns. (2 marks)

Analytical processes

- 37 **Compare** authority-compliance leadership styles and team leadership styles. Give an example of a workplace situation where each leadership style might excel. (4 marks)
- 38 **Interpret** the significance of the findings from Haney and colleagues' (1973) study on understanding authority in educational settings. (2 marks)
- 39 **Compare** the findings of Asch's (1955) research on conformity with Milgram's (1963) research on obedience. (2 marks)
- 40 **Deduce** how Asch's findings on conformity apply to modern-day social situations, such as online communities. (2 marks)
- 41 **Suggest** how power imbalances can lead to conflict or cooperation within a group. (2 marks)

Knowledge utilisation

- 42 **Discuss** the ethical considerations raised by Zimbardo's experiment. (4 marks)
- 43 **Discuss** why levels of conformity have been found to be decreasing in recent times, with reference to individualistic and collectivist cultures. (2 marks)

44 Brian enjoys going to the ballet. When his wife asks him to attend the latest production of *Swan Lake* while they are having dinner with a group of friends, Brian laughs and says no – he'd prefer

to go to the football game that's on the same night. **Discuss** why Brian reacted this way, with reference to the social influence theory. (2 marks)

Data drill

Influence of social status on motivation to conform

A study by Kim and colleagues (2021) investigated how individual preferences for novel stimuli are influenced by the preferences of others in the social hierarchy and whether anonymity affects such preference changes.

Method: Sixty students from Korea University were manipulated into different social ranks and asked to rate images. They were shown ratings by partners of higher or lower social rank and could adjust their ratings. The study included both public and private conditions to test the effect of anonymity.

Results: Participants were more likely to conform to the preferences of a superior partner (higher social status) compared to an inferior partner (lower social status), especially in public conditions.

Conclusion: The motivation to make better impressions on people of higher social status drives conformity, particularly when choices are visible to others.

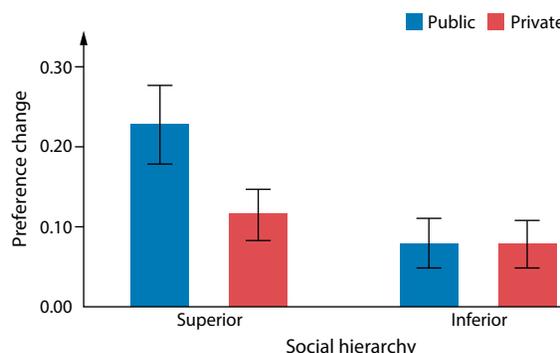


FIGURE 1 The degree to which participants changed their preferences from the first rating to the second rating for the superior partner (higher social status) compared to inferior partner (lower social status) under a public and private condition. Error bars indicate 95% confidence intervals.

Apply understanding

- Determine** the number of participants used in this study. (1 mark)
- Identify** the percentage of participants in the private inferior condition. (1 mark)

Analyse data

- Contrast** the percentage change between private and public for the superior condition. (1 mark)
- Identify** the condition with the greatest uncertainty around the percentage change. Provide a reason for your response. (2 marks)

Interpret evidence

- Infer** if there is a significant difference between the public and private condition in the superior condition. Use evidence to support your answer. (2 marks)
- Draw a conclusion** about the two factors that are likely to increase conformity. (2 marks)



Module 11 checklist: Status and power in groups

Topic 1 review

Multiple choice

(1 mark each)

- 1 Who are the primary agents of primary socialisation?
 - A Media and celebrities
 - B Teachers and classmates
 - C Parents and close family members
 - D Neighbours and community leaders
- 2 Which of the following is an example of secondary socialisation?
 - A Learning to walk from siblings
 - B Learning to speak from parents
 - C Learning social norms from friends
 - D Learning family traditions from grandparents
- 3 What is referent power?
 - A Power that comes from being liked or admired
 - B Power that comes from holding a formal position
 - C Power derived from the ability to provide rewards
 - D Power based on the possession of knowledge or expertise
- 4 Which type of social influence involves following direct orders from authority figures?
 - A Conformity
 - B Obedience
 - C Social norms
 - D Peer pressure
- 5 What leadership style involves making decisions without consulting others?
 - A Democratic
 - B Authoritarian
 - C Laissez-faire
 - D Collaborative
- 6 What are gender scripts?
 - A Written scripts about gender behaviour
 - B Government scripts on gender roles
 - C Biological instructions for gender behaviour
 - D Scripts children build about how males and females should act based on observations
- 7 What factors did Asch identify as influencing conformity?
 - A Physical appearance and age
 - B Economic status and education level
 - C Individual intelligence and personality
 - D Group size, unanimity and deindividuation
- 8 What is compliance according to Kelman's social influence theory?
 - A Following group norms to be liked
 - B Changing attitudes due to internal beliefs
 - C Adopting behaviours to align with personal values
 - D Changing behaviour to gain rewards or avoid punishment
- 9 Which of the following best describes identification?
 - A Changing behaviour to avoid punishment
 - B Changing attitudes due to internal beliefs
 - C Following direct orders from authority figures
 - D Adopting behaviours to be associated with a group
- 10 Obedience is primarily influenced by
 - A group norms.
 - B peer pressure.
 - C personal beliefs.
 - D authority figures.
- 11 Nonconforming behaviours might be driven by
 - A internal beliefs.
 - B a desire to fit in.
 - C fear of punishment.
 - D a desire to stand out.
- 12 Kelman's theory suggests people change attitudes, beliefs and behaviours under which conditions?
 - A Obedience, conformity, social norms
 - B Compliance, identification, internalisation
 - C Normative influence, informational influence, authority
 - D Descriptive norms, injunctive norms, prescriptive norms

- 13** According to Kohlberg, at what age do children reach gender identity?
- A** 1 to 2 years
 - B** 2 to 3 years
 - C** 3 to 4 years
 - D** 5 to 6 years
- 14** How does vicarious punishment influence gender-role learning?
- A** By teaching children through direct instruction
 - B** By rewarding children for gender-appropriate behaviour
 - C** By punishing children for gender-inappropriate behaviour
 - D** By observing others being punished for gender-inappropriate behaviour
- 15** Conformity can be influenced by
- A** normative influence.
 - B** informational influence.
 - C** both normative influence and informational influence.
 - D** neither normative influence nor informational influence.
- Short response**
- 16 Define** “conformity”. (1 mark)
- 17 Identify** the leadership style that involves making decisions without consulting others. (1 mark)
- 18 Describe** the laissez-faire leadership style. (1 mark)
- 19 Explain** the concept of strategic conforming, using an example. (2 marks)
- 20 Identify** three sources of power within a group. (3 marks)
- 21 Describe** informational influence with reference to conformity. (2 marks)
- 22 Explain** the difference between descriptive norms and injunctive norms. (2 marks)
- 23 Describe** the difference between identification and internalisation. (1 mark)
- 24 Explain** the gender schema theory, using an example. (2 marks)
- 25 Identify** a difference between gender and sex. (1 mark)
- 26 Explain** how the desire to be correct affects informational influence, using an example. (2 marks)
- 27 Explain** why injunctive norms might be more effective than descriptive norms. (2 marks)
- 28 Identify** what Milgram’s research demonstrated about people’s behaviour towards authority figures. (1 mark)
- 29 Describe** the significance of deindividuation in Zimbardo’s Stanford prison experiment. (2 marks)
- 30 Describe** the primary factor in gender identity development, according to the theory of psychosexual differentiation. (1 mark)

TOTAL MARKS
/39 marks

MODULE

12

Prosocial behaviour

Introduction

Why might people ignore a man slumped over his steering wheel in a busy Queensland street? What makes 100 people stand by and watch as a man is beaten outside a hotel, without intervening or calling authorities for help? Why has there been such huge public support for Australian farmers and their families during recent times of drought? And why did the Australian public show such overwhelming support for the people traumatically affected by the Queensland floods of 2019? These are all real Australian examples of the bystander effect and prosocial behaviours, each with its own unique set of social contexts and outcomes.

In this module we will examine the different theories used to explain people's helping behaviour from the perspective of social psychologists. Factors such as socialisation, biology and the environment can help explain why people help others without the incentive of immediate benefit or reward. However, these same factors can also help explain why people choose not to help others and to act in antisocial ways. The bystander intervention model explores what influences helping behaviour, and the bystander effect model explores what influences non-helping behaviour. We will also address the phenomena of helping – the actions, patterns of behaviour and motivations that contribute to social behaviour.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to prosocial behaviour before you start.

Subject matter

Science understanding

- Interpret the findings of Latané and Darley's (1969) study of bystander intervention.
- Describe social factors that influence prosocial behaviour, with reference to the reciprocity principle and social responsibility.
- Describe personal characteristics that influence prosocial behaviour, with reference to empathy, mood, competence and altruism.
- Describe social and cognitive factors that influence individual behaviour, including groupthink, diffusion of responsibility, audience inhibition, social influence and cost–benefit analysis.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify, research and construct questions for investigation
- identify and operationalise variables to be manipulated, measured and controlled
- predict possible outcomes from investigations, e.g. identify null and alternative hypotheses
- distinguish between types of investigations
 - experiments (independent and dependent variables)
 - independent groups
 - matched participants
 - repeated measures
- design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data required to obtain valid and reliable evidence
- identify and use appropriate sampling procedures for selection and allocation of participants
 - convenience sampling
 - random sampling
 - stratified sampling
 - random allocation
- identify errors, and extraneous or confounding variables that are likely to influence results; and implement strategies to minimise systematic and random error
- use scientific language and representations to systematically record information, observations and data, e.g.
 - measurements
 - sample calculations
 - statistics
 - tables
 - figures
- translate information between graphical, numerical and/or algebraic forms
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - explain findings
 - construct scientific arguments
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Key study



**Key
study
summaries**

Read a summary of the key study for this module.

→ Latané & Darley, 1969

Lesson 12.1

Factors influencing individual behaviour

Key ideas

- Factors that influence helping behaviour include whether a situation is an emergency or a non-emergency. This is known as bystander intervention.
- The bystander effect is influenced by factors and occurs where a bystander is more likely to help others in an emergency when there is no one else around, than when there are other bystanders.
- Latané and Darley (1969) found that the bystander effect is strongest when the bystanders are strangers rather than friends.
- The decision-stage model of helping suggests that potential helpers go through up to five stages in a decision-making process about whether to provide help.
- Factors that influence individual behaviour include groupthink and cost-benefit analysis. In deciding whether to help, a person combines their thoughts and physiological arousal levels in a cost-benefit analysis; whereas groupthink happens when people in a group prioritise harmony and cohesiveness over critically analysing the situation.



Learning intentions
and success criteria

Bystander intervention

bystander intervention

the act of a person voluntarily helping someone else

bystander effect

a bystander is more likely to help others in an emergency when there is no one else around, than when there are other bystanders present



FIGURE 1 The number of bystanders in any situation can influence the likelihood of help being offered. If you are the only one, you are more likely to help than if there are many people present.

The bystander effect

We have seen that bystander intervention is where a person voluntarily goes to the aid of another who is in need. The bystander effect is where the likelihood of bystanders helping is influenced by the number of bystanders present at the scene – the more bystanders there are, the less likely it is that one of them will provide help. This is demonstrated in the case of Kitty Genovese.



FIGURE 2 The more bystanders there are, the less likely it is one of them will provide help.

Reasons for the bystander effect

The bystander effect (or bystander apathy) occurs in a variety of situations, and a number of factors can be involved, including diffusion of responsibility, audience inhibition and social influence. Each factor can be classified as social or cognitive, as outlined in Table 1.

TABLE 1 Classification of factors influencing the bystander effect

| Factor | Classification |
|-----------------------------|----------------|
| Groupthink | Social |
| Diffusion of responsibility | Social |
| Audience inhibition | Social |
| Social influence | Social |
| Cost–benefit analysis | Cognitive |

We will look at each of these factors in turn.

Groupthink

Individuals in a group tend to be influenced by the actions, thoughts and behaviours of those around them. This is especially true when it comes to making group decisions in times of extreme stress, when a group is highly cohesive, or when a group has a strong, charismatic leader. **Groupthink** refers to the tendency of group members to make decisions based on maintaining group harmony and cohesion, rather than critically analysing and realistically appraising the situation (Burton et al., 2018; Park, 2000). Individuals in these situations characteristically tend to put aside their personal beliefs and adopt the beliefs of the group. Likewise, people who are opposed to group decisions tend to remain silent rather than cause disruption by voicing their opinion.

Groupthink has been used to explain instances of poor decision-making when social justice or foreign policy decisions have been made by groups in power or in times of crisis, such as war. For example, researchers have used groupthink to explain the contentious decision of the United States government to not heed the possibility of an attack on Pearl Harbor during the Second World War, despite the certainty of civilian casualties (McCauley, 1989) (Figure 3).

groupthink

the tendency of a group to make decisions based on maintaining group cohesion rather than by critically analysing the realities of the situation



FIGURE 3 Groupthink has been used to explain the United States' decision not to heed the possibility of an attack on Pearl Harbor during the Second World War.

Social psychologist Irving Janis (1982) outlined a model of groupthink that included interactions between characteristics or antecedents of the group (e.g. strong group cohesiveness), symptoms of groupthink (e.g. rationalising and illusions of vulnerability) and symptoms of poor decision-making (e.g. not examining all available options). This model explains why groupthink results in poor decisions that are often misaligned with prosocial thinking.

Diffusion of responsibility

Sometimes when there are several bystanders, they look at each other to see how they are reacting to the emergency. If nobody in the group responds to the emergency, then it is possible each bystander has experienced a **diffusion of responsibility**. This is where the presence of others leads each bystander to feel less responsibility for helping the person in need. Each bystander believes that it is the responsibility of the other bystanders to take charge and provide help. Conversely, if you are by yourself, then the responsibility to take action is yours alone.

diffusion of responsibility

the idea that bystanders are less likely to take responsibility for helping in the presence of others

Audience inhibition

The presence of other bystanders or onlookers can make a potential helper feel self-conscious and thus inhibit helping behaviour. This is also known as “fear of social blunders”, where people are afraid that others will judge them by their actions if they make an incorrect move, and they experience **audience inhibition**.

audience inhibition

the reluctance of bystanders to help due to the perceived negative appraisals of others (or due to feelings of self-consciousness)

Social influence

The reaction of other bystanders will influence the likelihood of help. If the other bystanders appear unconcerned, then potential helpers might not perceive the situation to be one that warrants assistance. On the other hand, if the crowd appears concerned, then it is likely that bystanders will provide help. This is called **social influence**.

social influence

the likelihood that bystanders will be more likely to help based on the reaction of others

Cost-benefit analysis

The **cost-benefit analysis model** by Piliavin and colleagues (1981) suggests that bystanders weigh up the pros and cons of helping before deciding whether to provide help in emergency situations. The cost-benefit analysis model includes both cognitive and physiological processes. It suggests that when bystanders are confronted with emergencies, they weigh up the costs and benefits of providing help compared to those of not helping.

According to this model, bystanders work their way through three stages before they respond to an emergency:

- 1 **Physiological arousal** (e.g. increased heart and respiratory rate): This is triggered by witnessing a victim’s distress. The greater the arousal, the more likely it is that the bystander will help.
- 2 **Labelling the arousal with a specific emotion**: In an emergency, this might be either personal distress or empathetic concern. Personal distress is a feeling of anxiety and tension when someone else is in distress. Bystanders take action to make themselves, rather than victims, feel better. Empathic concern is the ability to recognise someone else’s emotional state and express appropriate concern if that state is negative.
- 3 **Evaluating the consequences of helping**: This involves working out whether the costs of helping outweigh the benefits. Costs usually involve time and/or effort. The greater these costs, the less likely it is that a bystander will help. A helper must weigh up the personal costs and the empathy cost of their helping or failing to help.

cost-benefit analysis model

a model of behaviour that suggests that when bystanders are confronted with emergencies, they weigh up the pros and cons of providing help compared to those of not helping

Features of the cost–benefit analysis model:

- The more onlookers, the less likely it is that a bystander will help because there is a reduced personal cost for not helping (e.g. in terms of public disapproval or self-blame).
- The greater the victim’s need for help, the greater the personal distress of not helping. For example, a child attacked by a dog is more likely to get help than a man on the street begging for money to buy cigarettes.
- If the victim is a relative or friend, or is perceived to be similar to the bystanders, then the bystanders are likely to help because they will experience both greater physiological arousal and more empathy costs (such as guilt for not helping).

Challenge

Party reactions

On the weekend, Tom celebrated his 18th birthday party at home. His parents hired security guards to check the guest list and to occasionally walk through the party. They also invited their friends, Mike and Priya, to help keep an eye on how the party was going. Tom’s girlfriend, Cat, walked past a group of boys bullying another guest. Cat noticed that no one else was reacting to the fight, so she didn’t think much of it. Cat mentioned it in passing to Mike, who said he’d go and have a look. Mike brushed it off, as he assumed someone else would come and investigate. Eventually, the security guards defused the incident.

The bystander effect offers several explanations for the behaviour of everyone at the party. **Propose** a reason for the way Cat, Mike and the security guards each reacted. Then, **discuss** a potential reason that could have led to Cat and Mike acting differently. Decide if your reasons align with the bystander effect.

Study tip

The syllabus requires you to describe social and cognitive factors that influence individual behaviour, including groupthink, diffusion of responsibility, audience inhibition, social influence and cost–benefit analysis. Make sure you are able to describe each factor and can classify each as social or cognitive.

Real-world psychology

Kitty Genovese

The attack and murder of Kitty Genovese in New York, in 1964, inspired a major area of research into prosocial and antisocial behaviour.

The way in which she was murdered shocked and appalled New Yorkers. What also disturbed many people was that nobody responded to her screams for help as her murderer attacked her repeatedly.

The attack occurred late at night in the respectable borough of Queens in New York. Kitty was on her way home from her job at a bar. Her attacker struck and, initially, her screams and struggles drove him away. However, when he realised that nobody was coming to help her, he attacked again. Once more, she screamed for help and managed to escape. Again, nobody came to her aid. In the third attack, Kitty was stabbed eight more times and sexually assaulted.

Being late at night, most residents of the apartment block near the attack were at home and would have heard her repeated cries for help. About half an hour after the attack began, the police received a call from a witness who wanted to remain anonymous because he “did not want to get involved”.

The next day, the police discovered that at least 12 people in the area had heard the victim’s cries for help. All of these people had time to do something to help her but failed to act. Some had telephones in their homes, but still did not call the police.

Although these people may be excused for not rushing to Kitty’s aid because they feared being attacked too, the question arose: Why didn’t they call the police when they heard Kitty’s screams? ▶

◀ This question prompted Bibb Latané and John Darley to seek the answer through research on bystander intervention and the bystander effect. Their research revealed that the lack of response by Kitty's neighbours was typical of the bystander effect, where the presence of other people actually inhibits helping behaviour. This effect occurs in a range of situations, where each bystander experiences a diffusion of responsibility if there are other bystanders present.

Apply your understanding

- 1 **Describe** the bystander effect with reference to the Kitty Genovese case. (2 marks)
- 2 **Propose** how an understanding of the bystander effect can help in developing strategies to encourage prosocial behaviour in emergency situations. (1 mark)

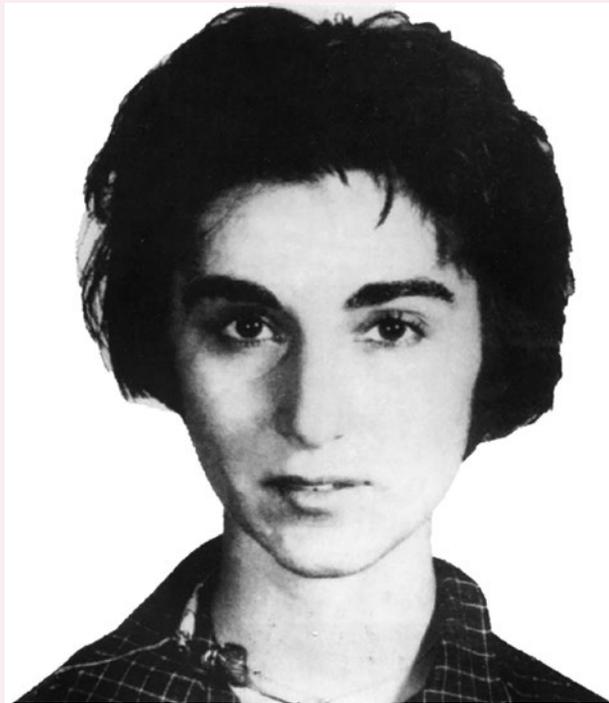


FIGURE 4 Kitty Genovese

Latané and Darley's (1969) study of bystander intervention

Aim

The study aimed to investigate how the presence of friends or strangers affects the likelihood of bystander intervention in an emergency. Specifically, it examined whether people are more or less likely to help someone in distress when they are alone, with a friend, or with a stranger.

Method

The researchers conducted an experiment with 120 male undergraduate students from Columbia University. Participants were divided into four groups where they were either:

- alone
- with a passive stranger (a confederate)
- with another stranger
- with a friend.

Participants were initially told that they were taking part in a market research study. This was a cover story to ensure that the participants were unaware of the true purpose of the experiment, which was to observe their reactions to an emergency situation. While waiting to participate in a market research study, they overheard a woman fall and cry out in pain. The researchers measured whether and how quickly the participants intervened to help the woman.

Results

The study found that participants who were alone were more likely to help the woman compared to those who were with a passive stranger or another stranger. Specifically, 70 per cent of those alone offered help, while only 7 per cent of those with a passive stranger did. When with another stranger, 40 per cent intervened. Interestingly, pairs of friends were more likely to help than pairs of strangers, but still less likely than individuals alone.

TABLE 2 Results of Latané and Darley's study

| Condition | Percentage of participants who helped |
|-------------------------|---------------------------------------|
| Alone | 70% |
| With a passive stranger | 7% |
| With another stranger | 40% |
| With a friend | 41 to 69% |

Conclusion

The study concluded that the presence of others can inhibit bystander intervention, resulting in a bystander effect. This effect is stronger when the bystanders are strangers rather than friends. The findings suggest that people may look to others for cues on how to react in an emergency, and the inaction of others can lead to a misinterpretation of the situation as non-serious. This has significant implications for understanding why people in groups are less likely to help in emergencies, especially in urban settings.

Evaluation

The study was groundbreaking in highlighting the social dynamics that influence bystander behaviour. However, it had limitations, such as using only male college students, which may not generalise to other populations. Additionally, the artificial setting of the experiment might not fully capture real-life emergencies. Despite these limitations, the study provides valuable insights into the factors that inhibit helping behaviour and has influenced further research in social psychology. We will learn more about factors that inhibit helping behaviour (the bystander effect) in Lesson 12.3.

Skill drill

Interpreting results

Science inquiry skills: Planning investigations (Lesson 1.4); Evaluating evidence (Lesson 1.8); Preparing for your exams (Lesson 1.13)

The syllabus requires you to interpret the findings of Latané and Darley's (1969) study of bystander intervention. This means that you will need to know this study in depth to answer questions in the exams. Test your knowledge of this study.

- Describe** how the presence of a passive stranger affected the likelihood of bystander intervention compared to being alone. (1 mark)
- Identify** the key findings of the study regarding the likelihood of participants helping the woman in distress. (1 mark)
- Describe** the experimental method used in the study. How were the participants divided, and what was the cover story provided to them? (3 marks)
- Describe** diffusion of responsibility, and explain how it relates to the bystander effect observed in Latané and Darley's study. (2 marks)
- Discuss** any potential limitations of Latané and Darley's study. (2 marks)

Later studies by Latané and Darley

In 1970 Latané and Darley conducted a study where participants (volunteer students) were each placed in individual cubicles connected by an intercom. Through the intercom, the students participated in discussion groups of three different sizes. Because the students were in separate cubicles, the researchers could observe how each individual behaved. At the start of the discussions, an accomplice of the researchers, posing as one of the students, said that he was prone to suffer from seizures. Later on, during the discussion, he pretended to have a

seizure and call for help. The researchers found that although most students tried to get help for him, the larger the group size, the less likely it was that group members would seek help. This is shown in Figure 5.

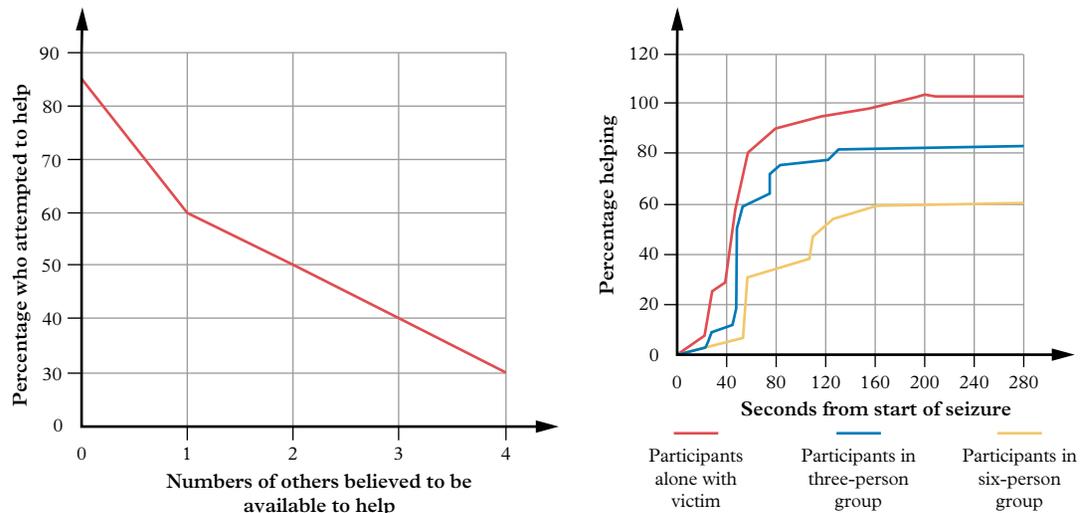


FIGURE 5 Latané and Darley (1970) found that the number of bystanders present influenced whether or not people attempted to help the victim of a seizure, and the time it took to provide help.

In another study, the researchers found that the bystander effect occurs even when a person's own safety is at risk (Latané & Darley, 1968). The researchers asked students to complete a questionnaire about the problems of city life. Not long after they had started to fill out the questionnaire, artificial smoke began to pour into the room. Where there was only one participant in the room, at least 50 per cent of the participants reported the smoke within 4 minutes. However, when there were three participants in the room at one time, only one of the 24 participants reported the smoke within the first 4 minutes, and only three did so within 6 minutes. This is shown in Figure 6. This study showed that people might fail to act even when their own safety is at risk.



FIGURE 6 Latané and Darley (1968) found that the number of people present in a room when it began to fill with smoke influenced the time it took for the situation to be reported.

The decision-stage model of helping

The decision-stage model of helping (Latané & Darley, 1970) is a model of the situational influences on bystander intervention. It says that when confronted with a situation that might require their assistance, potential helpers go through five stages in deciding to help:

- 1 Notice the need for help.
- 2 Decide that it is an emergency.
- 3 Decide to take responsibility.
- 4 Decide on a way to help.
- 5 Take action to help.

If a bystander stops at any one of these steps, they will not provide assistance. Most bystanders tend to stop at stage 3, where they decide that it is not their responsibility to help (Figure 7). For example, an off-duty doctor who witnesses a person collapse in the street may feel that they have the responsibility and ability to help due to their medical training, compared with an accountant who is also on the scene who may not feel any responsibility.

How people interpret a situation will influence whether they will help. Sometimes, for example, a bystander will look at other bystanders and see that they are taking no action. The bystander assumes that they are the only person who is confused about what to do. However, the other people on the scene are also making the same assumption, and therefore no help is given to the person who is genuinely in need.

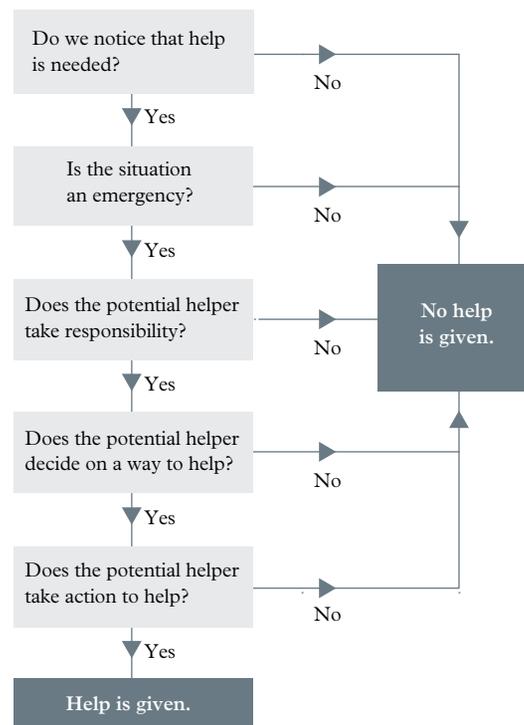


FIGURE 7 The decision-stage model of helping (adapted from Latané & Darley, 1970)

Challenge

Why didn't they help?

In 2014, Brisbane woman Kylie Reid stood up for a woman who was being racially abused by a man while riding the bus home. It has been suggested that fellow passengers failed to support Reid or the victim

as a result of the bystander effect. Research the event online. **Explain** why other passengers did not assist Kylie Reid in her defence of the victim, using the decision-stage model of helping.

Check your learning 12.1



Check your learning 12.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- Describe** how one social and one cognitive factor influence behaviour. (2 marks)
- Explain** the bystander effect, using an example. (2 marks)
- Identify** the characteristics of groupthink that can lead to poor decision-making when a group of young people witness an emergency situation outside the school grounds. Give an example to illustrate. (2 marks)
- Explain** a factor that influences the bystander effect, with reference to Latané and Darley's (1969) study of bystander intervention. (2 marks)

Analytical processes

- Explain** how the number of bystanders can affect a person's decision to help (2 marks)
- Compare** diffusion of responsibility and social influence. (2 marks)
- Distinguish** between bystander intervention and the bystander effect. (1 mark)
- You are at a busy shopping mall and see a child who appears to be lost and crying. **Apply** the decision-stage model of helping, explaining the steps you would take to decide whether or not to intervene. (5 marks)

◀ Knowledge utilisation

- 9 A person collapses in a crowded shopping centre. Use the decision-stage model to **explain** why bystanders might not help. (2 marks)
- 10 **Evaluate** the cost–benefit analysis model. (2 marks)
- 11 **Recall** a situation when you were a witness or involved in a situation that required intervention. **Discuss** the reactions of bystanders with reference to bystander intervention (2 marks)

Lesson 12.2

What is prosocial behaviour?

Key ideas

- Helping behaviour refers to acts that are favourably viewed by society, including altruistic behaviour and acts that are intended to help other people.
- Prosocial behaviour can be automatic or deliberate, and is influenced by both biological (nature) and environmental (nurture) factors.
- Situational factors, such as whether the situation is an emergency, the number of bystanders, and the clarity of the need for help, strongly affect the likelihood of helping.
- Personal characteristics, including empathy, mood and a sense of responsibility, increase the likelihood of prosocial behaviour.



Learning intentions and success criteria

Introducing prosocial behaviour

prosocial behaviour

helping behaviour that benefits other people and society in general

antisocial behaviour

behaviour that is harmful to others and, ultimately, to the community (e.g. prejudice, aggression)

Helping behaviour is also known as prosocial behaviour. **Prosocial behaviour** is behaviour that benefits other people and society in general. The opposite of prosocial behaviour is **antisocial behaviour**. Antisocial behaviour is behaviour that is harmful to others and, ultimately, to the community.

Prosocial behaviour is intended to benefit others and can include aiding and assisting, charity, cooperation, friendship, rescuing, sacrificing, sharing, sympathy, trust and bystander intervention. Helping behaviour is often voluntary and can sometimes be altruistic because it involves helping others for no reward, and this might also be at a personal cost to the helper. Helping behaviour can be an automatic response to an immediate situation, or it can be deliberate and occur over time.

FIGURE 1 Prosocial behaviour includes aiding and assisting others, as this food hub does for university students experiencing the effects of the high cost of living.



Explanations of prosocial behaviour

Why do people help others? Prosocial behaviour is of interest because psychologists have found that it is explained partly by nature and partly by nurture. Table 1 summarises these explanations of prosocial behaviour.

TABLE 1 Explanations of prosocial behaviour

| Explanation | Description |
|---|--|
| Biological (nature) | This explanation is part of socio-biology, which sees prosocial behaviour as genetic – humans naturally assist others as a way of protecting our common gene pool. |
| Environmental (nurture) | This is the view that prosocial behaviour is not innate, but that it is learnt during the socialisation process. It suggests that classical and operant conditioning and social learning (also referred to as observational learning) all contribute to the development of prosocial behaviour. Children can learn prosocial behaviour by copying the prosocial behaviour of others around them, and through being rewarded for appropriate behaviour. |
| Interaction between biological and environmental factors (nature and nurture) | This approach suggests that although we might be born with an innate tendency to help others, exactly how we help is the product of social learning. |

The impact of situational and personal factors on prosocial behaviour

There are several specific influences on the likelihood of people engaging in prosocial behaviour. These include the situation (the characteristics of the situation), social norms, personal characteristics of the helper and altruism.

The characteristics of the particular situation will have an influence on whether an individual will behave in a prosocial way. If a situation is a clear-cut need for help, it is more likely that people will assist. If the situation is ambiguous, then help might not be forthcoming.

The environmental setting can also influence the likelihood of help being offered to people in need; for example, people in rural settings are often more inclined to help each other than people living in densely populated urban settings (Ma et al., 2015).

Whether the situation is an emergency or not is one relevant factor that affects how a potential helper might react, influencing whether they choose to help. Emergency situations include flash flooding, car accident, explosion, heart attack or mugging. They:

- are usually dangerous
- are unusual occurrences; something rarely experienced by the helper
- are sudden and unexpected
- require immediate action to offset the risk to the victim's life or wellbeing.

Non-emergency situations on the other hand:

- are less immediately dangerous (e.g. ongoing illness, disability or poverty)
- are a familiar occurrence (e.g. problems associated with old age or young children needing support)

Study tip

Go to Module 9 to revise conditioning and social learning.



FIGURE 2 People in rural settings are more likely to help each other than people in urban settings.

- are predictable and expected happenings (e.g. old age, drought-affected families, ongoing illness or poverty)
- require deliberate and planned action (e.g. planning to work with a charity, or donating money or time on an ongoing basis).

We will look at factors influencing prosocial behaviour in more detail in Lesson 12.3.

Summary of prosocial behaviour

Table 2 summarises the effect of various factors on a bystander's decision to intervene in a situation.

TABLE 2 The effect of various factors on bystanders

| Factor | Elements | Effect on bystanders |
|---------------|--|----------------------|
| The victim | Similarity of victim to the bystander (in terms of gender, age, race) | More likely to help |
| | Some relationship to bystander | More likely to help |
| | Bleeding or injured | Less likely to help |
| | Member of a stigmatised group | Less likely to help |
| The situation | Many bystanders | Less likely to help |
| | No other bystanders | More likely to help |
| | Limited time | Less likely to help |
| | Urgent need for help | More likely to help |
| The bystander | Similarity to victim (gender, age, race) | More likely to help |
| | Some relationship to victim | More likely to help |
| | Negative responses to features of the victim (prejudices, judgments about grooming, presence of blood) | Less likely to help |
| | Empathy | More likely to help |
| | Knowledge or expertise in how to help the victim | More likely to help |
| | Mood (good) | More likely to help |
| | Arousal (high) | More likely to help |
| | Altruistic | More likely to help |

Check your learning 12.2



Check your learning 12.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** prosocial behaviour. (1 mark)
- 2 **Identify** two factors that will influence prosocial behaviour. (2 marks)
- 3 **Describe** environmental influences on prosocial behaviour. (1 mark)

Analytical processes

- 4 **Compare** prosocial behaviour in emergency and non-emergency situations. (2 marks)

Knowledge utilisation

- 5 **Discuss** the role of empathy in influencing prosocial behaviours. (2 marks)
- 6 “Helping behaviour is always motivated by self-interest.” To what extent do you agree with this statement? **Justify** your answer. (2 marks)

Lesson 12.3

Factors influencing prosocial behaviour

Key ideas

- The development and maintenance of helping behaviour is influenced by social norms, including the reciprocity principle and social responsibility.
- Social norms and the personal characteristics of an individual are variables that influence the chances of the person behaving in prosocial ways.
- Helping behaviour is influenced by personal factors such as empathy, mood, personal competence and altruism.
- Altruism is behaviour that is driven by a desire to help others without any expectation of reward.



Learning intentions and success criteria

Introducing factors influencing prosocial behaviour

There are many factors that will increase or decrease the likelihood of someone helping in a situation. Some of these depend on social expectations and cues; others are related to the characteristics of the person involved.

This lesson expands on the different social and personal factors that influence the likelihood of someone helping.

Social factors influencing prosocial behaviour

A very important influence on the development and maintenance of prosocial behaviour is social norms. A norm is a form of action or behaviour that is standardised and expected in a society; in other words, behaviour that society regards as “normal”. Norms are learnt, and they provide a background for human social interaction.

It is expected in most societies that prosocial behaviour is normal, especially when there is minimal cost to the helper. Society might approve of, and even reward, examples of prosocial behaviour through recognition and acknowledgment. On the other hand, antisocial behaviour is disapproved of. In extreme cases, antisocial behaviour is punished with a jail sentence.

Two norms that are influential in prosocial behaviour are the reciprocity principle and the social responsibility norm.

Reciprocity principle

The **reciprocity principle** is often expressed as “Do unto others as they do unto you”, because it describes the social expectation of reciprocity between people. We feel grateful if someone does us a favour and often feel the need to do that person a favour in return. If the favour someone does us involves a significant effort, then we are likely to feel more indebted to that person.

reciprocity principle

the social expectation that you will respond in kind to someone who has helped you or done you a favour



FIGURE 1 Prosocial behaviour is influenced by both social expectations and personal characteristics.

social responsibility norm

the expectation that members of a society will provide help to people who are dependent or in need, without the expectation of favours being returned

Social responsibility

The **social responsibility norm** is where members of a society are expected to provide help to people who are dependent or in need, without the expectation of favours being returned. Examples of this include donating money or time to charity, helping family, and assisting the frail, impaired and sick.

However, people are only expected to help others who are genuinely in need. People who have behaved irresponsibly and are perceived to be responsible for their own problems – for example, gamblers experiencing financial hardship – are less likely to receive help.



FIGURE 2 Donating time or money to charity, such as conservation programs around Australia, or personally helping someone in need, are examples of the social responsibility norm.

Real-world psychology

Saving a drowning stranger

Why do people risk their own lives to help complete strangers? Putting yourself in danger to protect family and friends is one thing, but why endanger yourself when there is nothing to gain from it personally? Whatever the motivation, acting altruistically is a common occurrence.

Take the case of Brisbane tradesman Lincoln Sherlock. The morning of 15 July 2015 started off like any other work day for Lincoln. At around 7 am, he was driving along busy Kingsford Smith Drive to a roofing job in the Brisbane suburb of Eagle Farm when things took an unexpected turn. Right in front of his eyes, Lincoln saw a ute careen across three lanes of traffic, crash through a fence and plunge into the Brisbane River. The driver, 51-year-old Shayne Wood, suffered a medical episode and blacked out at the wheel, causing him to lose consciousness and control of the car.

Lincoln, 39, was among many drivers on the busy road who immediately pulled over to check what was happening as the car started to sink beneath the surface. But unlike the other bystanders, who simply stood back watching, Lincoln leapt into action. He raced down a steep embankment and jumped into the chilly water on his own, swimming out to the car. Lincoln managed to haul the barely conscious Shane through a slightly open window and into a nearby tinny. He then secured the ute with a strap so it didn't slide deeper into the river.

Once the rescue was completed, Lincoln simply left to get to his roofing job, as if what he'd done was no big deal.

Speaking a few days later, Lincoln remained humble about what had occurred.

“I didn't think it was a really dangerous thing. The minute he went into the water I knew I'd probably have to go and get him ... just to make sure he was all right.”

Lincoln would later receive a Commendation for Brave Conduct at the 2016 Queensland Bravery Awards (Government House Queensland, 2016).

Lincoln Sherlock's story of bravery is an excellent example of prosocial behaviour.



FIGURE 3 Lincoln Sherlock rescued a man with little to no thought of his own personal safety or gain.

Apply your understanding

- 1 **Describe** the actions that Lincoln took to rescue Shayne Wood. (1 mark)
- 2 **Explain** how Lincoln's action demonstrated prosocial behaviour. (2 marks)
- 3 **Identify** two factors that might have inhibited other bystanders from acting in emergencies like the one described. (2 marks)
- 4 **Explain** how social responsibility could have influenced Lincoln's actions (2 marks)
- 5 **Decide** if Lincoln's story is considered an example of altruistic behaviour. **Explain** why or why not. (2 marks)

Personal characteristics influencing prosocial behaviour

We have already noted that both biological (nature) and environmental (nurture) factors influence prosocial behaviour (Lesson 12.1). Although we might be born with a predisposition to act in a particular way, past experiences and the immediate circumstances of the individual will influence a person's prosocial behaviour.

Empathy

Empathy is our emotional response to another person's distress. We find it unpleasant to see another person suffering, so we take action to help and thus alleviate the suffering. There are several different explanations for why empathy causes prosocial behaviour:

- **Arousal:** Bystanders help others in distress because it relieves the unpleasant emotional feeling that comes from empathising with those who are suffering. This explanation sees bystanders assisting others for selfish reasons rather than a genuine concern for others in distress. Helping others reduces the bystander's unpleasant levels of arousal, as well as allowing the bystander to avoid any feelings of guilt that might result from a failure to help.
- **Similarity:** We are more likely to feel empathy if we perceive those in need to be similar to ourselves: the greater the similarity, the stronger the feelings of empathy and arousal are likely to be. This is because the helper can more easily identify with the person in need.
- **Genuine desire to help:** Some helpers genuinely feel sad for the victim. By helping the victim, the helper also feels better.

empathy

the capacity to understand and respond to the distress and emotions of others, which often leads to prosocial behaviour

Mood

A person's **mood** has been found to influence their propensity to behave in prosocial ways. Generally, people who are in a good mood are more likely to demonstrate prosocial behaviour than people who are in a bad mood.

Research has also found that when people are made to feel good by succeeding at a task, they are more likely to be helpful than those who have failed in a task. Similarly, people who hear good news or experience good weather are more likely to feel optimistic and positive towards others and help them (Carlson et al., 1988; Rhoads & Marsh, 2023).

Research has also found that when people feel bad or depressed, they are more likely to focus inwardly towards themselves rather than outwardly towards others in need (Mor & Winquist, 2002).

mood

an emotional state that can affect our perceptions, thoughts and behaviours

competence

an individual's ability to respond effectively to a situation or to perform a task successfully

altruism

a prosocial behaviour that involves selflessness or helping others, even if there is nothing to be gained personally or if there is some personal cost

Competence

The way bystanders perceive their **competence** to deal with an emergency will influence whether they will provide help. For example, a study has found that people with first-aid training are more likely to help in emergencies than people who have no such experience (Shotland & Heinold, 1985).

Altruism

Altruism is a unique influence on prosocial behaviour where, for no personal gain and sometimes at great personal cost, a person helps others due to a deeply felt concern for fellow human beings. Altruistic behaviour is typically selfless and only concerned with the welfare of others.



FIGURE 4 Following natural disasters, such as the Queensland floods, many people volunteered to assist victims in the clean-up.

Challenge

Acting on empathy

The caption to Figure 4 reads, “Following natural disasters, such as the Queensland floods, many people volunteered to assist victims in the clean-up.” **Explain** why this story might exemplify empathy as a motive for prosocial behaviour. **Justify** your response.

Skill drill**Experimental design**

Science inquiry skills: Understanding the scientific method (Lesson 1.3); Planning investigations (Lesson 1.4); Collecting data (Lesson 1.6)

Prosocial behaviour is influenced by various personal characteristics. Understanding these characteristics can help explain why individuals engage in helping behaviours and how they can be encouraged.

Practise your skills

Design an experiment to test personal characteristics that influence prosocial behaviours.

- 1 **Identify** one personal characteristic to investigate (empathy, mood, competence or altruism). (1 mark)
- 2 **Create** a research question. (1 mark)
- 3 **Create** an alternative and null hypothesis (ensure you identify and operationalise the independent and dependent variables). (4 marks)
- 4 **Describe** how you will control two potential extraneous variables. (2 marks)
- 5 **Identify** the type of design you will use (e.g. independent groups). (1 mark)
- 6 **Describe** the materials needed for the experiment. (1 mark)
- 7 **Describe** the type of data you will be collecting. (1 mark)
- 8 **Identify** the sampling method that will be used and describe how participants will be allocated into groups. (2 marks)

Check your learning 12.3

Check your learning 12.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Define** the reciprocity principle. (1 mark)
- 2 **Describe** social responsibility, using an example. (2 marks)
- 3 **Explain** how empathy may influence prosocial behaviour. (2 marks)

Analytical processes

- 4 **Compare** competence and empathy as reasons for engaging in prosocial behaviour. (2 marks)
- 5 **Differentiate** between altruism and social responsibility. (1 mark)
- 6 **Distinguish** between altruistic behaviour and helping behaviour. (1 mark)

Knowledge utilisation

- 7 **Discuss** the following statement: “Individuals cannot act out of pure altruism when their friends or family are involved.” Use your knowledge of prosocial behaviour to provide an argument for and an argument against this statement. (2 marks)

Lesson 12.4

Review: Prosocial behaviour

Summary

- 12.1**
- Factors that influence helping behaviour include whether a situation is an emergency or a non-emergency. This is known as bystander intervention.
 - The bystander effect is influenced by factors and occurs where a bystander is more likely to help others in an emergency when there is no one else around, than when there are other bystanders.
 - Latané and Darley (1969) found that the bystander effect is strongest when the bystanders are strangers rather than friends.
 - The decision-stage model of helping suggests that potential helpers go through up to five stages in a decision-making process about whether to provide help.
 - Factors that influence individual behaviour include groupthink and cost–benefit analysis. In deciding whether to help, a person combines their thoughts and physiological arousal levels in a cost–benefit analysis; whereas groupthink happens when people in a group prioritise harmony and cohesiveness over critically analysing the situation.
- 12.2**
- Helping behaviour refers to acts that are favourably viewed by society, including altruistic behaviour and acts that are intended to help other people.
 - Prosocial behaviour can be automatic or deliberate, and is influenced by both biological (nature) and environmental (nurture) factors.
 - Situational factors, such as whether the situation is an emergency, the number of bystanders, and the clarity of the need for help, strongly affect the likelihood of helping.
 - Personal characteristics, including empathy, mood and a sense of responsibility, increase the likelihood of prosocial behaviour.
- 12.3**
- The development and maintenance of helping behaviour is influenced by social norms, including the reciprocity principle and social responsibility.
 - Social norms and the personal characteristics of an individual are variables that influence the chances of the person behaving in prosocial ways.
 - Helping behaviour is influenced by personal factors such as empathy, mood, personal competence and altruism.
 - Altruism is behaviour that is driven by a desire to help others without any expectation of reward.

Key study

Latané & Darley, 1969

Review questions 12.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- Helping behaviour and altruism are two expressions of
 - reciprocity.
 - the bystander effect.
 - prosocial behaviour.
 - antisocial behaviour.
- A person who demonstrates prosocial behaviour is likely to
 - avoid groupthink.
 - come to the aid of strangers.
 - have an individual personality.
 - use outrageous behaviours to get attention.

- 3 Which of the following plays a role in the development of prosocial behaviour?
 - A Social learning
 - B Operant conditioning
 - C Classical conditioning
 - D Cognitive dissonance
- 4 People often give generously to victims of natural disasters and have no expectation of personal gain for their generosity. What explains this?
 - A Empathy
 - B Compliance
 - C The bystander effect
 - D Social responsibility norm
- 5 Which three processes help to explain the bystander effect?
 - A Empathy, arousal, social influence
 - B Audience inhibition, arousal, social influence
 - C Apathy, audience inhibition, diffusion of responsibility
 - D Diffusion of responsibility, audience inhibition, social influence
- 6 When a group of people witness a person in distress, under which circumstance is the bystander effect likely to occur?
 - A The group is small.
 - B The group is large.
 - C The victim is a child.
 - D The witnesses are male.
- 7 Which of the following is an explanation for the bystander effect?
 - A Compliance
 - B Social loafing
 - C Social facilitation
 - D Diffusion of responsibility
- 8 Under which circumstance is there a greater likelihood that a bystander will help in an emergency?
 - A The bystander is alone.
 - B The bystander is in a good mood.
 - C The bystander is similar to the victim.
 - D The bystander knows how to help the victim.
- 9 According to the cost–benefit analysis model, when bystanders perceive someone in need of help, they work through three stages before they respond. What are the stages?
 - A Evaluation, action, arousal
 - B Evaluation, responsibility, action
 - C Labelling arousal, evaluation, action
 - D Arousal, labelling arousal, evaluation
- 10 Anthony’s company often consults outside organisations when making decisions during crises. Petra’s committee is bound by a strong sense of loyalty and run by a charismatic president. Marcello’s boss is a strong leader who values the opinions of others. Which of these groups is most vulnerable to groupthink?
 - A Petra’s group
 - B Anthony’s group
 - C Marcello’s group
 - D Both Petra’s and Marcello’s groups
- 11 What are some of the personal characteristics that affect prosocial behaviour?
 - A Similarity, empathy, mood
 - B Knowledge, empathy, mood
 - C Mood, empathy, competence
 - D Arousal, empathy, competence
- 12 What is altruism?
 - A An example of the bystander effect
 - B An act only performed if the helper feels competent
 - C An act only performed if there is social benefit to be gained
 - D The selfless helping of others without the expectation of reward
- 13 Which of the following is a stage in Latané and Darley’s decision-stage model of helping?
 - A Take action to help.
 - B Set goals for helping.
 - C Evaluate alternatives.
 - D Notice the need for help.
- 14 “Do unto others as they do unto you” is an expression of
 - A the helper principle.
 - B bystander empathy.
 - C the reciprocity principle.
 - D the social responsibility norm.

Review questions 12.4B Short answer



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 15 Identify** the steps in the decision-stage model of helping. (5 marks)
- 16 Describe** personal characteristics that influence social behaviour. (4 marks)
- 17 Explain** how diffusion of responsibility and social influence can affect behaviour, using examples. (4 marks)
- 18 Explain** how factors related to the victim can influence the prosocial behaviour of bystanders. (2 marks)
- 19** People in a hurry are less likely to help someone than people who are not in hurry. **Explain**, using the cost–benefit analysis model, why people in a hurry are less likely to help in an emergency. (2 marks)
- 20 Explain** how groupthink may lead to poor decisions being made in groups that are highly cohesive. **Use** an example to illustrate. (2 marks)
- 21 Explain** how audience inhibition may cause people to be less likely to come to the assistance of a person in need. (2 marks)
- 22 Explain** how social norms influence prosocial behaviour, using an example. (2 marks)
- 23** Helping behaviour depends on several groups of factors. **Identify** an example of each of the following factors and **explain** how these factors influence helping behaviours
- situational factors (2 marks)
 - personal factors. (2 marks)
- 24** Susannah notices that her son is struggling to swim offshore. **Identify** the responsibility Susannah would feel in this situation, compared to a bystander who noticed, using the decision-stage model of helping. (3 marks)

Analytical processes

- 25 Interpret** the findings of Latané and Darley’s 1969 study to **explain** factors that influence the bystander effect. (2 marks)
- 26** Mel was falling asleep in her apartment when she heard a woman screaming for help. She could see that the victim was a young woman. She could also see that people in the woman’s apartment block were looking out and watching the events. Mel hesitated before calling 000, but decided it was the right thing to do. When Mel spoke with the operator, they

informed her that despite there being other onlookers, hers was the first phone call about the incident. Mel wasn’t surprised because she has studied psychology.

Determine why Mel acted in this situation, with reference to bystander intervention. (2 marks)

- 27 Compare** bystander intervention with helping behaviour. (2 marks)
- 28** Marcel was stand-up paddle-boarding one day when a rogue wave knocked him off his board. As he fell down he hit his head and didn’t resurface. Several onlookers from the beach witnessed this, and watched as a lifeguard swam out to rescue him. **Infer** the personal characteristic of the lifeguard that influenced his behaviour. (2 marks)

Knowledge utilisation

- 29** Altruism is helping without expectation of personal gain. **Propose** a reason why some psychologists argue that it might also be motivated by self-interest. (1 mark)
- 30 Identify** whether each of the following events is an emergency. **Propose** one reason someone may assist and one reason why they might not.
- A car is stopped at a set of lights with their emergency lights on. An onlooker notices that a large spider is on the window and that the driver is terrified of moving. (3 marks)
 - Flood waters are surrounding a primary school, with most students evacuated to the roof. (3 marks)
 - On a trip to the zoo, your friend falls over the railing into the chimpanzee enclosure. (3 marks)
 - Your mother screams from the kitchen. When you get there, you see she has accidentally cut her finger. The bleeding can be stopped with a Band-Aid. (3 marks)
- 31** Myra lives in a small town. Her bedroom is on the bottom floor of her house, with a large window. One night, Myra heard a violent fight outside her window, and instead of helping, Myra shrank into her doona and pretended she couldn’t hear anything. The next morning, Myra discovered that the victim had been murdered. **Propose** a reason why Myra did not act in this situation. (1 mark)
- 32 Discuss** possible explanations for the bystander effect. **Use** an example to illustrate your response. (3 marks)

Data drill

The volunteer's dilemma

A study by Campos-Mercade (2021) investigated why people are less likely to help others when in a group compared to when they are alone.

The study used a dynamic game and a lab experiment to test the strategic interactions predicted by the volunteer's dilemma (a concept in game theory that describes a situation where each member of a group faces a choice: to make a small personal sacrifice for the benefit of the group or to wait and hope that someone else will make the sacrifice).

The study involved 80 subjects who participated in an experiment at the Laboratory for Experimental Economics (LEE) at the University of Copenhagen and were randomly assigned to the role of either bystander or victim. These roles were fixed throughout the experiment.

In each round, a victim was matched with a group of one, two or four bystanders. The experiment consisted of two parts of seven rounds each, with subjects participating in different group sizes in random order.

It was found that bystanders helped immediately when alone but delayed or refrained from helping in larger groups.

TABLE 1 The proportion of bystanders who never helped, by condition

| Condition | Proportion of bystanders who never helped |
|-----------------|---|
| One bystander | 25% |
| Two bystanders | 28.6% |
| Four bystanders | 35.3% |

An inferential test was used to test the difference between the one-bystander group and the two-bystanders group, which yielded a p -value of 0.443. The difference between the one-bystander group and the four-bystanders group yielded a p -value of 0.016. The difference between

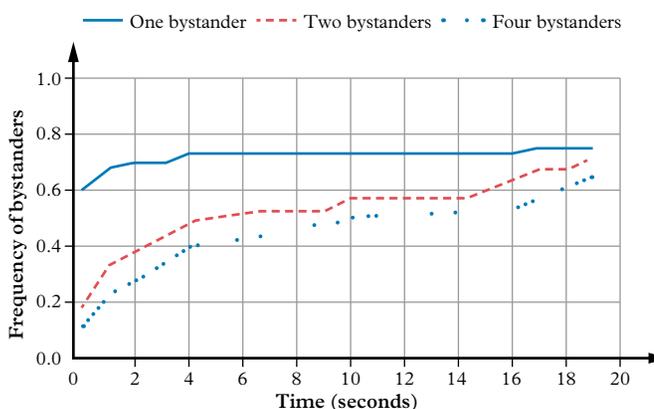


FIGURE 1 Frequency of bystanders selecting to help at each second by group size

the two-bystanders group and the four-bystanders group yielded a p -value of 0.042.

Apply understanding

- Determine** the proportion of bystanders who never helped in the one-bystander group. (1 mark)
- Identify** the frequency level for the four-bystanders group at 4 seconds. (1 mark)

Analyse data

- Distinguish** the trend between the one-bystander group and the four-bystanders group. (1 mark)
- Contrast** the proportion of bystanders who never helped in the two-bystanders group and the four-bystanders group. (1 mark)

Interpret evidence

- Infer** if there was a statistical difference in the frequency of bystanders selecting to help between the one-bystander group and the two-bystanders group. Use evidence to support your answer. (2 marks)
- Draw a conclusion** about helping behaviour when alone compared to when in larger groups, using evidence to support your conclusion. (2 marks)



Module 12 checklist: Prosocial behaviour

Introduction

In psychological terms, aggression is referred to as verbal or physical behaviour carried out with the intention of harming another person (Burton, Westen & Kowalski, 2018). Evolutionary psychologists suggest that aggressive behaviour has an adaptive purpose – think of two lions fighting each other to mate with the same lioness. Researchers have identified neurological circuits in the human brain that become activated in response to threatening environmental stimuli or certain social situations (e.g. engaging in a tackle during a rugby game; Blair, 2016). Aggressive behaviour can be considered a form of antisocial behaviour that is problematic if used persistently, out of context or to achieve a goal (e.g. to gain money by mugging a bystander).

Aggression is a multifaceted behaviour influenced by biology, our cognitive processes, the social environment and, in many instances, our culture. Aggressive behaviour has been associated with various forms of media influence; for example, watching violent television programs or playing violent video games. However, the results of studies investigating this connection are inconclusive.

In this module, we will review aggression as an antisocial behaviour by exploring different types of aggression before investigating the various explanations for aggressive behaviour. We will then review the current ways in which media influences aggressive behaviour.

Prior knowledge



**Prior
knowledge
quiz**

Check your understanding of concepts related to aggression before you start.

Subject matter

Science understanding

- Make predictions using the general aggression model (GAM), with respect to single and multiple episodes.
- Explain how media can influence aggression, with reference to advertising, video games and social media.

Science as a human endeavour

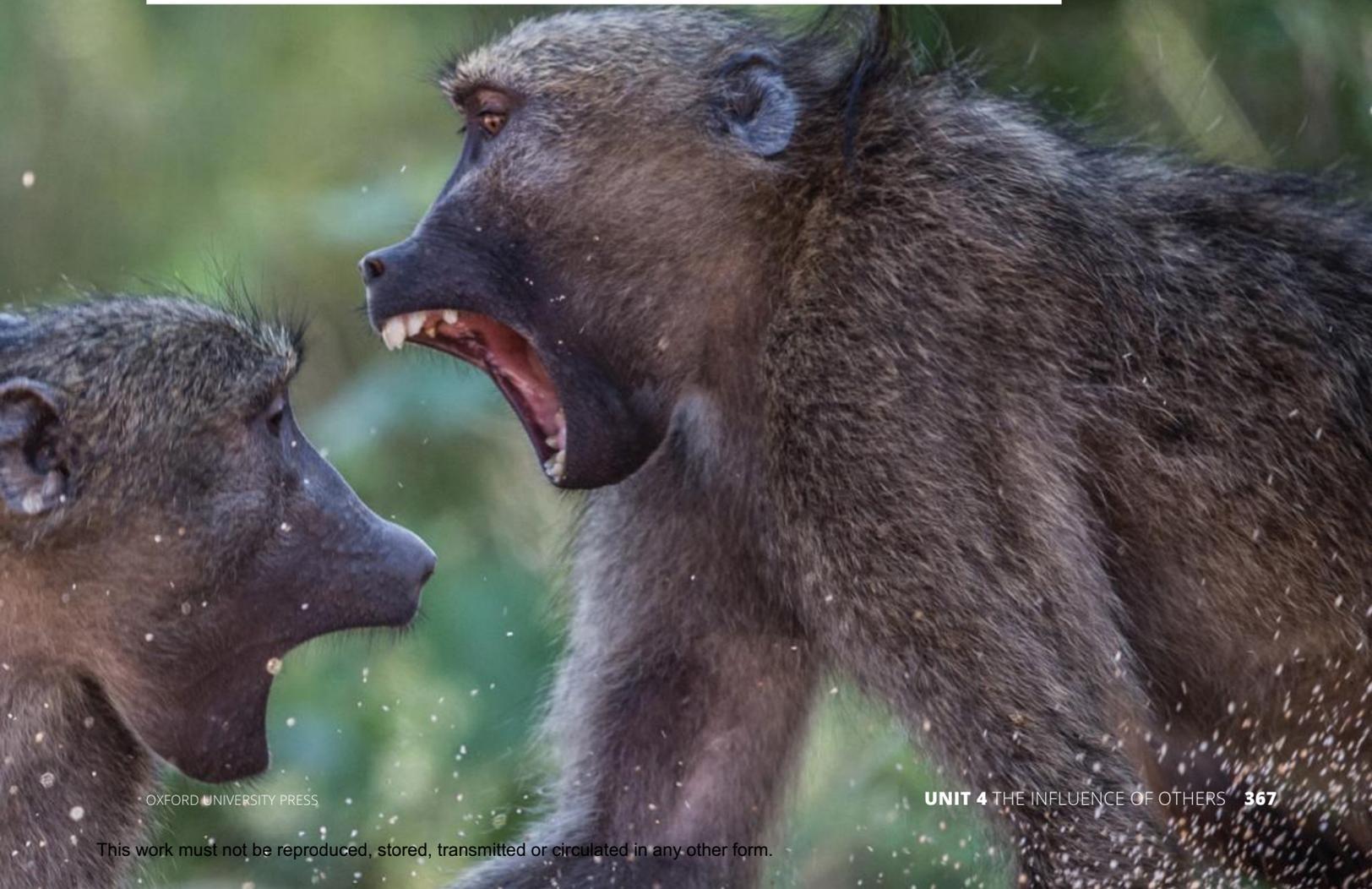
- Consider that a strength of the general aggression model (GAM) (Anderson & Bushman 2002) is that it encompasses evidence from multiple theories across multiple perspectives.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify, research and construct questions for investigation
- distinguish between types of investigations
- identify and apply ethical principles
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - correlation, e.g. Pearson r correlation coefficient
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - explain findings
 - construct scientific arguments
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- acknowledge sources of information with standard scientific referencing conventions.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024



Lesson 13.1

Aggression

Key ideas

- Aggression is the intentional behaviour aimed at causing harm to another person who wants to avoid that harm. It includes physical, verbal, relational and passive aggression that can be direct or indirect.
- The general aggression model (GAM) is a framework that examines interplay between personal traits, situational factors and internal processes.
- The general aggression model considers proximate causes and processes including inputs, routes and outcomes. This leads to either thoughtful or impulsive actions and a social encounter that can either be positive or negative.
- The general aggression model also considers distal causes and processes, including biological and environmental modifiers, which shape personality and influence responses to immediate situations.
- According to the general aggression model, a single episode of aggression has an immediate impact on the internal state, reinforcing future behaviour, whereas multiple episodes has a cumulative impact in shaping long-term aggressive behaviour.



Learning intentions
and success criteria

Introducing aggression

aggression

intentional behaviour aimed at causing harm to another person who wants to avoid that harm

According to Allen and colleagues (2018) **aggression** is defined as intentional behaviour aimed at causing harm to another person who wants to avoid that harm.

Aggression involves three key characteristics:

- **observable action:** Aggression requires an action, not just thoughts or feelings.
- **intent to harm:** The behaviour must be intended to cause harm, not accidental or for a beneficial purpose.
- **victim's motivation:** The victim must be motivated to avoid the harm, excluding cases like masochism or assisted suicide.

For example, yelling at someone in anger, spreading false rumours to damage their reputation, hitting or pushing them, and giving them the silent treatment to make them feel excluded are all forms of aggression.

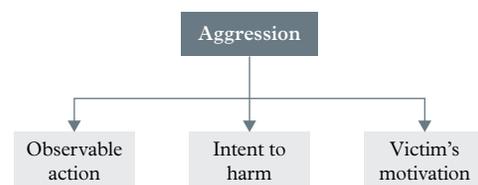


FIGURE 1 The three key characteristics of aggression

physical aggression

involves actions like hitting, kicking, or damaging someone's property

verbal aggression

uses words to harm, such as yelling or spreading rumours

Forms of aggression

Aggression is a complex and multifaceted behaviour that can manifest in various forms, each with distinct characteristics and impacts. Understanding these forms is crucial for comprehending human interactions and addressing conflict effectively.

- **Physical aggression** involves actions like hitting, kicking, or damaging someone's property.
- **Verbal aggression** uses words to harm, such as yelling or spreading rumours.

- **Relational aggression** aims to harm someone's social relationships, like spreading lies or excluding them.
- **Passive aggression** involves indirect actions that cause harm, like ignoring someone or not inviting them to an event.

Each type of aggression can be direct (target is present) or indirect (target is absent).

relational aggression

aims to harm someone's social relationships, like spreading lies or excluding them

passive aggression

involves indirect actions that cause harm, like ignoring someone or not inviting them to an event

general aggression model (GAM)

a framework that explains how personal traits, situational factors and internal processes interact to influence aggressive behaviour

Introducing the general aggression model

The **general aggression model (GAM)** offers a comprehensive framework for understanding the complexities of aggressive behaviour. By examining the interplay between personal traits, situational factors and internal processes, the GAM provides valuable insights into why individuals may act aggressively. This model helps us explore the emotional, cognitive and physiological pathways that lead to aggression, enabling us to develop effective strategies for managing and reducing such behaviours. The processes involved in the GAM are shown in Figure 2.

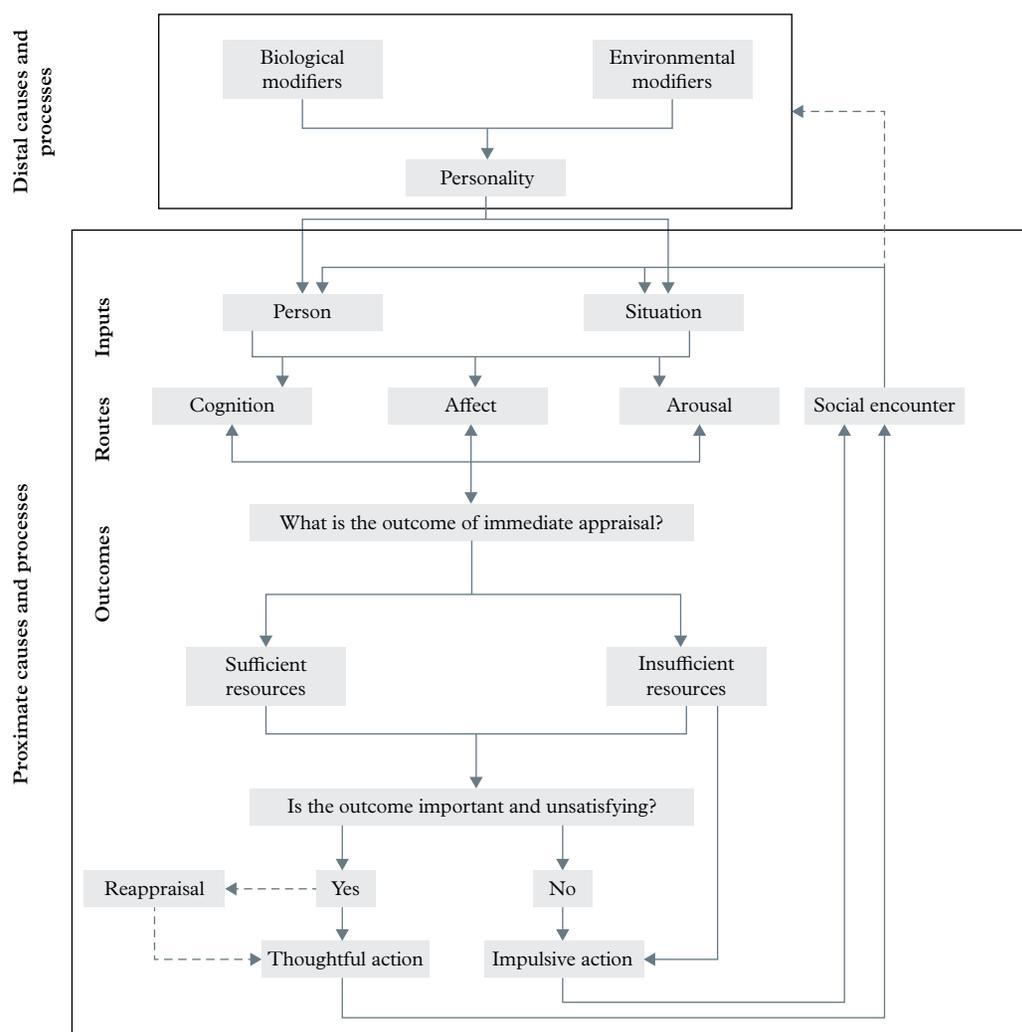


FIGURE 2 The general aggression model

To interpret the model, you should start with the proximate causes and processes (bottom section of Figure 2). The term “proximate” refers to something that is immediate or closest in relationship. In the context of causes or explanations, it means the direct or immediate cause of an event, as opposed to the underlying cause. For example, in biology, proximate causes explain how a behaviour occurs, while underlying causes explain why it occurs.

The second part of the GAM focuses on distal causes and processes (top section of Figure 2), explaining how long-term biological and environmental factors interact to shape personality, which then affects person and situation factors. These processes work in the background during each episode of proximate processes, shaping personality and influencing how a person reacts in various situations.

We will now look at proximate and distal processes in detail.

Proximate causes and processes

Stage 1: Inputs

Inputs are the factors that can trigger aggression. Both person and situation factors can combine or interact to affect cognition, emotions or arousal. Generally, more risk factors increase the likelihood of aggression, while more protective factors decrease it. For example, someone who views aggression as normal is more likely to be aggressive, especially if provoked in a stressful environment. Conversely, someone who is agreeable and in a good mood is less likely to act aggressively.

Person factors

Person factors are individual differences that influence how someone reacts to situations. These factors are generally stable over time and across different situations if the person uses the same knowledge structures consistently. Personality can be seen as a summary of these knowledge structures. Aggressive knowledge structures increase the likelihood of aggression. Several person factors are identified as risk factors for aggression, including:

- acceptance of aggression
- aggressive behavioural scripts
- aggressive self-image
- certain personality disorders
- dehumanisation
- displacement of responsibility
- goals that support aggression
- high neuroticism
- high self-efficacy for aggressive behaviour
- high trait anger
- hostile attribution biases
- low agreeableness
- low conscientiousness
- low self-control
- moral justification of violence
- narcissism
- positive attitudes towards aggression
- unstable high self-esteem.

Conversely, reversing these factors, such as having negative attitudes towards aggression, low neuroticism, high agreeableness and high conscientiousness, can reduce the likelihood of aggression.

Situation factors

Situation factors are elements of a situation that can influence the likelihood of aggression. These factors include:

- alcohol intoxication
- anonymity
- bad moods
- discomfort
- ego depletion
- exercise
- frustration
- hot temperatures
- noise
- pain
- provocation
- rejection
- social stress
- the presence of weapons
- threatening stimuli
- violent media.

For instance, the mere presence of a gun can increase aggression compared to a non-threatening object like a badminton racquet. Some factors, like good mood or exposure to prosocial media, can reduce aggression.

Stage 2: Routes

Stage two examines how person and situation factors influence appraisal and decision-making processes, leading to either aggressive or non-aggressive outcomes. These factors can alter a person's affect (emotions), cognition (thoughts) and arousal (physical state). These three elements form a person's current internal state, and changes in any of them can increase the likelihood of aggression. Different factors affect different internal state variables, but these variables also interact and influence each other. For example, feeling angry can lead to hostile thoughts and increased arousal, while interpreting a situation as hostile can increase anger and arousal. Any of these variables can influence the others in any order.

Affect

Affect refers to the emotional response a person has to a situation. Emotions like anger, frustration or sadness can increase the likelihood of an aggressive response. For example, if someone feels angry after being insulted, this emotion can drive aggressive behaviour. Situation factors like pain or hot temperatures can also increase aggressive feelings.

Cognition

Cognition involves the thoughts and interpretations a person has about a situation. This includes how they perceive the intentions of others and their own beliefs about aggression. For example, if a person interprets a comment as a deliberate insult, they are more likely to respond aggressively. Aggressive thoughts can be triggered by situation factors (like violent media) or become chronically accessible through repeated activation. This is known as priming. For example, exposure to media violence can temporarily increase aggressive thoughts, while trait aggression can make these thoughts persistently accessible.

Arousal

Arousal refers to the physiological state of the person, such as increased heart rate or adrenalin levels. High arousal can amplify emotional and cognitive responses, making aggressive behaviour more likely. For example, if someone is already physically aroused from exercise or stress, they might react more aggressively to a provocation. Arousal can affect aggression in several ways: it can be misinterpreted as anger (excitation transfer), strengthen aggressive tendencies when provoked, or become an aversive state that increases aggressive feelings and thoughts, similar to pain or extreme temperatures.

Stage 3: Outcomes

This is the final stage where appraisal and decision-making occurs, leading to either aggressive or non-aggressive behaviour. This stage involves several components that help determine the final action.

Immediate appraisal

This is a quick, automatic reaction to a situation based on the current internal state (affect, cognition and arousal). For example, if someone bumps into you, your immediate appraisal might be that they did it on purpose, leading to an aggressive response like shouting.

Sufficient resources

This refers to whether the individual has enough cognitive resources (time, energy and mental capacity) to think through the situation. If resources are sufficient, the person can move to the next step (reappraisal). If not, they might act impulsively.

Important and unsatisfying outcome

This component assesses whether the immediate appraisal leads to an outcome that is important and unsatisfying to the individual. If the outcome is deemed important and unsatisfying, the person is more likely to engage in reappraisal.

Reappraisal

This is a more deliberate and thoughtful consideration of the situation. During reappraisal, the individual might consider alternative explanations for the event and potential consequences of different actions; for example, realising that the person who bumped into them might have done it by accident. However, reappraisal can also confirm the initial perception of intentional harm, leading to more anger and aggression. After reappraisal, the person decides on an action, which can be either aggressive or non-aggressive.

Thoughtful action

If the reappraisal process is successful, the individual can choose a thoughtful, non-aggressive action; for example, calmly asking if the person who bumped into them is okay. The action taken then affects the social interaction, potentially changing person and situation factors, and starting the cycle again.

Impulsive action

If resources are insufficient or the reappraisal process fails, the individual might resort to an impulsive, aggressive action; for example, pushing the person who bumped into them without thinking it through.

Social encounter

Thoughtful action or impulsive action can lead to either a positive or negative social encounter, which influences an individual's future internal state (affect, cognition and arousal). Over time, repeated positive or negative social encounters contribute to the development of an individual's personality and long-term behaviour patterns and social environments.

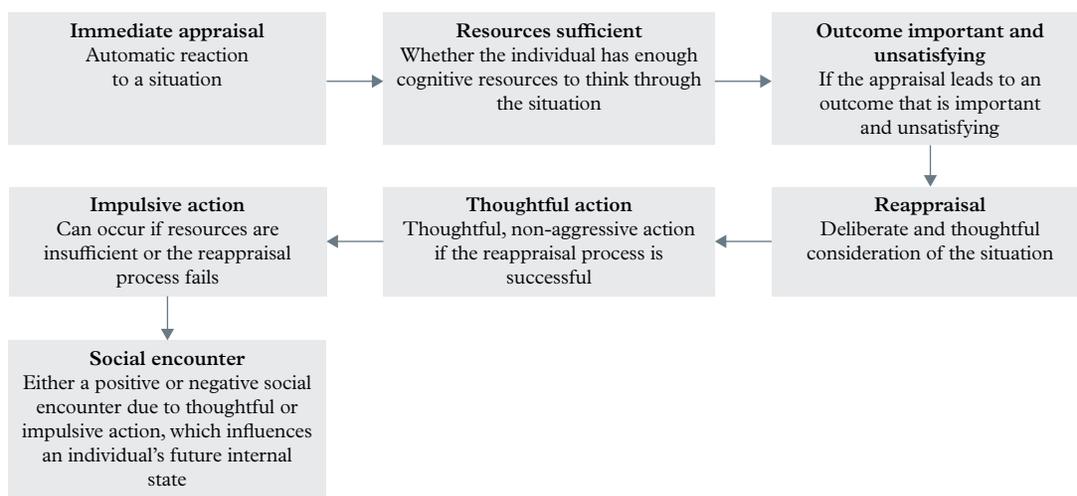


FIGURE 3 The outcome stage (stage 3) of the GAM

Distal causes and processes

In the second part of the general aggression model (GAM), the focus shifts to distal causes and processes, as depicted in the top section of Figure 2. **Distal causes** refer to long-term biological and environmental factors that interact over time to shape an individual's personality. These factors, known as modifiers, operate in the background, influencing personality development and subsequently affecting how a person responds to various situations. By understanding these distal processes, we can better comprehend how personality traits are formed and how they play a role in the proximate processes that occur during specific episodes of behaviour.

distal cause

long-term biological or environmental factor that has a role in shaping an individual's personality

Biological modifiers

Biological modifiers that can increase the likelihood of developing an aggressive personality include:

- ADHD: attention-deficit/hyperactivity disorder, which can affect impulse control
- impaired executive functioning: difficulties in planning and decision-making
- hormone imbalances: for example, high levels of testosterone leading to increased aggression
- low serotonin: associated with mood regulation issues
- low arousal: individuals may seek out stimulating, often aggressive, activities to compensate.

Environmental modifiers

Environmental modifiers that can contribute to an aggressive personality include:

- cultural norms: societies that accept or glorify violence
- family dynamics: poor parenting or living in a coercive family environment
- life conditions: experiencing deprivation or victimisation
- neighbourhoods: living in violent or unsafe areas
- peer groups: associating with violent or antisocial peers
- media exposure: chronic exposure to violent media content.

Personality

These biological and environmental factors interact over time to shape an individual's personality, making them more or less likely to exhibit aggressive behaviour. This, in turn, influences how they respond to immediate situations (proximate processes). For example, someone with high testosterone and poor parenting might be more prone to interpret ambiguous situations as hostile and react aggressively.

Single and multiple episodes

The GAM helps us understand how both single and multiple episodes of aggression can influence behaviour over time. A single episode of aggression can have an immediate impact on the individual's internal state (affect, cognition, arousal). For example, if someone reacts aggressively to being insulted, they might feel a temporary sense of relief or empowerment. The outcome of the single episode can reinforce future behaviour.

If the aggressive response leads to a desired outcome (e.g. the insult stops), the individual might be more likely to use aggression in similar situations in the future. A single episode can cause short-term changes in the individual's mood and thoughts; for example, feeling justified in their aggression might lead to a temporary increase in self-esteem.

Multiple episodes of aggression have a cumulative impact, shaping long-term behaviour and personality. Repeated aggressive responses can solidify into habitual patterns of behaviour. Over time, individuals develop cognitive scripts based on their repeated experiences. These scripts guide future behaviour and interpretations of social situations.

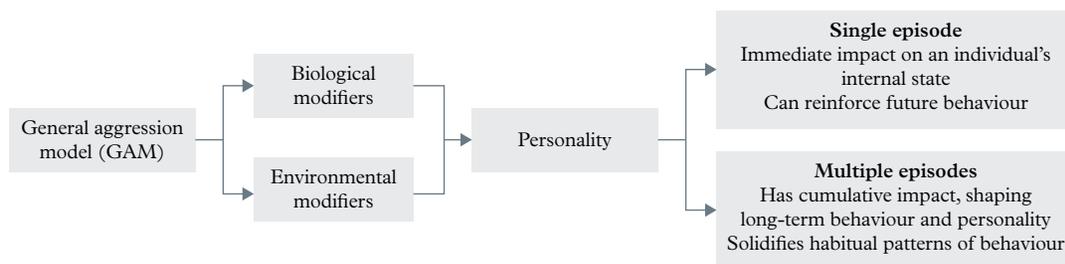


FIGURE 4 Distal causes and processes leading to single or multiple episodes according to the GAM

For example, someone who frequently uses aggression might develop a script that interprets ambiguous situations as hostile. Multiple episodes may contribute to the development of stable personality traits. For instance, repeated aggression can lead to the formation of an aggressive personality, characterised by traits like hostility and impulsivity. The cumulative effect of multiple episodes can lead to long-term social consequences such as strained relationships, social isolation or even legal issues.

Making predictions using the general aggression model

Study tip

The syllabus requires you to make predictions using the GAM with respect to single and multiple episodes. You will need an in-depth understanding of the GAM to do this. Practise doing this by applying the GAM to real-life situations, such as media violence or social stress, to predict aggressive behaviour. This will help solidify your understanding and improve your predictive skills.

In an external exam, you may be asked to make predictions using the GAM. It is important to consider both single and multiple episodes of behaviour when answering these types of questions.

- 1 Identify the inputs:** Determine the person factors (e.g. personality traits, biological factors) and situation factors (e.g. environmental influences, immediate context) that are relevant to the scenario.
- 2 Analyse the routes:** Consider the individual's affect (emotions), cognition (thoughts), and arousal (physiological state) in response to the inputs.
- 3 Predict the immediate appraisal:** Predict the individual's initial, automatic reaction to the situation based on their internal state.
- 4 Evaluate resources and reappraisal:** Assess whether the individual has the cognitive resources to reappraise the situation and consider alternative responses.
- 5 Determine the outcome of a single episode:** Predict whether the individual will engage in a thoughtful action (non-aggressive, prosocial) or an impulsive action (aggressive) in a single episode.
- 6 Consider effects of multiple episodes:** Reflect on how repeated episodes (multiple episodes) will influence the individual's personality and future behaviour.

Worked example 13.1A

Making predictions using the GAM

Predict how a student, Jamie, who has a history of being bullied, might react to a new classmate accidentally bumping into them in the hallway. Use the GAM to explain your prediction for both a single episode and multiple episodes.

| Think | Do |
|--|---|
| Step 1: Identify the inputs. | <ul style="list-style-type: none"> Person factors: Jamie has a history of being bullied, leading to high sensitivity to perceived threats. Situation factors: The new classmate accidentally bumps into Jamie. |
| Step 2: Analyse the routes. | <ul style="list-style-type: none"> Affect: Jamie feels a surge of anger and fear. Cognition: Jamie interprets the bump as a deliberate act of aggression. Arousal: Jamie's heart rate increases, and muscles tense up. |
| Step 3: Predict the immediate appraisal. | <ul style="list-style-type: none"> Jamie's immediate appraisal is that the new classmate is hostile. |
| Step 4: Evaluate resources and reappraisal. | <ul style="list-style-type: none"> If Jamie has the cognitive resources (time and mental capacity), they might reappraise the situation and realise it was an accident. If not, Jamie might act impulsively. |
| Step 5: Determine the outcome of a single episode. | <ul style="list-style-type: none"> Impulsive action: Jamie might shout at the new classmate or push them away. Thoughtful action: If Jamie reappraises, they might calmly ask if the bump was accidental. |

Step 6: Consider effects of multiple episodes.

- Repeated impulsive actions can lead to a more aggressive personality, making Jamie more likely to react aggressively in future situations. Jamie might develop a hostile personality, interpreting ambiguous situations as threats.
- Repeated thoughtful actions can help Jamie develop better emotional regulation and prosocial behaviour. Jamie might become more empathetic and better at handling conflicts.

Your turn

Predict how a student, Alex, who is generally calm but has recently been under a lot of stress, might react to a peer making a sarcastic comment during a group project. **Explain** your prediction for both a single episode and multiple episodes, using the GAM. (3 marks)

Check your learning 13.1



Check your learning 13.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the four types of aggression. (4 marks)
- 2 **Describe** the three components of the route stage of the GAM. (3 marks)
- 3 **Describe** the difference between proximate and distal causes in the GAM. (1 mark)
- 4 **Explain** how a single episode of aggression can impact future behaviour, using an example. (2 marks)
- 5 **Explain** how cognitive scripts can lead to multiple episodes of aggression. (2 marks)

Analytical processes

- 6 **Distinguish** between immediate appraisal and reappraisal according to the GAM. (1 mark)
- 7 **Contrast** person and situation factors that serve as inputs in the GAM. (1 mark)
- 8 **Apply** the GAM to prosocial behaviours by assessing the proximate processes within the GAM. (3 marks)

Knowledge utilisation

- 9 **Evaluate** the effectiveness of the GAM by considering the strengths and limitations of the model. (4 marks)

Lesson 13.2

Influence of advertising and the media on aggression

Key ideas

- Advertising can influence acceptable standards in society; aggressive advertisements can make aggression seem normal, but aggression can also be used in advertisements to deter violence.
- Social marketing campaigns use violence to attract attention and encourage attitude change regarding aggressive behaviour.
- Advertising can use violent behaviour to attract attention to its message, which encourages desensitisation and could alter social norms in relation to aggression.



Learning intentions and success criteria

Introducing the influence of the media

Media includes anything from newspapers, radio, magazines and television to social media or blogging. It is where we get our information and connect with the outside world on a global scale. Using technology, we can access this information from many different devices, such as our phones, tablets or computers, from practically any location.

The messages and information coming from the media can have an impact on our attitudes and behaviour, whether we are aware of it or not. As we are fed more and more information through images, sounds, slogans and branding, we are incorporating what the media shows us into our knowledge of the world.

There is little doubt that the media has positive and negative influences on individual and group behaviour. Advertising, television, social media and video games play an important role in shaping society and individuals.



FIGURE 1 After witnessing an advertisement for KFC, you may really want to eat fried chicken.

The power of advertising

Imagine you are watching your favourite television series and the ads are becoming annoying. Sometimes, the amount of time allocated to advertising seems longer than the show itself! Despite this, a new advertisement from KFC is making you salivate.

Advertising is directed at *you* and fosters artificially created “needs” to have the latest, best, most desirable consumer item on the market or to make you behave in a particular way. Do you have an Apple or an Android device? Do you drink Coca-Cola or Pepsi? Do you really think “the burgers are better at Hungry Jacks”?

Advertising sends the message that “the only way to secure pleasure, popularity, security, happiness or fulfilment is through buying more ... regardless of how much we already have” (Lewis, 2011).

Targeted advertising

Advertising also likes to grab our attention – sometimes by using subtle forms of aggression. This strategy is particularly effective when combined with humour. Modern advertising uses sophisticated targeting to reach specific audiences. This means that messages promoting aggression or, conversely, anti-violence messages can be tailored to influence groups more effectively. For instance, the Federal Government’s campaign discussed in Real-world psychology: The \$30 million campaign against domestic violence, uses technology to deliver messages to those at risk of holding or developing harmful attitudes towards women.

Although targeted advertising may seem quite harmless, researchers argue that this form of advertising can lead to desensitisation of the impacts of aggressive behaviour and can influence social norms, making aggressive behaviour more acceptable (Gradinaru, 2016). According to social learning theory, people learn behaviours by observing others, especially those they consider role models. Advertisements featuring celebrities or influential

figures engaging in or endorsing aggressive behaviour can lead viewers to imitate these actions. Advertising can shape attitudes by consistently presenting certain messages. For example, advertising that implicitly or explicitly endorses aggression can contribute to more hostile attitudes.

Real-world psychology

The \$30 million campaign against domestic violence

Boys as young as nine will be targeted in the new fight against domestic violence.

Social media will also become the new way to deliver the Federal Government's \$30 million education campaign.

The Assistant Minister for Women, Michaelia Cash, has revealed boys aged between nine and 12, non-English-speaking women and Aboriginal and Torres Strait Islanders are among the groups chosen for special focus.

Senator Cash said extensive research was already underway into who needed the messages most, what would work and when, and how they should be delivered.

She said starting with young children aged nine to 12 years meant respectful attitudes could be shaped while they were forming relationships and opinions.

"We want them to understand the girl standing next to you is the same as the boy standing next to you," she said.

Unlike major attitudinal-change campaigns such as drink-driving and seatbelt awareness, this year's push to change the way some think about domestic violence won't be seen on TV screens but delivered to personal devices.

Technology will be used to target messages to specific groups deemed at risk of abuse or of holding bad attitudes towards women.

"It'll be looking at how we get to different age groups and what is the most effective medium to get to them," Senator Cash said.

"A lot of kids don't watch TV but they do have an iPhone."

"And that's the exciting thing about the internet, we have the reach we didn't have during road safety campaigns."

Jessica Marszalek, *The Courier-Mail*, 27 April 2015



FIGURE 2 A purple ribbon is commonly used to raise awareness of domestic violence.

Apply your understanding

- 1 **Identify** the age group targeted in this campaign against domestic violence. (1 mark)
- 2 **Describe** how the Federal Government intended to deliver its \$30 million education campaign. (1 mark)
- 3 **Explain** why it is important to educate children about respectful attitudes. (2 marks)
- 4 **Explain** how advertising can influence attitudes towards aggression, with reference to the campaign. (2 marks)

Advertising in health and wellbeing

Social marketing campaigns regularly feature aggression to raise awareness of the impact of aggressive behaviour. For example, government campaigns targeting domestic violence often use shock tactics to help change attitudes and social practices that tolerate violence towards the perpetrator's partner and children (Queensland Government, 2016).

Advertising can also be a powerful vehicle to distribute important health and wellbeing messages as well as education. There are many examples, such as the Victorian Transport Accident Commission (TAC) advertisements, “If you drink, then drive, you’re a bloody idiot” or “Speed kills”, where graphic scenes portrayed by actors illustrate what can happen when people drink and drive, or drive too fast.

Socially responsible messaging

The media can also deliver very important socially responsible messages to large audiences. Following the brutal, unprovoked hit to the head that left Daniel Christie in a coma, the media reframed the incident as a “coward’s punch”.

Daniel’s family made the painful decision to turn off his life support 11 days later and donated his organs. Social media showed immense support for Daniel and his family – a great example of how these vehicles of communication can have a positive effect on individuals and groups.



FIGURE 3 Rosie Batty’s advocacy for awareness of family violence has led to ongoing media discussion about the significance of the issue and related issues.

The murder of Luke Batty on 12 February 2014 at the hands of his father spurred his mother, Rosie Batty, to raise public awareness of domestic violence against women and families in Australia (Figure 3). The horrendous circumstances of Luke’s death led to a broader discussion through television, newspapers, social media and magazines. Rosie Batty was awarded Australian of the Year for her work in this area. Following Luke’s death and Rosie’s persistence, laws on domestic violence are changing for the better and the government has pledged \$30 million to fund an advertising campaign that will be delivered through social media to target boys as young as nine. Social media has been a vehicle for this campaign, as younger generations tend to use their phones more than they watch television.

The dual role of media in violence

Despite advertising and social media campaigns against domestic violence, particularly violence against women, some advertisements still include violence towards women or negative treatment of women. These advertisements reinforce the idea that women are men’s property and that they can be treated with disrespect and aggression. Increased exposure to these advertisements can normalise such actions and cause an increase in aggression. Repeated exposure to aggressive content can desensitise individuals to violence.

Check your learning 13.2



Check your learning 13.2: Complete these questions online or in your workbook.

Retrieval and comprehension

1 **Describe** the effects of advertising on aggression. (1 mark)

2 **Explain** how advertising can change our attitudes. (2 marks)

- 3 **Explain** how advertising can be used to positively influence individuals and groups, using an example. (2 marks)

Analytical processes

- 4 **Consider** the impact of repeated exposure to aggressive content in media. **Explain** how desensitisation can alter an individual's perception of violence. (2 marks)

Knowledge utilisation

- 5 Investigate online for news stories about the “coward’s punch” campaign. **Discuss** how media was used to encourage change. (2 marks)
- 6 **Discuss** the ethical implications of using targeted messaging in advertising to influence behaviour. (2 marks)

Lesson 13.3

Social media and aggression

Key ideas

- Social media can have positive influences on behaviour but also negative influences such as social isolation, normalising violence, cyberbullying and aggression exposure.



Learning intentions and success criteria

Introducing social media and aggression

Social media can influence society in a positive or negative way. There are many benefits to having greater connectivity and, as a result, access to more information. We will look at both the positive and negative influences of social media on society, focusing on aggression.



FIGURE 1 Social media can have both positive and negative influences on aggression.



FIGURE 2 Positive influences of social media include connection with friends, family and the world!



FIGURE 3 With your phone you have access to global news in real time, online job seeking and shopping, social outlets, as well as access to gossip, cyberbullying and aggressive content.

Positive influences: Connection

So far, we have discussed the power of advertising on individuals and groups, and briefly examined both the negative and positive influences that this form of communication has on individuals and society.

Is your phone in your pocket or sitting on your desk? How often do you actually turn it off or leave it at home when you go out? Is your answer “Never”?

The reality of technology today means that most of us are connected to our friends, family, news feeds, social media and the global community 24 hours a day. We can call, email and message, as well as use FaceTime, Zoom, WhatsApp, TikTok, Snapchat, Facebook and Instagram. Our smartphones also allow us to play video games with friends, share photos with our loved ones and organise events with ease. The opportunity to be part of the global community is literally in the palm of your hand.

Negative influences: Cyberbullying

It is clear that there are many benefits to accessing the great range of media at our fingertips. However, there is also a dark side. Cyberbullying, a form of aggression, can be traumatic and lead to self-harm or, in some cases, suicide.

Internet “trolls” have become an unfortunate online presence and find pleasure in deliberately creating arguments, putting people down, and being sarcastic, cruel and emotionally destructive. Recent statistics revealed that 44 per cent of Australian young people reported having a negative online experience in the last 6 months, which includes 15 per cent who received threats or abuse online (eSafety Commissioner, 2024).

Social media can also encourage aggressive thoughts and behaviour. This can happen by normalising aggressive behaviour or thoughts, as well as making them appear socially acceptable.

Online social media provides a platform for a specialised form of bullying where people are deliberately hurt – psychologically or emotionally – via electronic technology. There are multiple social media tools that cyberbullies can use to bully another person. These include Instagram, Snapchat, TikTok, messaging and other social networking forums. Cyberbullies can engage in verbal and socially aggressive behaviour such as harassment, insults, threats and rumour spreading. Unfortunately, cyberbullying can occur any time of the day or night – 24 hours a day, seven days a week. This means the effects of cyberbullying can be profound and hard to escape (Australian Human Rights Commission, 2012; Gordon, 2018).

As you may remember from Module 12, the bystander effect explains why people may not respond when they see another person in trouble. This has particular relevance for cases of cyberbullying. Quite often, people in the same social groups are aware of what is happening but choose not to assist or become involved. Australian researchers found that school students may refrain from assisting those being cyberbullied out of:

- fear of becoming the next target of bullying behaviour
- fear of rejection from peers who may disapprove of bystander action
- lack of knowledge of the history of the bullying situation to know whom to support and how
- uncertainty about whom to tell to get help to resolve the situation.

Real-world psychology

Forty per cent jump in child bullying reports to eSafety Commissioner in 2023

In recent years, there has been a significant increase in child bullying reports to the eSafety Commissioner in Australia, with a 40 per cent jump in 2023 (eSafety Commissioner, 2025a). The eSafety Commissioner, established in 2015, is an independent regulator dedicated to promoting online safety. It administers regulatory schemes and mandatory industry codes to ensure online platforms adhere to safety standards. As the world's first government agency focused solely on online safety, the eSafety Commissioner provides education on online risks; helps remove harmful content; and supports victims of cyberbullying, adult cyber abuse and image-based abuse. Its innovative strategies and policies have influenced international online safety practices and inspired similar initiatives worldwide.

In 2024, the eSafety Commissioner received 2,978 valid cyberbullying complaints, marking a 25 per cent increase compared to the previous year. Of these reports, 46 per cent were related to children aged 13 years and younger, with children aged 12 and 13 accounting for 35 per cent of the reports (eSafety Commissioner, 2025b). Additionally, girls reported cyberbullying at double the rate compared to boys. The most common issues reported included nasty comments or name-calling, offensive pictures or videos, fake accounts and impersonations, threats of violence and unwanted contact. To help young people stay safe online, several tips are recommended. Firstly, it is important to talk about online safety with parents or carers and inform them if anything online makes one uncomfortable. Respecting others online is crucial, just as it is in person.

Understanding the purpose of parental controls and privacy settings on devices can help keep young people safe. Regular check-ins with parents about online activities and interactions are also beneficial. With the rise of sophisticated online abuse through new AI technologies, staying vigilant is essential. The eSafety Commissioner can assist in removing harmful content if platforms do not act.

Young people are encouraged to connect by keeping their apps and devices secure, reflect on how their online actions affect others, and protect themselves by visiting the eSafety Commissioner website for tips on staying safe and reporting abuse. Resources such as the eSafety Commissioner, Kids Helpline and schools are available to provide expert assistance, content removal, support and educational materials. By utilising these strategies and resources, young people can navigate the online world safely and confidently, knowing they are not alone in facing online challenges.

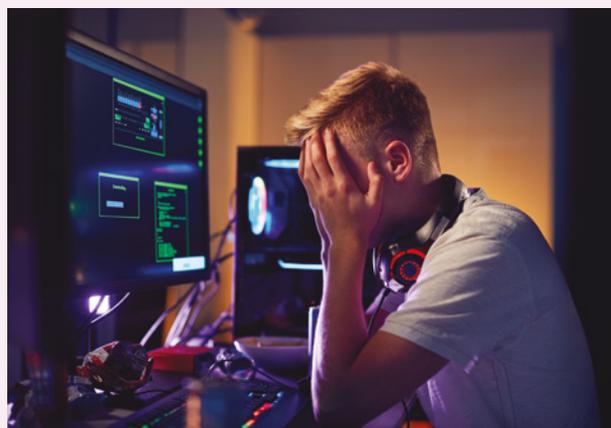


FIGURE 4 Cyberbullying can severely impact teenagers' mental health, leading to anxiety, depression and even suicidal thoughts.

◀ Apply your understanding

- 1 **Describe** the primary role of the eSafety Commissioner in Australia. (1 mark)
- 2 **Identify** the age group most affected by cyberbullying. (1 mark)
- 3 **Identify** three types of support the eSafety Commissioner provides to victims. (3 marks)
- 4 **Identify** two tips for staying safe online. (2 marks)
- 5 **Explain** how the eSafety Commissioner influenced international online safety practices. (2 marks)
- 6 **Explain** why it is important to regularly check in with parents about online activities. (2 marks)



FIGURE 5 The Slender Man is an online myth that is shared through various social media sites. Acts of violence and aggression have been linked with the Slender Man.

Negative influences: Physical aggression

Social media has also been implicated in aggressive acts by teenagers. You may have heard of the Slender Man. The Slender Man is an online viral image and story that has been shared by adolescents around the world, particularly in the United States (Figure 5). Eventually, the Slender Man was made into a video game. What's interesting about the Slender Man is that it sparked very violent and aggressive acts among teenagers. In 2014, two 12-year-old girls stabbed their friend in the woods in an attempt to please the Slender Man. The girls had no previous violent or aggressive tendencies, and stated that they only acted this way for the Slender Man. While there were other issues involved in this case, it prompted a discussion about how much teenagers are influenced by social media, and if it could be blamed for violent, aggressive and negative social behaviour. The case also saw social

media and internet outlets use the positive networking they provide to raise money for the victim and discourage this sort of behaviour.

Check your learning 13.3



Check your learning 13.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** how social media can influence aggressive behaviour. (1 mark)
- 2 **Explain** the impact of cyberbullying on victims. (2 marks)

Analytical processes

- 3 **Compare** the effects of social media and advertising on aggressive behaviour. (2 marks)

Knowledge utilisation

- 4 Think about your use of social media, and the types of information you encounter. **Evaluate** the effects of this on your general mood and feelings of aggression. (2 marks)
- 5 **Create** a research question for the following claim: "Social media makes teenagers more aggressive." **Propose** a method to test this. (2 marks)

Lesson 13.4

Video games and aggression

Key ideas

- Playing video games can have a positive influence on cognition and education, including boosting spatial navigation, reasoning, memory and perception, improving problem-solving skills, and enhancing multitasking and decision-making abilities.
- The negative influence of video games includes promoting aggression, with research suggesting that frequent exposure to violent media increases the likelihood of aggressive behaviour. Violent video games may desensitise people to violence.
- Research links aggression with video gaming; however, the results must be interpreted with caution, especially when applied to lethal forms of aggression.



Learning intentions
and success criteria

Introducing video games and aggression

Although video games are often discussed in negative terms, emerging research also links gaming with positive social functioning, including positive mental health and wellbeing of young players.

Benefits of video games

Playing video games offers numerous benefits across cognitive, social, emotional, health and educational domains. According to the American Psychological Association (2020), video games can enhance cognitive abilities such as spatial navigation, reasoning, memory and perception, with shooter games improving 3D visualisation skills crucial for STEM fields, and strategic games boosting problem-solving abilities and academic performance. Socially, gaming fosters online friendships similar to real-life ones, promoting emotional support, cooperation and prosocial behaviours like empathy and teamwork. Emotionally, video games provide a safe space to experience failure and build resilience. Health-wise, games like EndeavorRX are used therapeutically, particularly for ADHD, and offer stress relief and relaxation. Educationally, video games align with self-determination theory, helping players gain competence, autonomy and relatedness, while also enhancing creativity and critical thinking through interactive learning activities (Goode, 2014; Jones et al., 2014).



FIGURE 1 Video games are said to improve a player's cognitive function through the repetitive practice of quick responses, tactical thinking and problem-solving skills.

Negative influence of video games

Research generally indicates that watching violence on television, in movies or video games promotes aggression (LoBue, 2018). Simply watching violent movies or playing violent video games will not cause someone to become aggressive. However, repeated exposure to television violence in childhood has been shown to predict aggressive behaviour in adulthood (Huesmann et al., 2003).

A large-scale survey by Australia's Interactive Games and Entertainment Association highlights the worrying effects of young people spending too many hours a week playing video games, especially violent ones. Their research shows that children who are constantly exposed to violent multimedia are more likely than other children to engage in aggressive behaviour when placed in a conflict situation. It is therefore clear that frequent exposure to media violence increases the likelihood of engaging in aggressive behaviour at a later point in time (Flynn, 2012).

Craig Anderson (2002) found strong evidence that playing violent video games on a frequent basis (approximately 20+ hours a week) increased aggressive behaviour and decreased positive social behaviours in children and young people. Anderson suggested that this was due to improved computer graphics and the development of visually realistic games that involved brutal mass killings as the main goal of scoring points and winning the game. Games such as Grand Theft Auto, Call of Duty and the Battlefield series all involve wounding or killing opponents in graphically lifelike settings. They show realistic people, blood and wounds, and use various weapons such as shotguns, explosives and knives. Although there has been much support for Anderson's position, with many stating that violent video games desensitise people, there are other researchers who have found that those who become obsessed with violent video games already possess an aggressive and possibly violent predisposition. However, one of the common

threads with many of the perpetrators of mass shootings is that they tend to be quiet and reclusive, and may have a history of spending countless hours playing violent video games (Feldman, 2016).

The American Psychological Association (2020) cautions that there has been very little substantive research actually examining whether violent video-game use causes lethal violence. Their findings suggest that the public and media exercise caution when blaming video-game playing for large-scale public massacres, especially after tragedies such as American school shootings. There is, however, no denying that there is evidence linking frequent exposure to gaming with different forms and levels of aggression, but care should be taken when interpreting this evidence and applying it to video gamers in general.



FIGURE 2 People who play Halo may become predisposed to violence.

Challenge

Aggression in video games

Design a method to investigate whether playing aggressive video games increases aggression, based on your understanding of violence, aggression and the role of video games.

The general aggression model and violent video games

The general aggression model (GAM) provides a comprehensive framework for understanding how exposure to violent video games can influence aggressive behaviour. By examining the interplay between personal and situational factors, as well as the immediate and long-term effects on an individual's internal state and behaviour, the GAM offers valuable insights into the mechanisms driving aggression. The GAM can be applied to the context of playing violent video games:

- person and situation factors: Playing violent video games can serve as a situation factor that increases the likelihood of aggression. Person factors, such as a player's pre-existing aggressive tendencies or hostile attribution biases (the tendency to interpret others'

ambiguous behaviours as having hostile intent) can interact with this situation factor to further increase aggression.

- present internal state: Violent video games can influence a player's present internal state by increasing aggressive thoughts, feelings and arousal. For example, the game may prime aggressive thoughts (where exposure to one stimulus influences the response to a subsequent stimulus, without conscious guidance or intention) and elevate arousal levels, making the player more likely to interpret ambiguous situations as hostile.
- appraisal and decision processes: The immediate appraisal of in-game events can lead to aggressive responses if the player perceives the game as competitive or frustrating. Repeated exposure to violent video games can reinforce aggressive scripts and hostile attribution biases, making aggressive responses more automatic.
- learning and development: Each gaming session serves as a learning trial, reinforcing aggressive knowledge structures. Over time, this can contribute to the development of a more aggressive personality, as the player becomes more likely to use aggression as a response in real-life situations.



FIGURE 3 The GAM suggests that people who play video games are more likely to interpret ambiguous situations as hostile. Recent research implies Fortnite is increasing violent behaviour among players.

Skill drill

Drawing a conclusion from empirical evidence

Science inquiry skills: Planning investigations (Lesson 1.4); Considering safety and ethics (Lesson 1.5); Evaluating evidence (Lesson 1.8)

In 2002, Bushman and Anderson sought to test whether playing violent video games produces a hostile expectation bias, where individuals expect others to react aggressively in potential conflicts. The study's participants were 224 undergraduate students who were enrolled in introductory psychology courses. The students received course credit for their participation.

Participants were told that they were helping researchers select stimuli for future studies. They were then randomly assigned to play either a violent or nonviolent video game for 20 minutes. They were tested individually and had to complete three ambiguous story stems, "The car accident", "Persuading a friend" and "Going to a restaurant". Each story ended with "What happens next?". Participants had to suggest what the main character in the story would do, say, think and feel if the story continued. After this, participants were debriefed and none reported any suspicion that the study was investigating aggression.

The study found that people who had played a violent video game for just 20 minutes described the main character as behaving more aggressively, thinking more aggressive thoughts, and feeling angrier than those who played nonviolent games. The results support the GAM by showing that violent video games can temporarily increase aggressive expectations, suggesting that repeated exposure could contribute to developing an aggressive personality.

Practise your skills

- 1 **Identify** the aim of the study. (1 mark)
- 2 **Identify** the experimental design used in this study, using evidence from the study. (2 marks)
- 3 **Explain** an ethical consideration that was taken into account and why it was important to consider. (2 marks)
- 4 **Describe** the main finding of the study relating to playing violent video games. (1 mark)
- 5 **Explain** the significance of the study, with reference to the GAM. (2 marks)

Skill drill**Looking at research data****Science inquiry skill: Understanding the scientific method (Lesson 1.3)**

A meta-analysis by Anderson and Bushman (2001) that looked at 42 studies involving nearly 5,000 participants found a statistically significant small to moderate strength relationship between watching violent media and acts of aggression or violence later in life. Research by Robertson and colleagues (2013) found that watching excessive (more than 2 hours per day) violent television as a child or teenager was associated with antisocial behaviour in early adulthood. Studies like these suggest a relationship, but can we go so far as to say multimedia causes violence?



FIGURE 4 Violent activity in video games may encourage violence in people that participate.

When choosing research to use, you should be mindful of the topic of research. For example, when looking at classical conditioning, Pavlov's research is likely to still be relevant today; however, social media and violence is a relatively new area of research. For the current claim, research that is more than 50 years old is unlikely to be relevant so it is not useful; research more than 20 years old can be considered, but be cautious in its use.

You should also make sure that you are using a broad range of sources. Look beyond your textbook and consider Google Scholar, university libraries and your local library.

Practise your skills

The following claim has been made: Multimedia causes violence.

- 1 **Identify** and **define** the key terms in the claim. (3 marks)
- 2 **Create** a research question for this claim. (1 mark)
- 3 **Investigate** two sources that support your research question. Use a book for one source, and a journal article for the other. Write down a reference for the source and determine whether or not it is credible. (4 marks)

Check your learning 13.4

Check your learning 13.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** a negative effect of playing violent video games. (1 mark)
- 2 **Explain** how aggression interacts with long-term video-game use, with reference to the general aggression model. (2 marks)

Knowledge utilisation

- 3 **Create** an alternative and null hypothesis for the following statement: "Playing nonviolent video games will lead to a decrease in aggression in society." (2 marks)
- 4 **Discuss** the potential effects of long-term exposure to violent video games. (2 marks)

Lesson 13.5

Review: Aggression

Summary

- 13.1**
- Aggression is the intentional behaviour aimed at causing harm to another person who wants to avoid that harm. It includes physical, verbal, relational and passive aggression that can be direct or indirect.
 - The general aggression model (GAM) is a framework that examines interplay between personal traits, situational factors and internal processes.
 - The general aggression model considers proximate causes and processes including inputs routes and outcomes. This leads to either thoughtful or impulsive actions and a social encounter that can either be positive or negative.
 - The general aggression model also considers distal causes and processes, including biological and environmental modifiers, which shape personality and influence responses to immediate situations.
 - According to the general aggression model, a single episode of aggression has an immediate impact on the internal state, reinforcing future behaviour, whereas multiple episodes has a cumulative impact in shaping long-term aggressive behaviour.
- 13.2**
- Advertising can influence acceptable standards in society; aggressive advertisements can make aggression seem normal, but aggression can also be used in advertisements to deter violence.
 - Social marketing campaigns use violence to attract attention and encourage attitude change regarding aggressive behaviour.
 - Advertising can use violent behaviour to attract attention to its message, which encourages desensitisation and could alter social norms in relation to aggression.
- 13.3**
- Social media can have positive influences on behaviour but also negative influences such as social isolation, normalising violence, cyberbullying and aggression exposure.
- 13.4**
- Playing video games can have a positive influence on cognition and education, including boosting spatial navigation, reasoning, memory and perception, improving problem-solving skills, and enhancing multitasking and decision-making abilities.
 - The negative influence of video games includes promoting aggression, with research suggesting that frequent exposure to violent media increases the likelihood of aggressive behaviour. Violent video games may desensitise people to violence.
 - Research links aggression with video gaming; however, the results must be interpreted with caution, especially when applied to lethal forms of aggression.

Review questions 13.5A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- Which of the following statements best describes the influence of media on individuals and society?

| | |
|---|---|
| <p>A Media has a solely positive influence on individual and group behaviour.</p> <p>B Media's influence is limited to traditional forms like newspapers and radio.</p> | <p>C Media only provides information and has no impact on attitudes or behaviour.</p> <p>D Media influences attitudes and behaviour through images, sounds, slogans and branding.</p> |
|---|---|

- 2 What type of aggression involves harm to someone's social relationships, like spreading lies or excluding them?
A Verbal **B** Passive
C Physical **D** Relational
- 3 What does the general aggression model (GAM) help us understand?
A The ultimate causes of aggression
B The benefits of aggressive behaviour
C How to encourage aggressive behaviour
D The interplay between personal traits, situational factors and internal processes leading to aggression
- 4 Which of the following is a distal cause that can influence the development of an individual's personality over time?
A Social stress
B Immediate appraisal
C High self-efficacy for aggressive behaviour
D Long-term biological and environmental factors
- 5 Which of the following is a person factor that can trigger aggression according to the GAM?
A Stress
B Rejection
C High self-esteem
D Exposure to violent media
- 6 What is the term used to describe the immediate or closest cause of an event in the context of the GAM?
A Distal cause **B** Ultimate cause
C Proximate cause **D** Situational cause
- 7 Which stage of the GAM involves the emotional, cognitive and physiological responses to a situation?
A Inputs **B** Routes
C Outcomes **D** Reappraisal
- 8 Which of the following is a biological modifier that can increase the likelihood of developing an aggressive personality?
A ADHD **B** High arousal
C High serotonin levels **D** Low testosterone levels
- 9 What does the term "reappraisal" refer to in the context of the GAM?
A Physiological state of the person
B External influences like stress or rejection
C Immediate, automatic reaction to a situation
D Deliberate consideration of the situation and potential consequences
- 10 What can multiple episodes of aggression lead to over time?
A Immediate relief from stress
B No significant long-term impact
C Temporary changes in behaviour
D Development of stable personality traits like hostility and impulsivity

Review questions 13.5B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 11 **Describe** the impact of a single episode of aggression on an individual's internal state, according to GAM. (1 mark)
- 12 **Define** verbal aggression, using an example. (2 marks)
- 13 **Identify** three environmental modifiers that can contribute to an aggressive personality according to the GAM. (3 marks)

Analytical processes

- 14 **Discriminate** between direct and indirect aggression, using an example. (2 marks)
- 15 **Compare** the negative effects of video games with the negative effects of social media. (2 marks)

- 16 **Select** an advertisement that promotes or discourages aggression. **Determine** how the advertisement does this, and **describe** how this affects society. (2 marks)
- 17 **Apply** your understanding of the bystander effect to **explain** how it facilitates cyberbullying. Use a specific barrier to explain why people may not want to help a victim of cyberbullying. (2 marks)

Knowledge utilisation

- 18 **Predict** the actions of an individual who frequently engages in heated arguments on social media platforms by applying the GAM. (6 marks)
- 19 **Discuss** strengths and limitations of the GAM. (4 marks)
- 20 **Apply** the social learning theory to explain the influence of media on aggressive behaviour. (2 marks)

Data drill

Gender differences in brain activity during aggressive behaviour

A study by Repple and colleagues (2018) looked at how boys and girls differ in brain activity in relation to aggression by using a test that measures reactions to social situations.

Method

Forty-two right-handed, healthy subjects (22 males, 20 females) were given a modified Taylor Aggression Task (mTAT) to provoke aggressive behaviour in an fMRI setting. Subjects were provoked by money being taken by a fake opponent and were given the opportunity to retaliate likewise. Aggression and brain activation were measured.

Results

- Male and female participants showed different brain activation patterns in response to provocation (Figure 1).
- Men had higher activation in the left amygdala during high provocation (Figure 2).

Apply understanding

- 1 **Determine** the number of female and male participants used in this study. (2 marks)
- 2 **Identify** the brain region that was shown to have higher activation during high provocation in men. (1 mark)

Analyse data

- 3 **Contrast** the strength and direction of the relationship between left amygdala activation during high provocation and the Aggression Questionnaire subscores (Anger) in men compared to women (Figure 1). (4 marks)
- 4 **Distinguish** the direction of the relationship between the average aggressive responses and the AQ (total) scores for women and men (Figure 2). (1 mark)
- 5 **Identify** a characteristic that makes it appropriate to use a Pearson's correlation coefficient to analyse the data. (1 mark)

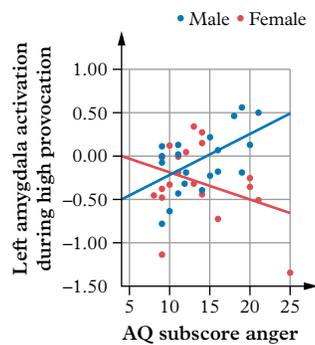


FIGURE 1 Correlation between the left amygdala activation during high provocation and the Aggression Questionnaire subscores (Anger). Men: Pearson's correlation coefficient $r = +0.531$; $p = 0.011$; women: Pearson's correlation coefficient $r = -0.336$, $p = 0.0147$

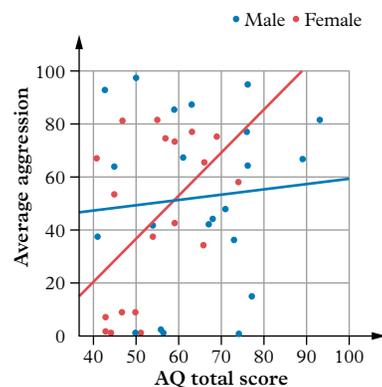


FIGURE 2 Correlation of Aggression Questionnaire (AQ) score and average aggression in men and women. Men: Pearson's correlation coefficient $r = +0.091$; $p = 0.69$; women: Pearson's correlation coefficient $r = +0.51$, $p = 0.023$.

Interpret evidence

- 6 **Deduce** if there is a statistically significant relationship between the left amygdala activation during high provocation and the Aggression Questionnaire subscores (Anger) in men and women (Figure 1). Use evidence to support your response. (3 marks)
- 7 **Draw a conclusion** about the relationship between Aggression Questionnaire (AQ) scores and average aggression for women (Figure 2), with reference to the p -value. (2 marks)



Module 13 checklist: Aggression

MODULE

14

Attraction and relationships

Introduction

Have you ever wondered what makes that boy sitting across the room from you look so good? Or why that girl who walked past you in the hallway smells so enticing?

Attraction can be explained using cultural, biological, social and cognitive viewpoints, with each perspective identifying different factors that aid in explaining the formation of attraction to another. Different cultures have varying norms and values that influence what is considered attractive. For example, some cultures may place a higher value on physical attractiveness, while others may prioritise traits like industriousness or financial stability (Buss, 1989). The biological framework suggests that the best partner is one who will serve the best evolutionary purpose: we find the best person to help us to survive the big world (Buss et al., 1996).

The cognitive and social perspectives suggest that we seek a partner whom we perceive to have a similar personality to our own and who reciprocates our love. The research suggests that long-term love and happiness may depend on this level of “likeness” (Markey & Markey, 2007).

Given all the factors that need to be considered regarding attraction, we should also consider the factors that may hasten a relationship breakdown. In this module, we will investigate why relationships end, based on Duck’s model of dissolution.

Prior knowledge


Prior knowledge quiz

Check your understanding of concepts related to attraction and relationships before you start.

Subject matter

Science understanding

- Describe biological and cultural explanations of attraction, with reference to Buss et al. (1990).
- Describe social and cognitive origins of attraction, including proximity, reciprocity, similarity and self-disclosure.
- Determine stages in relationship dissolution, with reference to Rollie & Duck’s phase model, i.e. intrapsychic, dyadic, social, grave-dressing and resurrection phases.

Science as a human endeavour

- Understand that the formation of relationships is influenced by cultural norms and expectations.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify and use appropriate sampling procedures for selection and allocation of participants, e.g.
 - convenience sampling
 - random sampling
 - stratified sampling
 - random allocation
- identify errors, and extraneous or confounding variables that are likely to influence results; and implement strategies to minimise systematic and random error, e.g.
 - type of participant selection and allocation
 - single-blind and double-blind procedures
 - counterbalancing
 - standardised instructions and procedures
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - measures of central tendency: mean and median
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - explain findings
 - construct scientific arguments
- use data and reasoning to discuss and evaluate the reliability and validity of evidence
- judge the reliability and validity of the experimental process
 - reliability of observers (selection, training)
 - reliability of psychological tests/measures
 - internal validity and external validity
 - validity of psychological tests/measures.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 14.1

Cultural and biological explanations of attraction

Key ideas

- Attraction is influenced by cultural norms, values and traditions. Culture shapes what people find attractive, with different societies valuing different traits.
- The International Mate Selection Project (Buss et al., 1990) studied mate preferences across 33 countries using standardised questionnaires. Cultural differences were found in traits like chastity, housekeeping skills and the desire for children.
- Despite cultural variations, universal traits like mutual attraction, love, dependability and kindness were highly valued.
- Some mate preferences might be biologically based, as similarities in preferences were observed across diverse cultures.
- Cultural influences are stronger than sex differences, but some sex differences in preferences are consistent across cultures.
- Biological explanations of attraction include physical attractiveness evolutionary theory and gender differences.
- Wedekind and colleagues (1995) found that people are more attracted to those who have different immune systems from themselves.



Learning intentions and success criteria

Introducing relationships

relationship
a connection between two or more people

Relationships are necessary in order to meet life's demands, whether they be social support from friends, finding your first love or growing old with your partner by your side. As human beings, there is a need for us to feel like we belong, and there seems to be an evolutionary benefit to having relationships that are successful, and a negative consequence if there is an absence of social relationships. In this lesson, we will explore the cultural and biological explanations for the attraction that occurs between romantic partners and leads to long-term relationships.



FIGURE 1 Relationships, or connections, occur between friends, romantic partners, classmates and work colleagues.

culture
a collection of ideals, values, belongings and ethics that belong to a group of people and are passed on from generation to generation

Cultural explanations of attraction

Attraction is shaped by the culture we live in, and understanding cultural explanations of attraction means looking at how different societies influence what people find appealing in others. **Culture** can be defined as a collection of ideals, values, belongings and ethics that belong to a group of people and are passed on from generation to generation. Cultural norms,

values and traditions play a huge role in shaping our preferences. For example, what one culture considers attractive, such as certain body types or personality traits, might be different in another culture. By exploring these cultural influences, we can better understand the diverse ways people around the world experience and express attraction. This knowledge not only broadens our perspective but also helps us appreciate the rich variety of human relationships.

The International Mate Selection Project (Buss et al., 1990) investigated cultural explanations of attraction. We will look at this study in detail.

The International Mate Selection Project

Aim

The International Mate Selection Project (Buss et al., 1990) was a large-scale study involving 49 researchers from 33 countries across six continents and five islands. The aim of this project was to understand what characteristics people value in potential mates. Researchers used two standardised questionnaires, translated into various languages, to gather data on 31 different traits that individuals might look for in a partner.

The main goal of the study was to identify which traits are valued worldwide, find similarities and differences in mate preferences across different cultures, and explore any common preferences that might exist among humans. Additionally, the study aimed to see how countries cluster together based on their mate preferences, and to examine differences between men and women within each country regarding these preferences.

Method

The study included 9,474 participants from diverse backgrounds, with ages ranging from about 17 to 30 years old. The sample sizes varied, with some countries having as few as 43 participants and others having up to 1,491. The researchers aimed to get a diverse and representative sample from each country, although some groups, like those from rural or lower socioeconomic backgrounds, were under-represented. Participants were asked to provide biographical information and rate the importance of various traits in a potential mate, such as dependability, health and attractiveness. In addition to rating, participants were also asked to rank each characteristic based on its desirability in a mate. This approach allowed the researchers to gather a wide range of data on what people around the world look for in a partner.

It is important to note that these instruments have cultural limitations, because they were originally developed in the United States and then translated for use in other cultures. Each research collaborator was given instructions on how to translate the questionnaires into the appropriate language for their sample. Most of the data were collected by native residents in each country and then sent to the United States for statistical analysis. The original data protocols were requested and, in most cases, provided for analysis. This method ensured that the data were as accurate and representative as possible.

Results

The study explored how cultural values influence mate preferences. These cultural differences can explain why certain traits are valued more in some cultures than others. This aspect of the study has sparked some controversy, as it highlights the varying expectations and norms across different societies.

The results of the project highlight two main conclusions. First, the culture in which individuals live significantly influences their preferences for certain traits in a potential mate. Second, the extent of this cultural influence varies greatly depending on the specific characteristic. For example, the importance placed on chastity, or having no previous sexual

experience, showed the largest cultural differences. People from China, India, Indonesia, Iran, Taiwan and Palestinian Arab communities highly valued chastity in a mate. In contrast, individuals from Sweden, Finland, Norway, the Netherlands and West Germany generally considered chastity to be unimportant. Other traits, such as the desire for a home and children and being a good housekeeper, also showed significant cultural differences. High value was placed on housekeeping skills by participants from South Africa (Zulu), Estonia and Colombia. On the other hand, participants from the United States, Canada and most Western European countries, except Spain, placed less importance on these domestic skills.

Personality traits like having a pleasing disposition and an exciting personality, and being easygoing also varied in importance across cultures. For instance, an exciting personality was highly desirable in France, Japan, Brazil, the United States, Spain and Ireland. However, it was less emphasised in South Africa (Zulu), China, India and Iran. These findings illustrate how cultural values and norms shape what people look for in a partner, leading to diverse mate preferences around the world.

The study also revealed several key findings about human mate preferences. Firstly, despite the unique cultural differences among the samples, there were significant commonalities, suggesting that some mate preferences might be universal. However, no two countries or samples were exactly alike, each showing unique patterns in mate preferences. The degree of similarity with other countries varied, with African and Asian samples being the most distinct, differing not only from the international averages but also from other samples within their continents. Another important finding was the variation in sexual dimorphism, which refers to the differences in mate preferences between males and females. In some countries, the preferences of men and women were very similar, while in others, they differed greatly. Notably, Nigeria and Zambia, which practise polygamy, showed the highest degree of sexual dimorphism. While some sex differences in mate preferences appear to be universal, many others are influenced by cultural factors and vary from one culture to another.

Conclusion

This study demonstrated that culture has a significant impact on what people look for in a partner. Across the 31 characteristics studied, culture explained about 14 per cent of the differences in preferences. Some traits, like chastity, showed even larger cultural effects, accounting for 37 per cent of the variation. Other traits, such as being a good housekeeper and the desire for a home and children, also varied greatly across cultures.

Despite these cultural differences, there were strong commonalities. Almost all samples rated mutual attraction and love as the most important characteristic in a mate. Traits like dependability, emotional stability, kindness and intelligence were also highly valued across the board.



FIGURE 2 Buss and colleagues' (1990) research demonstrated that certain traits are universal across different cultures.

Overall, the study highlights that while culture strongly influences mate preferences, some sex differences are consistent across cultures. Traditional versus modern orientations towards mating also play a significant role, with traditional cultures placing more value on traits like chastity and domestic skills, and modern cultures devaluing these attributes. Despite these variations, there are strong similarities in what people value in a partner, regardless of cultural or sex differences. While our backgrounds and identities shape what we look for in a partner, there are also universal traits that many people value, highlighting a shared human experience in mate selection.

Real-world psychology

Arranged royal marriages: Are they happy?

The marriage of Meghan Markle and Prince Harry (Figure 3) was all the rage in 2018; celebrities, royals, and the rich and famous all gathered to celebrate the couple's wedding. They chose each other because they fell in love, but in the royal family and historical British culture, arranged marriages were the tradition.

Marriage in this day and age is still an important institution, even though it is not considered to be as vital as it was in the past. More than 90 per cent of individuals will get married at one time or another. Therefore, the satisfaction within a marriage, or at least the perception of satisfaction, is an important point of research.

Cultural expectations or ideals have historically played a part in determining one's marriage partner. Free will to choose whom we love is a relatively recent phenomenon. Culture can be geographically determined, and similar values encourage individuals to become a cultural group. These practices are often passed from one generation to the next. One of the cultural expectations still around today is the concept, or cultural practice, of arranged marriages.

Historically, these were used to barter for status or even to reunite feuding factions within cultures. Arranged marriages still exist. In some countries, the rate of divorce among arranged marriages is much lower than among marriages freely chosen (Kohler, 2024). This increased satisfaction and longevity of the marriage are suggested to be due to parents understanding their children and choosing the right mate for them, rather than allowing their children to be led by lust or attraction. The families of the man and woman who are to be married will often have lengthy discussions, and get to know each other very well before the arranged marriage proceeds.

Therefore, it is possible that, because of the time taken to know the family of the groom or bride and other important financial considerations, the best match for their children is sought – and this enables a longer lasting relationship. Recent research into arranged marriages has found very little difference in relationship satisfaction for purely love-based relationships compared to arranged marriages (Regan, 2012). This suggests that arranged marriages generally outlast love-based marriages due to cultural traditions rather than enhanced satisfaction levels.

For example, within the culture of the British royal family, divorce is not viewed favourably and, as such, married couples tend to work on their relationships to avoid seeking divorce. This was especially important historically, as most royal marriages were made for political alliances and divorce could potentially start a war. This could further explain why relationships endure in arranged marriages. The arranged marriage between Queen Victoria and Prince Albert was one that stood the test of time. ▶

- ◀ While their marriage did have political advantages, it was also a genuine love match. Queen Victoria and Prince Albert were deeply in love, and their marriage is often cited as one of the great love stories of the British monarchy.



FIGURE 3 Prince Harry and Meghan Markle married in May 2018.

Apply your understanding

- 1 **Identify** the percentage of individuals in the twenty-first century expected to get married at some point in their lives. (1 mark)
- 2 **Describe** how marriages were traditionally arranged in the British royal family and historical British culture. (1 mark)
- 3 **Explain** why arranged marriages may last longer than love-based marriages. (2 marks)

Biological explanations of attraction

The results of the International Mate Selection Project (Buss et al., 1990) suggest that certain mate preferences might have a biological basis rather than being solely influenced by culture. This is because men and women across different cultures showed similar preferences, despite their diverse cultural backgrounds.

The study found significant differences between what men and women value in potential mates. One of the biggest differences was in the importance placed on financial prospects and earning capacity. Women generally valued a partner's ability to earn money more than men did. Related to this, women also placed a higher value on ambition and industriousness in a mate. On the other hand, men tended to value physical appearance more than women did. Men also placed more importance on a partner being a good cook and housekeeper. While these differences were notable, women also valued traits like educational background, emotional stability, maturity, social status, intelligence and being a college graduate slightly more than men did.

These findings align with the evolutionary explanations of attraction, which propose that we might be attracted to specific traits because they could enhance the survival and success of our future offspring. Essentially, the traits we find appealing in a partner might be those that historically helped our ancestors thrive and reproduce, indicating an evolutionary influence on our behaviour and preferences, which will be explored in the next section.

The study found that both men and women across different cultures value mutual attraction and love the most in a potential mate. This isn't just a characteristic but a state of the relationship that signifies mutual respect and reciprocity. Following this, the most valued traits are dependable character, emotional stability and maturity, and a pleasing disposition, which are all personality traits. Conversely, the least valued traits were chastity, having a similar religious background, and having a similar political background. Both men and women ranked the top four characteristics in the same order: kind and understanding, intelligent, exciting personality and healthy. These traits reflect a desire for a partner who is intellectually and socially stimulating but not overly aggressive or self-centred. The Australian sample showed a high similarity with the international averages, differing significantly only in a few areas. Australians valued easygoing mates and those with similar political backgrounds more than average, while they placed less importance on refinement, an exciting personality and health.

Overall, the study showed that cultural influences on mate preferences were generally stronger than the differences between sexes. Cultural values significantly affected preferences for traditional traits like chastity, housekeeping skills, and the desire for home and children, as well as personality traits. However, sex differences were consistent across cultures, particularly regarding earning capacity, physical appearance and housekeeping skills. This suggests that while culture shapes many of our preferences, some differences between what men and women look for in a partner are quite universal.

Evolutionary explanations

Relationships, whether they are romantic or otherwise, increase the chances of survival, according to Darwin's theory of evolution (Buss et al., 1990). Darwin outlines two key aspects of sexual selection. The first is inter-sexual selection, which is the preference for certain mates over others. The second is intra-sexual selection, which involves competition among individuals of the same sex for access to mates. Studying these mate preferences can reveal important insights into the reproductive histories of species and the current trends in sexual selection. This makes the study of mate preferences a crucial area in evolutionary biology (Buss et al., 1990).

On a more immediate level, mate preferences are deeply rooted in psychology. Social psychologists are particularly interested in these preferences as they relate to interpersonal attraction.

As social animals, humans live in communities to benefit from each other's strengths. Evolutionary psychologists believe that **attraction** is based on wanting a partner who is most likely to keep the family or offspring alive. For example, women are often physically attracted to men who are likely to be able to provide for them, and men are likely to be physically attracted to women who give the impression of being fertile. Age preferences and physical attractiveness in partner choice among homosexuals also suggest a similar pattern to those seen in heterosexual couples (Gottman et al., 2003). Regardless of sexual orientation, it appears females tend

attraction
the ability to evoke
interest and attention



FIGURE 4 Michael Douglas is 25 years older than his wife, Catherine Zeta-Jones.

to prefer a partner the same age or slightly older than themselves, as this will enhance the chance their partner will financially provide for them. In contrast, men generally look for a younger partner, as this will enhance their chance of reproductive success (Kenrick et al., 1995) (Figure 4). This evolutionary preference for age of partner is replicated across cultures worldwide. Some of the physical attributes that lead to attraction will be considered in this chapter.

Physical attractiveness

physical attractiveness

attributes that can be seen on the exterior of a person that draw people to that person

reproductive fitness

a measure of how likely a person is to pass their characteristics on to the next generation

Physical attractiveness is not just about vanity: it may actually have an evolutionary purpose. Research has supported the idea of physical attractiveness as a measure of **reproductive fitness**, which can be defined as the likelihood that our genes will be passed to the next generation (Leventhal & Krate, 1977). Therefore, characteristics that attract a partner include those that signal health and fertility, and also traits that suggest better reproductive success. Physical attractiveness is thought to benefit reproduction, as it signals to a partner the “quality” of a person’s genes (Leventhal & Krate, 1977). Apart from playing a role in determining attraction by a possible partner, physical attractiveness can also influence marketing and sales numbers (e.g. using beautiful celebrities as sales people). Attractiveness can also influence a candidate’s perceived suitability for a workplace and even influence the length of prison sentences.

The attractiveness halo effect

Leventhal and Krate (1977) investigated this phenomenon by setting up a mock trial in order to investigate the relationship between a criminal’s perceived attractiveness and the length of sentencing. They found that regardless of ethnicity or gender, the more attractive the defendant, the shorter the prison sentence assigned. A study by Eagly and her colleagues (1991) provided additional evidence that physical attractiveness is “good” or beneficial. They found that physical attractiveness strongly determines perceptions of social competence, and perceptions of intellectual competence to an extent.

This phenomenon is called the **attractiveness halo effect**, which suggests that because someone is physically attractive, people assume that they have additional positive qualities. According to this effect, people will often believe that an attractive person is more intelligent and successful than others who are not as physically attractive (Eagly et al., 1991). Research suggests this halo effect is unconscious and people are unaware of their bias towards those they deem to be physically attractive (Eagly et al., 1991).

We will now look at factors that affect attractiveness: facial symmetry, and masculinity–femininity and averageness.

Facial symmetry

Scientists can use graphic design software to engineer perfectly symmetrical faces for the purpose of research. Interestingly, when participants were asked to rank the level of attractiveness of faces that ranged from perfectly symmetrical to asymmetrical, overwhelmingly the results skewed towards the symmetrical faces. The reasons for this preference are widely debated, with two prevailing explanations.

First, the **evolutionary advantage view** suggests that symmetrical faces indicate healthier or better genes. Research has found that certain infections and diseases contracted during development can actually cause changes to physical appearance, causing small imperfections, including asymmetries, which indicate ill health (Rhodes, 2006). Therefore, individuals with symmetrical faces are less likely to have been exposed to as many infections or diseases and thus are likely to have a stronger immune system (Rhodes, 2006).

attractiveness halo effect

the theory that people who are physically attractive are assumed to have additional positive qualities

evolutionary advantage view

the theory that suggests that symmetry in facial characteristics is attractive is because symmetry suggests good health

Animal research also supports this theory. For example, peacocks with symmetrical tail feathers are more likely to mate and pass on their genetic material (Rhodes, 2006).

Second, the **perceptual bias view** proposes that we are more likely to think of symmetrical faces as attractive because our visual system is able to recognise and process symmetrical information more easily than asymmetrical information. This preference for symmetrical information is generalised to all stimuli, not only faces. Research into preferences for art, sculptures and architectural designs shows that symmetrical versions are the most popular and sought-after pieces compared to asymmetrical versions (Rhodes, 2006).



FIGURE 5 Like humans, peacocks have been known to show preference for symmetry when selecting a partner.

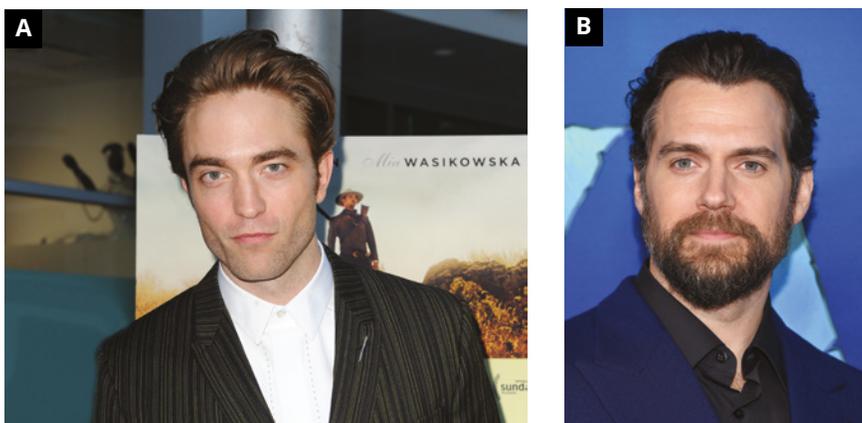


FIGURE 6 (A) Robert Pattinson and (B) Henry Cavill have highly symmetrical faces.

perceptual bias view

a theory that states that symmetrical faces are more attractive because the visual centres of the brain find symmetrical information easier to process

Little and Jones (2003) investigated which of the two theories was more likely when looking at human faces. The experiment was conducted using pictures of asymmetrical and symmetrical faces for both males and females, with half of the images presented right side up and the other half presented upside down. The upside-down images were presented to eliminate the effect of the participants feeling only the right-side-up faces could be potential mates. Therefore, by inverting the images, participants could view the faces as objects rather than as people, and enable both the perceptual bias view and the evolutionary advantage view to be tested simultaneously. The results showed that only for the right-side-up images did participants find the symmetrical image to be more attractive, supporting the evolutionary advantage view.

Challenge

Try it yourself!

Using programs online, you can find out what your face, or another person's, looks like when it is completely symmetrical (left or right symmetry).

Scarlett Johansson has a scientifically symmetrical face. Search online to find people with symmetrical faces. You will find images that have been modified so that you can see a right symmetrical version of the face, a left symmetrical version of the face and a “normal” face. Decide if you prefer one of these, or if you think that one is more attractive than the others. If you do, based on your understanding of attraction so far, **explain** why you prefer that image.

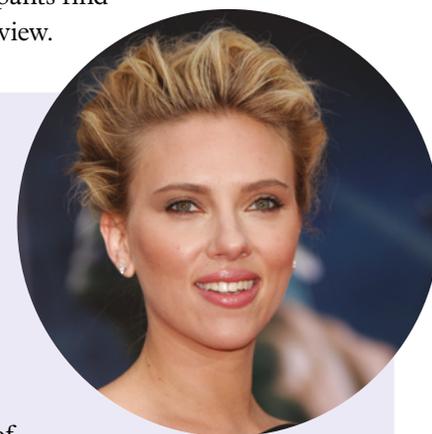


FIGURE 7 Scarlett Johansson has a scientifically symmetrical face.

Masculinity–femininity and averageness

Although you might think that faces that are rare or unusual are more desirable than faces that are common, this is not true. In fact, familiar or average faces are more attractive than faces that are rare. Peskin and Newell (2004) found that faces that we frequently see are the ones that are picked out and ranked as most attractive by the majority. The reason for this phenomenon is that we feel more familiar with people who are average or whom we are similar to and, therefore, we are more likely to prefer them as partners compared to unusual faces that are less familiar (Rhodes, 2006).

In addition to average faces being more attractive, typical or expected faces such as those that have traditionally feminine or masculine features are found to be more attractive than less traditional faces. Scientists suggest that these sex-specific characteristics (i.e. having features that are typically feminine or masculine) are preferred because they exaggerate a person's health and reproductive ability and, according to the evolutionary theory, are more preferable as mates (Buss, 2010).

Perrett and colleagues (1998) manipulated pictures to exaggerate masculinity and femininity of male and female faces to see if it changed perceived attractiveness (Figure 8, for example). It was found that both male and female participants preferred the femininised female faces as well as the femininised male faces. To date, no studies have found that masculine features on both male and female faces are more attractive, with one exception – during ovulation (when an egg is released during a female's menstrual cycle), women are more likely to find masculine men attractive. This finding possibly occurs because falling pregnant is most likely to occur during ovulation, so a masculine male who is likely to father offspring is preferred. At other times, however, females tend to find feminine males more attractive, viewing them as more likely to be caring and trustworthy. These traits are often attributed to femininity (Penton-Voak et al., 1999) and are therefore perceived to lead to longer lasting relationships.

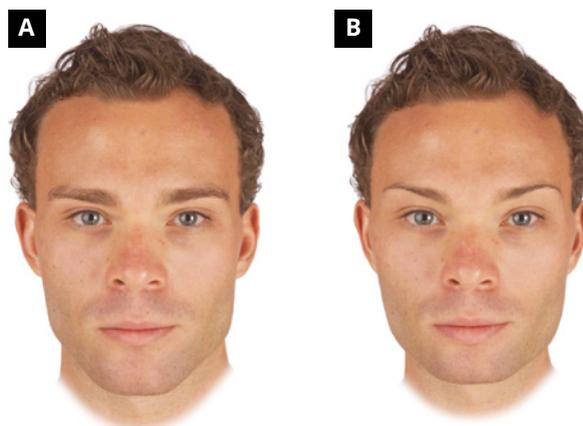


FIGURE 8 Research has found that more feminine faces on both males and females are preferred most of the time.

gene

a portion of your DNA that codes for a particular characteristic

phenotype

the physical representation of what your gene codes for (e.g. brown hair, blue eyes)

DNA

genetic information that is inherited from your parents

pheromone

a chemical substance released by the body that can affect other people

natural selection

mechanism for evolution that can predict the likelihood of survival based on an organism's phenotype

Genetics and attraction

Genes, which are inherited from our parents in varying combinations, along with our environment, determine our **phenotype** (our physical characteristics). In addition, these inherited genes, which are sections of **DNA**, also determine the hormones, neurotransmitters and **pheromones** that are produced by our bodies which, in turn, determine how our bodies and brains function. Therefore, given that physical appearance plays a key role in perceived attractiveness, it is important to understand the underlying biological factors within humans that determine these characteristics.

Natural selection is an evolutionary process that aids in determining which genes are more likely to be passed on to offspring. The process suggests that genes beneficial to the survival of the species are more likely to result in mating and, therefore, be passed along to the next generation (Wedekind et al., 1995). In terms of attraction, this means that genes

that increase the likelihood of a mate selecting you to build a romantic relationship with will increase the chances of those genes being passed to the next generation.

Claus Wedekind and colleagues (1995) investigated a specific set of genes suggested as important in the process of attraction. The group of genes are collectively called the major histocompatibility complex (MHC) and are responsible for the formation and maintenance of the human immune system. These genes allow the immune system to readily detect pathogens and, therefore, decrease the chances of infection in humans. Genome research has found that the more diverse the genes are within the MHC, the higher the chances that an individual will have a stronger immune system. According to the biological explanations of attraction, especially the evolutionary view, seeking a partner who has a different set of genes within their MHC from yourself is beneficial, as this increases the diversity in the genes within the MHC of the offspring, which increases their chance of survival.

Research by Rawool and colleagues (2020) provides further support for the evolutionary perspective of attraction. The study found that couples who suffer from repeated miscarriages often share a high percentage of their MHC genes. This suggests that due to decreased immunity resulting from limited variation in MHC genes, the offspring were less likely to survive.

Although there is strong scientific evidence supporting the evolutionary theory of mating, it is not the only explanation for attraction in human relationships. The decision to choose a mate based on genes is not a conscious one and, therefore, this perspective ignores many other factors that can influence attraction. For example, your culture can also affect what you perceive to be attractive.



FIGURE 9 A person's genetics, in particular their MHC similarity, can increase or decrease attraction to another.

Skill drill

Evaluating experimental research

Science inquiry skill: Evaluating evidence (Lesson 1.8)

Claus Wedekind and colleagues (1995) conducted the Sweaty T-Shirt Study. The aim was to see if women would be attracted to a man unconsciously based on just his natural scent, which can signal the uniqueness of his MHC. A total of 93 students (49 females and 44 males) from the University of Bern, Switzerland, were recruited for the study and each participant was tested for the combination of genes present in their MHC. A wide variety of MHCs were included in the final sample and women who were on oral contraceptives (which include high levels of estrogen and sometimes progesterone) were recorded. The men in the experiment were asked to wear a T-shirt to bed for two nights and they were also given perfume-free washing detergent to clean their bodies, clothes and linens. They were

asked not to use deodorants or aftershave, to avoid confounding variables in the experiment. In an attempt to control as many extraneous variables as possible, the men were asked to refrain from alcohol, tobacco and sexual activity, and to avoid any spicy or strongly flavoured foods. The women were tested during the second week of their menstrual cycle, where possible, as their sense of smell would be the highest at this time. The study was designed as a double-blind experiment. This means that neither the researchers nor the participants knew which T-shirt they were being exposed to at any given time.

After the 2 days, the women smelled seven T-shirts, each with a different combination of MHCs from the men. Out of the seven T-shirts, three of them came from men who had a similar MHC to the woman, three men with a MHC dissimilar to the

woman, and one of the T-shirts was unworn and acted as the control. Women were tested one at a time and every T-shirt and its associated odours were rated for intensity on a scale from 0 to 10. The T-shirts were also rated for pleasantness and sexiness (0 = unpleasant, 5 = neutral and 10 = extremely pleasant).

The results of the study supported the evolutionary theory of attraction. The women consistently chose MHCs that were dissimilar from their own. They scored male body odours as more pleasant when the MHC of the men was different from their own and less pleasant when the MHC was similar to their own. When asked, the women also suggested that the odours from the T-shirts of men who had dissimilar MHCs reminded them of past relationships, suggesting that MHC genes may influence human attraction – or at least the action of choosing a mate.

The Sweaty T-Shirt Study supports the evolutionary view for attraction in humans, especially the notion that genes have some influence on the level of attraction you feel for another person. A study conducted in 2021 by Roberts and colleagues investigated MHC similarity and scores for facial attractiveness in females by males. It found that males who rated females with high facial attractiveness also had MHCs dissimilar to these women, supporting the idea that genetic diversity in MHC genes is preferred in mate selection.



FIGURE 10 During the study, the intensity, pleasantness and appeal of a male's sweat were rated by women.

Practise your skills

- 1 Explain** how the Sweaty T-Shirt Study supports biological explanations of attraction. (2 marks)
- 2 Describe** how the study controlled an extraneous variable. (1 mark)
- 3 Identify** a strength of the study in relation to the design of the experiment. **Explain** how this increases the reliability and/or validity of the study. (2 marks)
- 4 Identify** a limitation of this study in relation to the design of the experiment. **Explain** how this decreases the reliability and/or validity of the study. (2 marks)

Check your learning 14.1



Check your learning 14.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** the cultural explanation of attraction, with reference to Buss et al. (1990). (2 marks)
- 2 Describe** biological explanations of attraction, giving one example of how these can explain attraction. (2 marks)
- 3 Identify** the aim, method, results and conclusion in the Buss et al. (1990) study. (4 marks)
- 4 Identify** one strength and one limitation of the Buss et al. (1990) study. (2 marks)
- 5 Explain** how the findings of Buss et al. (1990) illustrate the interaction between biological and cultural influences on attraction. (2 marks)

Analytical processes

- 6** Think of a person that you find attractive. **Identify** three characteristics that psychologists would suggest make that person attractive and explain why. (3 marks)

Knowledge utilisation

- 7 Discuss** the claim, “Attraction is determined only by biological factors”, with reference to biological and cultural explanations of attraction. (4 marks)

Lesson 14.2

Social and cognitive origins of attraction

Key ideas

- Social and cognitive origins of attraction include similarity, reciprocity, proximity and self-disclosure, which suggests that attraction is due to how we think within a relationship and how similar we are to our partners or how much interaction we have with them.
- Proximity suggests that physical closeness increases the likelihood of interaction and familiarity. Frequent encounters can lead to increased attraction due to the mere exposure effect.
- Reciprocity suggests that people tend to like others who show that they like them. Mutual liking can enhance feelings of attraction and build stronger connections.
- Similarity suggests that shared interests, values and beliefs can strengthen bonds between individuals. Similarity in attitudes and backgrounds often leads to greater attraction and relationship satisfaction.
- Sharing personal information and feelings can create intimacy and trust. The process of self-disclosure fosters deeper connections and mutual understanding.



Learning intentions and success criteria

proximity
the individual parts are close together

reciprocity
how much each person in a relationship is giving to the relationship

similarity
a characteristic that is alike between those in the relationship

self-disclosure
the act of sharing personal thoughts, feelings and experiences that are not immediately obvious with others

cognitive origins of attraction
the theory that our perception and interpretation of a potential mate is what attracts us

social origins of attraction
the theory that repeated exposure to a potential partner through regular interactions will influence attraction

Introducing social and cognitive origins of attraction

Imagine walking into a new school and finding yourself drawn to certain classmates more than others. What makes you feel connected to some people almost instantly? Factors like proximity, reciprocity, similarity and self-disclosure play crucial roles in attraction and forming these connections. **Proximity** refers to how physical closeness can spark friendships and romantic relationships. **Reciprocity** is the mutual exchange of feelings and actions that build trust and affection. **Similarity** highlights how shared interests and values can bring people together, while **self-disclosure** involves sharing personal thoughts and experiences to deepen bonds. Understanding these elements can reveal why we are attracted to certain individuals and how meaningful relationships are formed.

Cognitive origins of attraction suggest that our perception and interpretation of the potential mate is what attracts us to them, rather than any evolutionary benefit. In contrast, **social origins of attraction** suggest that living close to a potential partner or being exposed to them over and over again through regular interactions will influence attraction more than our perception or biological influences.

Three theories of cognitive and social origin will be explored to fully understand all types of theories addressing attraction.

Proximity

Proximity is part of the social origin of attraction and is defined as being physically close to another person. The theory suggests that by increasing your proximity over time with a potential mate, you are more likely to feel attracted to them. This theory applies to both romantic relationships as well as friendship formations.



FIGURE 1 You are likely to develop relationships, platonic or romantic, with people you spend more time with or live closer to, such as your friends at school.

Evidence supporting the proximity factor in attraction includes research by Festinger and colleagues (1950), who investigated the role of proximity in friendship formation. The researchers recruited students living on campus at MIT University in the United States, where they observed and interviewed the residents regularly.

They found that the residents at the dorms who had a greater opportunity to bump into each other on a daily basis were more likely to become friends in the long run. In addition, by living in the same building, this increased the chances of people becoming friends with others in the same building by tenfold. The chances of being friends with the person who lived next door was even higher.

They concluded that proximity increased the opportunity for communication and, therefore, increased how familiar people became with one another in the housing complex, thus increasing the likelihood of attraction, a phenomenon known as the **mere exposure effect**. More recent research into the proximity effect found that students who sit together more often are more likely to like each other and become friends, compared to those who do not sit together regularly (Back et al., 2008). This finding supports the theory of proximity in attraction, at least in friendship.

mere exposure effect

a psychological phenomenon that predicts individuals who spend more time with someone and become more familiar with them will prefer them over other people with whom they have not spent as much time

The mere exposure effect

The mere exposure effect suggests that the reason we are more likely to prefer those we have seen or interacted with before is because they feel more familiar to us. This justification is supported by research that found infants are more likely to smile at a picture of someone

they have seen before rather than a picture of a stranger; individuals looking at a photo of themselves are also more likely to like the reversed image of themselves (because this is how they see themselves in the mirror) rather than the “real” image of their own faces (Brooks-Gunn & Lewis, 1981; Mita et al., 1977).

The research findings also suggest that the mere exposure effect may actually have an evolutionary basis as well as a social perspective. If we are faced with something or someone unknown, this is potentially a risk to our survival; therefore, we are more likely to avoid someone we do not know and gravitate towards someone we do know (Zebrowitz et al., 2007).



FIGURE 2 You are more likely to like your face in a mirror’s reflection than what it actually looks like, as this is what you are used to seeing.

The mere exposure effect applies to the initial stages of attraction, but once we have become familiar with someone, this may change our attraction towards them. For example, once we know someone, we might perceive them as boring. If after the initial phase of attraction, we discover that their personality is different from our own, we may lose interest or the liking for that person. It is also possible that a person we initially fall in love with is not reciprocal in their love for us, which may decrease our liking for them, and even end a relationship. Therefore, proximity (e.g. mere exposure and familiarity) cannot explain long-term romantic attraction, so other theories of attraction should be considered.

In today's society, with increasing exposure to the internet and social media, geographical proximity (physical closeness) is less relevant to the development of friendships and romantic relationships. Therefore, psychological closeness may actually replace geographical proximity as a topic in future research focused on the social origins of attraction.

Real-world psychology

Wearing the colour red can affect your chances of getting noticed!

There are many animals that have a preference for certain colours in their mates; for example, primates prefer red when they are selecting a mate for reproduction.

Elliot and Niesta (2008) conducted a study on colour preference and actually found that just like primates, humans also prefer their partners to be wearing red. They tested this idea by showing half of the participants a picture of a man on a red background, and the other half of participants the same man but on a white background.

Women rated the man to be more attractive when he was in front of the red background when compared to the white. The same result was found when men were asked to look at an image of a woman in front of either a red or white backdrop. This effect was also found when the colour of the shirt only was changed; red shirts were found to be more attractive than white shirts.

Interestingly, when men were asked to rate other men standing in front of a red or white background as a control, there were no differences found in the ratings for attraction. This means that the colour red seems to be important in sexual attraction or mate selection rather than just a colour that is preferred by all. In men, the colour red seems to be associated with social status, thus increasing a woman's interest in him.

The colour red on a female seems to be perceived as a sexual lure, and so more attractive for a man. According to research, women wearing red is associated with sex and interest. Women using dating sites are significantly more likely to wear red in their profile pictures than in pictures for social media sites or dating sites that are geared towards marriage rather than dating or “hooking up”.

Although sexual attraction and red are associated, the actual link between them is not clear. Perhaps there is an evolutionary explanation. In the animal kingdom, the colour red signifies power. For example, the female chimpanzee displays the redness of her chest and reproductive organs to signal her ovulation to potential mates.



FIGURE 3 Betty Boop is a famous cartoon character who wears a red dress and is often thought of as a sex symbol.

◀ Apply your understanding

- 1 **Identify** the colour primates prefer when selecting a mate for reproduction. (1 mark)
- 2 **Describe** how Elliot and Niesta (2008) tested their theory of colour preferences. (1 mark)
- 3 **Explain** how the colour red is perceived differently in men and women, with reference to Elliot and Niesta (2008). (2 marks)
- 4 **Propose** why there is an association between the colour red and sexual attraction, using evolutionary explanations. (2 marks)

Reciprocity

The reciprocity effect is part of the social origin of attraction and suggests that giving as much as you receive can influence the attraction and longevity of a relationship. Based on basic human instincts and etiquette in interpersonal relationships, a lack of reciprocity is generally associated with negative emotions (Buunk & Schaufeli, 1999). This expectation for reciprocity applies not only to romantic relationships, but also to friendships, familial relationships and work relationships.

Bram and colleagues (2011) proposed an evolutionary justification for the need for reciprocity: in order to survive, community and teamwork are needed so that individuals can benefit from the strengths of many and increase the likelihood of survival. In other words, because relationships are based on a person's idea of reward and cost in a relationship, if the relationship is perceived as a reward, then attraction is more likely. Reciprocity allows for a relationship to be perceived as a reward rather than a cost; therefore, the amount of reciprocal behaviour within a couple can determine the amount of attraction.

The concept of reciprocity is based on **social exchange** and **equity**. Social exchanges are the interactions we have with others in our social circle – and equity can be defined as how equal the exchanges within our social interactions are. Social exchange and equity dictate that similarity in status or behaviour between people who are in a relationship will increase the chances of attraction. For example, if you really like someone and keep leaving your weekends free to hang out with them, but they continually cancel on you, then your chances of being attracted to them will decrease because they have not reciprocated your behaviour. Relationships where there is an imbalance in the amount of attraction or willingness to be in a relationship will always be unstable. Such relationships may struggle to last in the long-term.

A problem with this theory, however, is that it is difficult to quantify many aspects of reciprocity. Therefore, even though research has generally been able to support a correlation between increased reciprocity and positive emotions, the ethical ramifications and the subjective nature of judging reciprocity make this effect difficult to assess.

social exchange

meaningful interactions with others

equity

equal investment in the relationship from both parties



FIGURE 4 The concept of reciprocity in relationships is based on the idea of equal exchange in social situations.

Similarity

Similarities between potential partners can influence the level of attraction felt between them and are part of the cognitive origin of attraction. The **similarity–attraction hypothesis** proposed by Markey and Markey (2007) suggests that individuals are more likely to be attracted to others who have similar characteristics to themselves.

In order to test the model, Markey and Markey (2007) investigated the extent to which similarity can affect attraction by using questionnaires on a large sample of young students asking them to describe their ideal partner. The researchers asked the young people to describe values, attitudes and even psychological characteristics of their ideal partner. They then filled out a questionnaire about their own characteristics and the two sets of results were compared. The results showed that the descriptions of the ideal partner were very similar to the self-evaluations that the participants completed.

In order to confirm their findings, a follow-up study with 106 couples was conducted. All of the couples had been together for one year, and both people were asked to fill in a questionnaire about their partner's characteristics as well as their own. The findings were in line with the original study, which suggests that people want someone similar to themselves; they also perceive their partners as more similar to themselves compared to non-romantic partners.

People are more likely to be attracted to those who are similar to themselves because this can help justify their own characteristics and attitudes. In addition, being with someone who is similar to you may boost your self-esteem because your values are endorsed, which then leads to attraction (Singh et al., 2016). Having similar characteristics or values may also make a relationship easier; for example, if you want to live in Portugal but your partner does not, this could cause serious issues for the relationship in the future.

Similarity is said to aid in the development of long-lasting attraction. Normal relationship progression would involve a couple sharing their attitudes, values and external characteristics (i.e. type of school, family, neighbourhood they come from) and through this sharing, if there are perceived similarities, a more substantive attraction is much more likely than if there is very little in common.

Research supports this finding across different cultures, with people who share age, education and IQ being more likely to like each other than if they had differing characteristics (Pinel et al., 2006). The similarity can also be physical, such as height.

Similarity can predict whether or not you like someone. Though people sometimes suggest that opposites attract, when it comes to core personality traits and the values or morals we have, it is similarity that is most important.

similarity–attraction hypothesis

people who are similar to each other are more likely to find each other attractive and start a relationship, compared to those who are less similar



FIGURE 5 Ryan Reynolds and Blake Lively are two actors who are happily married, and have very similar facial characteristics. Perhaps their similarity brought them together?

Challenge

Relationships

Take a moment to think about the relationships in your life, whether they be romantic, friendly or familial. Think about how you met these people: was it through school, sports, music or through family?

Select two key relationships and **consider** how proximity, reciprocity and similarity influence these. Write a brief essay that summarises the influence of each, and **determine** if you think these relationships would be different if you were not in close proximity.

Self-disclosure

Self-disclosure offers a cognitive explanation of attraction that suggests that sharing personal information can influence attraction in relationships. Self-disclosure involves revealing personal thoughts, feelings and experiences to others, which helps build intimacy and trust.

social penetration theory

an explanation of how relationships develop through gradual increases in self-disclosure

According to the **social penetration theory** proposed by Altman and Taylor (1973), relationships develop through gradual increases in self-disclosure, starting with superficial details and moving to more intimate ones. This process occurs in layers, like peeling an onion. At first, people share more superficial information (breadth) but avoid deeper, more personal topics. As the relationship progresses and trust grows, individuals begin to share more intimate details (depth).



FIGURE 6 Sprecher and Hendrick (2004) found that increased self-disclosure led to greater relationship satisfaction in heterosexual couples.

Research supports the importance of self-disclosure in relationships. For instance, Sprecher and Hendrick (2004) found that increased self-disclosure led to greater relationship satisfaction in heterosexual couples. Laurenceau and colleagues (2005) also discovered that couples who disclosed more felt greater intimacy. Mutual self-disclosure, where both parties share personal information, is crucial for developing and maintaining relationships. However, self-disclosure doesn't always guarantee success. The “boom and bust” phenomenon in online relationships, described by Cooper and Sportolari (1997), shows that sharing too much too soon without establishing trust can lead to short-lived, intense relationships that eventually break down.

Much of the research on self-disclosure is correlational, meaning it's unclear whether self-disclosure causes greater relationship satisfaction or if satisfied couples tend to self-disclose more. Despite this limitation, self-disclosure has practical applications, as it can help couples improve communication and build intimacy.

There are also some criticisms of the social penetration theory. It takes a “one size fits all” approach by suggesting that increased self-disclosure always leads to greater relationship satisfaction, but this isn't true for everyone. Other factors, such as personality, cultural practices, physical attractiveness and shared attitudes, also influence relationship success. Additionally, the theory is based mainly on research in Western, individualistic cultures, making it less applicable to collectivist cultures. For instance, Tang and colleagues (2013) found that people in the USA disclosed more sexual thoughts than people in China, but both cultures reported high relationship satisfaction. This suggests that self-disclosure may not be equally important across all cultures, highlighting the theory's cultural bias.

Check your learning 14.2



Check your learning 14.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Categorise** proximity, reciprocity, similarity and self-disclosure as either social or cognitive explanations of attraction. (4 marks)
- 2 Describe** the mere exposure effect using an example from everyday life. (2 marks)

- 3 Explain** how familiarity can increase attraction. (2 marks)

Analytical processes

- 4 Explain** the success of couples who meet in an online environment, using the attraction-similarity model. (2 marks)

5 **Compare** the role of pheromones in the biological explanation of attraction with the role of similarity in attitudes in the social and cognitive explanation of attraction. (2 marks)

Knowledge utilisation

6 Sarah and Thanh met overseas and started a relationship. They found that they were very similar in the way they think and behave, and their relationship was very happy for some time. However, after a while, Thanh had to go back to his home country and the couple did not know if they should be in a long-distance relationship.

They have come to you for advice. **Apply** your knowledge of the social and cognitive origins of attraction to their situation to **propose** what the couple should do. (3 marks)

7 **Evaluate** the value of self-disclosure in a relationship, by providing one argument for and one argument against self-disclosure in a relationship, and drawing a conclusion. (3 marks)

8 **Discuss** the statement, “Opposites attract”. **Justify** your evaluation with empirical research. (4 marks)

Lesson 14.3

Why relationships end

Key ideas

- Rollie and Duck’s phase model explains the five stages in which a relationship will end. It also suggests how couples can prevent relationships from ending. The model can be used to predict the likelihood of a relationship breakup.
- The intrapsychic phase involves internal dissatisfaction with the relationship, weighing the pros and cons of staying versus leaving.
- The dyadic phase involves communicating dissatisfaction to the partner and attempting to resolve problems or deciding to end the relationship.
- The social phase involves making the breakup public and seeking support and advice from others.
- The grave-dressing phase involves rationalising the breakup and moving on.
- The resurrection phase involves preparing for new relationships and personal growth.



Learning intentions and success criteria

Introducing relationship dissolution

Lessons 14.1 and 14.2 identified and evaluated possible origins of attraction. But questions remain: How do relationships keep going after the initial attraction has passed? What factors can extend or maintain the level of attraction between two people?

A key factor in the development of relationship satisfaction is **communication**. There are many aspects of communication that enable couples to get to know each other better and also increase intimacy, commitment and passion within a relationship.

There are many other factors that can contribute to increased relationship satisfaction, but there are also many factors that can decrease satisfaction and cause the relationship to end. Models and theories regarding relationships ending will be explored next.

communication
verbal and non-verbal expression between individuals

Relationship dissolution

Many theories predict the origins of attraction and marriage satisfaction; however, even more theories and models explain why relationships end. Numerous studies have identified factors that predict the end of a relationship. These include marrying young, criticism, defensiveness, stonewalling, contempt and blame (Gottman, 2004).

relationship dissolution

the ending of a relationship initiated by at least one partner in the relationship

Study tip

Use real-life examples when writing your notes. If you have not experienced a romantic relationship, think about a friendship and apply the principles of attraction and dissolution to your own life. This will help you to remember the concepts.

Relationship dissolution or the breaking up of a relationship (whether it be friendly or romantic) by one or more of the parties involved is a conscious process. Models of dissolution have typically focused on identifying the causes of breakups, especially looking for characteristics within individuals that increase the likelihood of the breakup.

Older dissolution theories saw breakups as a failure and that it is innately bad to be “broken up”. Now many researchers focus on finding ways to predict relationships ending in order to save people from staying in bad relationships. Additionally, new theories of “breakup” acknowledge benefits rather than failures. Rollie and Duck’s phase model (2006) explains why relationships change and end.



FIGURE 1 Relationship dissolution can be caused by many factors. Psychologists seek to predict relationships ending. Rollie & Duck’s phase model of relationship dissolution can be used to assess the healthiness of a relationship.

Rollie and Duck’s phase model of relationship dissolution

Rollie and Duck’s phase model of relationship dissolution

a model addressing the stages of a breakup including five phases: intrapsychic, dyadic, social, grave-dressing and resurrection

Rollie and Duck’s phase model of relationship dissolution approaches a relationship breakdown in stages rather than as an end in itself. According to Rollie and Duck’s phase model, there are five phases associated with a breakup. In each of the phases, one or both partners perceives a change in the relationship and thus becomes progressively less satisfied in the relationship. The model acknowledges that there are many factors that can initiate a breakup, including the couple feeling like the relationship is not going anywhere, lack of equity in commitment or a lack of communication or time with one another.

The five stages of the dissolution model identify aspects in a relationship that may lead to dissolution and potentially allow a couple to avoid dissolution in the long run. This model suggests that breaking up is composed of several stages and is a long-term rather than a short-term process. The phases are likely to occur sequentially, though sometimes they may be compounded. Figure 4 summarises the phases.

Phase 1: Intrapsychic phase

The focus in this phase is on the thinking processes (cognitive interpretation) occurring inside an individual. The person may feel dissatisfied in the relationship but does not verbalise it at this stage. They start to consider whether they will be better off getting out of the relationship and their thoughts are usually characterised by internal dialogue that suggests a need for change. For example, people in this stage may say to themselves things like, “It’s not worth the effort I’m putting in” or “I can’t be with this person anymore” or even “I can’t stand it”.

Phase 2: Dyadic phase

In this phase, the unhappy person within the relationship will start to discuss the source of their unhappiness. Concerns such as feeling inequality in the relationship, feelings of resentment, and also status and power imbalances will be raised in the hope of finding a resolution. If the discussions are honest, open and constructive, it is possible that the relationship can be repaired and the couple may continue with increased satisfaction in their relationship. However, anger from the resentment may also surface through this phase, and if this occurs it can have detrimental effects on the relationship, causing more unhappiness between the couple. Internal dialogue that could show the anger taking over may include self-talk like, “I am so much better off without him/her”.

Phase 3: Social phase

The social environment around the couple, including mutual friends and family, are now made aware of the breakup/dissolution. The individuals will look for social support and allies in this painful process. Mutual friends may be asked to side with one of the two individuals and talk can include prevalent judgment or criticism about the other individual in the relationship. This is where, at times, friends will divulge secrets they have held in, such as cheating, or secrets told behind the other person’s back, in efforts to speed up the dissolution. This is not done out of spite, but in an attempt to console the friend who is experiencing the breakup. Internal thoughts in this phase would revolve around thinking like, “Well it’s definitely over! No going back now.”



FIGURE 2 During the social phase people will tell friends and family, and seek support.

Phase 4: Grave-dressing phase

The couple reflects on the breakup and they each have their own perspective on what has happened. It is common for individuals to see themselves as being in the right and to justify their decision to end the relationship or to blame the other person for ending the relationship. This is partially a defence mechanism to rebuild damaged self-esteem from losing a treasured relationship. It is also vital for future relationships so the person can “bounce back” from the painful breakup. Internal dialogue in this phase is characterised by thoughts like, “Time to turn over a new leaf” or “Time to start my life afresh”.

Phase 5: Resurrection phase

After going through the process of dissolution, this last phase includes the individual seeking a new relationship. It may also be accompanied with other changes, such as a new job, house or hobbies. In this last phase, individuals aim to redefine themselves and to learn from their past mistakes and to avoid them in their new relationships.



FIGURE 3 During the resurrection phase, people may take on new hobbies.

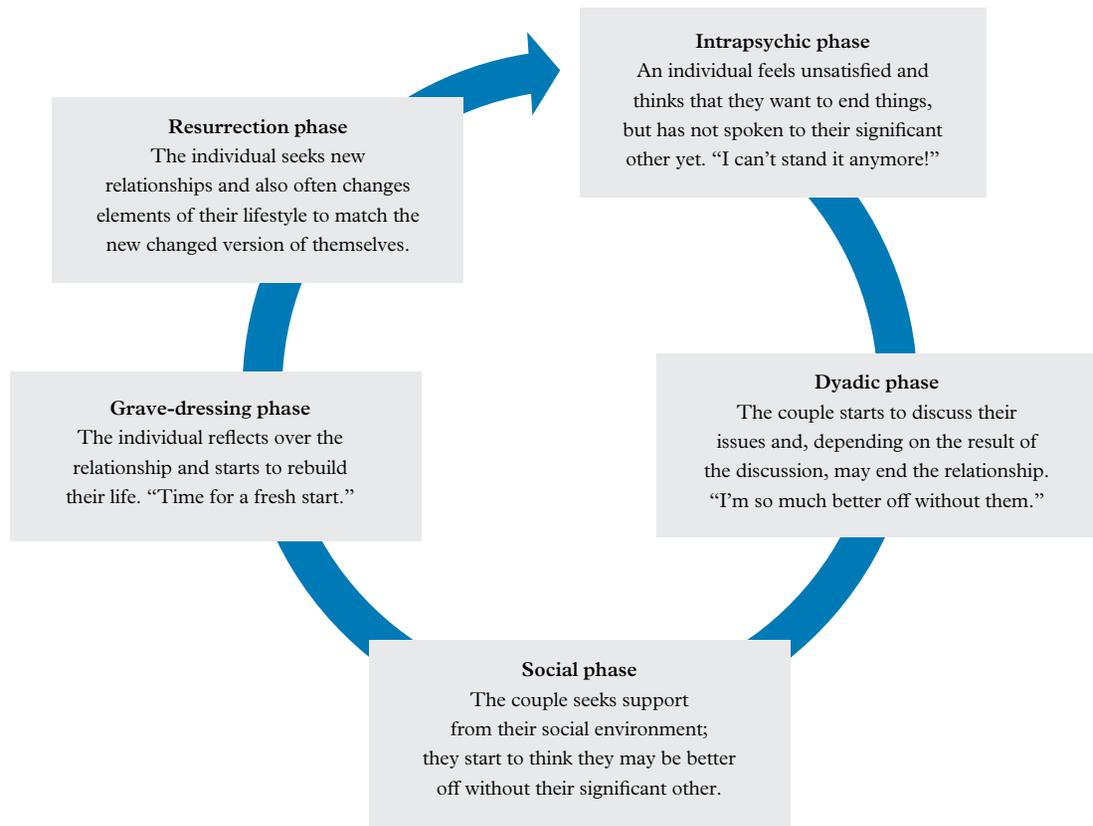


FIGURE 4 Summary of Rollie and Duck's phase model of relationship dissolution

Skill drill

Application of Rollie and Duck's phase model: Relationship dissolution and media influence

Science inquiry skill: Evaluating evidence (Lesson 1.8)

LeFebvre and colleagues (2015) conducted a study to investigate how social networking sites can be used to aid in the social, grave-dressing and resurrection phases of Rollie and Duck's phase model. They studied 208 participants' (77 males and 131 females) post-dissolution behaviours in an online environment to extend the application of Rollie and Duck's phase model to an online environment – specifically Facebook. Participants were recruited from undergraduate courses at a large southern university in the USA.

The methodology included participants first completing an online survey about a romantic relationship they'd had in the past 2 years that was now dissolved. They were then asked how frequently they had communicated with their ex-partner face-to-face and how often they used Facebook.

Participants were further asked to report on their online behaviour on Facebook both during and after their breakup via several open-ended questions. The questionnaire measured relationship dissolution and Facebook behaviours. The results were analysed using qualitative research methods.

Common online activities during the relationship dissolution included minimal or no Facebook activity, relational cleansing (e.g. deleting messages and pictures of the partner from their page), checking up on what their partner was doing and also engaging in other "normal" Facebook activities. After dissolution, these same behaviours were maintained, but virtual mourning, social network support and virtual reconciliation were also present. These behaviours seen in Facebook match the predicted behaviours seen in the social, grave-dressing and resurrection phases of Rollie and Duck's phase model, providing further support for this staged

model of relationship dissolution. The behaviours don't necessarily occur sequentially. For example, in this study, social network support came at the end of the breakup rather than during the breakup. Also, grave-dressing behaviours, such as relational cleansing, occurred both during and after the breakup. Overall, however, the research suggests that Rollie and Duck's phase model is relevant to current social media platforms and results can be generalised to relationships that dissolve in the modern day.



FIGURE 5 As a relationship ends, people may conduct relationship cleansing, where they remove evidence of their relationship from social media.

Practise your skills

- 1 **Identify** the aim of the study conducted by LeFebvre and colleagues (2015). (1 mark)
- 2 **Identify** the sample used for this study and describe a potential limitation with the participants used in this study. (2 marks)
- 3 **Explain** a limitation of the self-report method used in the study, with reference to reliability and/or validity. (2 marks)
- 4 **Describe** how the participants' online behaviours changed after the dissolution of their relationships. (1 mark)
- 5 **Explain** how behaviours observed in the study support the social, grave-dressing and resurrection phases of Rollie and Duck's phase model. (3 marks)
- 6 **Determine** whether the results of this study can be generalised to all relationships that dissolve in the modern day. **Justify** your answer. (2 marks)

Check your learning 14.3



Check your learning 14.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** the phases of Rollie and Duck's phase model of relationship dissolution. (5 marks)
- 2 **Explain** how the study of LeFebvre and colleagues (2015) supports Rollie and Duck's phase model of relationship dissolution. (2 marks)

Analytical processes

- 3 **Distinguish** between the social phase and the dyadic phase of Rollie and Duck's model. (1 mark)
- 4 Callum is unhappy in his relationship but he has not verbalised this to anyone. Instead, he is

becoming angry and upset at his partner for not living up to his expectations. **Apply** Rollie and Duck's model to **identify** the phase Callum is in, and the phase that would come next. (2 marks)

- 5 **Apply** Rollie and Duck's phase model to explain typical behaviours on social media platforms, like Instagram, during a breakup. (5 marks)

Knowledge utilisation

- 6 **Propose** two research questions that could be used to evaluate the claim, "All relationships must end". (2 marks)

Lesson 14.4

Review: Attraction and relationships

Summary

- 14.1**
- Attraction is influenced by cultural norms, values and traditions. Culture shapes what people find attractive, with different societies valuing different traits.
 - The International Mate Selection Project (Buss et al., 1990) studied mate preferences across 33 countries using standardised questionnaires. Cultural differences were found in traits like chastity, housekeeping skills and the desire for children.
 - Despite cultural variations, universal traits like mutual attraction, love, dependability and kindness were highly valued.
 - Some mate preferences might be biologically based, as similarities in preferences were observed across diverse cultures.
 - Cultural influences are stronger than sex differences, but some sex differences in preferences are consistent across cultures.
 - Biological explanations of attraction include physical attractiveness evolutionary theory and gender differences.
 - Wedekind and colleagues (1995) found that people are more attracted to those who have different immune systems from themselves.
- 14.2**
- Social and cognitive origins of attraction include similarity, reciprocity, proximity and self-disclosure, which suggests that attraction is due to how we think within a relationship and how similar we are to our partners or how much interaction we have with them.
 - Proximity suggests that physical closeness increases the likelihood of interaction and familiarity. Frequent encounters can lead to increased attraction due to the mere exposure effect.
 - Reciprocity suggests that people tend to like others who show that they like them. Mutual liking can enhance feelings of attraction and build stronger connections.
 - Similarity suggests that shared interests, values and beliefs can strengthen bonds between individuals. Similarity in attitudes and backgrounds often leads to greater attraction and relationship satisfaction.
 - Sharing personal information and feelings can create intimacy and trust. The process of self-disclosure fosters deeper connections and mutual understanding.
- 14.3**
- Rollie and Duck's phase model explains the five stages in which a relationship will end. It also suggests how couples can prevent relationships from ending. The model can be used to predict the likelihood of a relationship breakup.
 - The intrapsychic phase involves internal dissatisfaction with the relationship, weighing the pros and cons of staying versus leaving.
 - The dyadic phase involves communicating dissatisfaction to the partner and attempting to resolve problems or deciding to end the relationship.
 - The social phase involves making the breakup public and seeking support and advice from others.
 - The grave-dressing phase involves rationalising the breakup and moving on.
 - The resurrection phase involves preparing for new relationships and personal growth.

Key study

Buss et al., 1990

Review questions 14.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 Which of the following is a biological explanation of attraction?
 - A Proximity hypothesis
 - B Reproductive fitness
 - C Mere exposure effect
 - D Similarity–attraction hypothesis
- 2 “Phenotype” can be described as
 - A the genes passed on from your parents.
 - B a characteristic that is determined from genes.
 - C the effect of the environment on characteristics.
 - D chemicals that make an individual more desirable to the opposite sex.
- 3 Which of the following traits showed the most significant cultural differences in the International Mate Selection Project (Buss et al., 1990)?
 - A Chastity
 - B Ambition
 - C Intelligence
 - D Physical attractiveness
- 4 Which of the following concepts are associated with reciprocity?
 - A DNA and genes
 - B Halo effect and proximity
 - C Similarity and familiarity
 - D Social exchange and equity
- 5 What was the most universally valued trait in a potential mate across different cultures according to the International Mate Selection Project (Buss et al., 1990)?
 - A Religious similarity
 - B Financial prospects
 - C Physical appearance
 - D Mutual attraction and love
- 6 Cameron has just broken up with Sharaya and sent a group text to mutual friends about the breakup, asking for a buddy to hang out with on the weekend. What stage of Rollie and Duck’s phase model best matches this scenario?
 - A Social stage
 - B Intrapsychic stage
 - C Resurrection stage
 - D Grave-dressing stage
- 7 Marianna is sending a photo of herself to a modelling competition. She has access to digital manipulation technology. How can she increase her chances of the judges choosing her for the final stage?
 - A Adjusting her features to create a more angular jaw line
 - B Adjusting her features to look more masculine and older
 - C Adjusting her facial features so that she looks more unusual than other girls
 - D Adjusting her facial features to reflect more symmetry between the left and right side
- 8 Why are feminine faces more attractive than faces with masculine features?
 - A Feminine faces reflect more trustworthiness, which increases attraction.
 - B Feminine faces are more beautiful and therefore easier to process in the brain.
 - C Masculine faces reflect more threat and therefore scare away others, decreasing attraction.
 - D Masculine faces are more angular and therefore are more difficult for the visual centres of the brain to process.
- 9 Similarity can increase attraction because starting a relationship with someone similar to yourself
 - A increases your self-esteem.
 - B decreases the need for friends.
 - C decreases the need for reciprocity.
 - D decreases the familiarity you feel with the person.
- 10 Reciprocity is
 - A giving as much as you receive.
 - B assessing the cost and benefit of a relationship.
 - C surrendering to your partner in communications.
 - D one person giving more than another in a relationship.
- 11 Which explanation for attraction supports the idea that we are attracted to traits that could enhance the survival and success of future offspring?
 - A Social exchange theory
 - B Social penetration theory
 - C Evolutionary explanations
 - D Similarity–attraction hypothesis

- 12 Camille has just broken up with her boyfriend and signs up for a dating website. Which phase is she likely to be in according to Rollie and Duck's phase model of relationship dissolution?
- Social stage
 - Resurrection stage
 - Intrapsychic stage
 - Grave-dressing stage
- 13 An example of cultural difference in attraction is
- participants preferring one sweaty T-shirt over another.
 - participants all suggesting that one factor increases attraction.
 - participants in certain countries placing a higher emphasis on chastity.
 - participants looking at some pictures and picking the most familiar picture.
- 14 What is the role of self-disclosure in attraction?
- Self-disclosure has no effect on relationships.
 - Sharing personal information decreases intimacy and trust.
 - Self-disclosure is only important in professional relationships.
 - Sharing personal information and feelings creates intimacy and trust.
- 15 Casper was initially interested in a girl who lived across the hall from him in the dorms, but when he got to know her better he found that they were very different and the relationship did not last. Which concepts can be used to explain this attraction and breakup?
- Initially proximity and the resulting breakup due to a lack of similarity
 - Initially familiarity and the resulting breakup due to mere exposure effect
 - Initially natural selection and the resulting breakup due to a lack of reciprocity
 - Initially reciprocity and the resulting breakup due to Duck's model of dissolution
- 16 Tommy was running in the park and ran past a girl who had been running for a while and was sweating a fair bit. She smelled really good to him and made him turn his head. Which concept could explain why Tommy thought she smelled nice?
- Mere exposure effect
 - Attractiveness halo effect
 - Similarity–attraction hypothesis
 - Evolutionary explanation of attraction

Review questions 14.4B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 17 **Describe** two biological factors that can increase attraction. (2 marks)
- 18 **Identify** one key finding supporting the biological explanations of attraction according to the International Mate Selection Project (Buss et al., 1990). (1 mark)
- 19 **Identify** one key finding supporting the cultural explanations of attraction according to the International Mate Selection Project (Buss et al., 1990). (1 mark)
- 20 **Define** “similarity” and **explain** how it can increase attraction. (2 marks)
- 21 **Explain** why facial attraction, especially symmetry of features, can increase attractiveness. (2 marks)

- 22 **Define** “reproductive fitness” and **explain** how evolutionary psychologists use this concept to explain attraction. (2 marks)
- 23 **Describe** how the mere exposure effect can lead to attraction, using an example. (2 marks)
- 24 **Explain** the stages of Rollie and Duck's phase model of relationship dissolution using an example. (6 marks)

Analytical processes

- 25 **Compare** the cultural and biological explanations of attraction, using examples. (2 marks)
- 26 **Contrast** proximity, reciprocity and similarity in explaining attraction. (3 marks)

Knowledge utilisation

- 27 Discuss** the following statement: “Long-distance relationships never last.” (4 marks)
- 28 Investigate** the effects of communication on relationship satisfaction. **Justify** your response using a supporting study. (2 marks)
- 29 Analyse** the following relationship: Snezjana ran the same route around the park near her home every day. Each morning at the same time, she would run past a boy around her age and they would smile at each other. One day, Snezjana wasn’t paying attention and ran directly into the

boy. After apologising they began to talk and found that they actually study the same subjects at school and also play similar sports. Upon giving the boy a hug on her way home, Snezjana felt a sense of attraction based on his smell.

- a Apply** your knowledge of attraction to **decide** what the possible explanations for their behaviour may be. (2 marks)
- b Predict** the likelihood of their relationship lasting in the long-term and **justify** your response. (2 marks)

Data drill

Attraction in friendships

A study by Bleske-Rechek et al. (2012) aimed to investigate whether men’s and women’s mating strategies are reflected in their feelings of attraction towards their cross-sex friends.

Method

- Participants: 88 cross-sex friendship pairs from a public university in the US
- Procedure: Participants, who were heterosexual college students, brought a cross-sex friend to a research session. They completed identical questionnaires in separate rooms to ensure honest responses.
- Measures: Participants reported their current relationship status, physical and sexual attraction towards their friend, desire to date their friend, and their perception of their friend’s attraction and desire to date them. Responses were recorded on nine-point rating scales.

Results

- 1** Men reported more attraction to their female friends compared to women’s attraction to their male friends.

TABLE 1 Study I: Attraction in emerging adult cross-sex friendship pairs

| | Men (<i>n</i> = 88) Mean (SD) | Women (<i>n</i> = 88) Mean (SD) |
|--|-----------------------------------|--|
| Self-reported attraction to friend | 4.94 (2.49) | 3.97 (2.14) |
| Estimate of friend’s attraction to self | 4.54 (2.02) | 4.25 (2.07) |
| Self-reported desire to date friend | 4.55 (2.41) | 3.90 (2.54) |
| Estimate of friend’s desire to date self | 4.79 (2.00) | 4.28 (2.29) |

Note: All variables were measured on a nine-point (1 to 9) scale

2 Men overestimated their female friends' attraction to them.

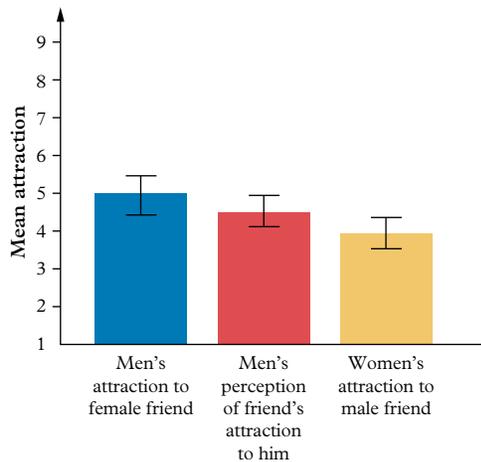


FIGURE 1 Males' overestimation of their cross-sex friend's attraction to them. Error bars represent 95% confidence intervals.

3 Women underestimated their male friends' attraction to them.

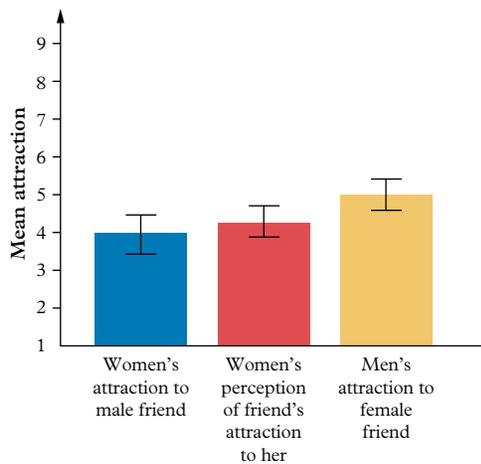


FIGURE 2 Females' underestimation of their cross-sex friend's attraction to them. Error bars represent 95% confidence intervals.

Conclusion

These results support the predictions that men experience more attraction to their cross-sex friends and tend to overestimate their friends' attraction to them, while women tend to underestimate their friends' attraction.

Apply understanding

- Calculate** the difference between the mean for men and women in self-reported attraction to their friend. Show your working. (2 marks)
- Determine** the group that has the lowest mean for self-reported desire to date their friend. Use evidence to support your answer. (2 marks)

Analyse data

- Identify**, with reference to Table 1, the measure that had the greatest variability for men and the measure that had the greatest variability for women. (4 marks)
- Contrast**, with reference to Figures 1 and 2, the trend between men's and women's estimation of their friend's attraction to them. (2 marks)

Interpret evidence

- Infer** if there is a significant difference between men's attraction to their female friend and women's attraction to their male friend, with reference to Figure 1. Give a reason for your inference. (2 marks)
- Deduce** if there is a significant difference between women's attraction to their male friend and their perception of their friend's attraction to her, with reference to Figure 2. Give a reason for your answer. (2 marks)



Module 14 checklist: Attraction and relationships

Topic 2 review

Multiple choice

(1 mark each)

- 1 Which of the following is a social factor influencing attraction?
 - A Proximity
 - B Evolutionary fitness
 - C Symmetry in facial features
 - D Immune system differences
- 2 How does similarity influence attraction?
 - A It decreases mutual liking.
 - B It creates competition in the relationship.
 - C Opposites attract, so similarity has no impact.
 - D Similar values, beliefs and interests strengthen bonds.
- 3 Which phase of the Rollie and Duck's model involves the process of making a breakup public?
 - A Social phase
 - B Dyadic phase
 - C Intrapsychic phase
 - D Grave-dressing phase
- 4 What universal traits were highly valued across cultures in Buss and colleagues' (1990) study?
 - A Athleticism and creativity
 - B Physical attractiveness and chastity
 - C Housekeeping skills and cooking ability
 - D Love, mutual attraction and dependability
- 5 Which of the following is a biological explanation of attraction?
 - A Reciprocity
 - B Similarity in interests
 - C Sharing personal information
 - D Physical attractiveness such as symmetry
- 6 What did Buss and colleagues (1990) find in their study of mate preferences across cultures?
 - A Only cultural factors influence mate preferences.
 - B No cultural differences exist in mate preferences.
 - C Mate preferences are entirely universal across cultures.
 - D Cultural differences exist, but some universal traits like love and dependability are highly valued.
- 7 Groupthink is more likely to occur in
 - A large groups.
 - B diverse groups.
 - C homogeneous groups.
 - D highly cohesive groups.
- 8 In what situation is audience inhibition likely to occur?
 - A When there is no one watching the bystander
 - B When helping behaviour is performed in private
 - C When the bystander is confident in their decision
 - D When an individual fears judgment from others while intervening
- 9 What role does personal competence play in helping behaviour?
 - A People who feel competent are less likely to help.
 - B Competence has no impact on prosocial behaviour.
 - C Feeling competent increases the likelihood of helping.
 - D Only incompetent people engage in helping behaviour.
- 10 Which personal characteristic is associated with altruism?
 - A Self-preservation
 - B High expectation of rewards
 - C Helping for social recognition
 - D Acting without expecting personal gain
- 11 The bystander effect is strongest when
 - A the victim is known.
 - B bystanders are friends.
 - C there are no bystanders.
 - D bystanders are strangers.

- 12 According to the general aggression model (GAM), what are “inputs”?
- A The immediate effects of aggression
 - B Factors that shape personality over time
 - C Emotional responses to aggressive behaviour
 - D Situational and personal factors that influence aggression
- 13 Social influence can
- A increase helping behaviour.
 - B decrease helping behaviour.
 - C both increase and decrease helping behaviour.
 - D neither increase nor decrease helping behaviour.
- 14 Which of the following is a distal cause of aggression according to the GAM?
- A Immediate cognitive appraisals
 - B Social pressure in a specific moment
 - C The mood of the person in a situation
 - D Biological and environmental factors shaping personality over time
- 15 In a cost-benefit analysis of helping, individuals consider
- A cognitive processes.
 - B physiological arousal levels.
 - C both cognitive processes and physiological arousal levels.
 - D neither cognitive processes nor physiological arousal levels.

Short response

- 16 **Define** “altruism”, using an example. (1 mark)
- 17 **Identify** three social factors that influence individual behaviour. (3 marks)
- 18 **Identify** the difference between the reciprocity principle and social responsibility. (1 mark)
- 19 **Describe** how self-disclosure fosters intimacy in relationships. (1 mark)
- 20 **Describe** the dyadic phase in Rollie and Duck’s phase model of relationship dissolution. (1 mark)
- 21 **Describe** diffusion of responsibility using an example. (2 marks)
- 22 **Identify** an internal thought that can contribute to the breakup process in the intrapsychic phase of Rollie and Duck’s phase model. (1 mark)
- 23 **Describe** how people rationalise breakups in the grave-dressing phase of Rollie and Duck’s phase model. (1 mark)
- 24 **Describe** how empathy influences prosocial behaviour. (1 mark)

- 25 **Explain** the role of environmental factors in shaping aggression, using the GAM. (2 marks)
- 26 **Explain** how personal traits and situational factors interact in the GAM to influence aggression. (3 marks)
- 27 **Explain** how social responsibility norms can influence behaviour. (2 marks)
- 28 **Explain** how advertising can influence aggressive behaviour, using an example. (2 marks)
- 29 Alex is a 16-year-old high school student who enjoys playing video games in his free time. Recently, he has been playing a new action-packed game that involves a lot of combat and aggressive strategies. Over the past month, Alex has been playing this game for several hours each day. One day, after a particularly intense gaming session, Alex gets into an argument with his younger sibling over a trivial matter and reacts aggressively, pushing his sibling.
- Using the general aggression model (GAM), **discuss** Alex’s aggressive behaviour in this scenario with reference to how single and multiple episodes of playing violent video games might influence Alex’s aggression. (4 marks)
- 30 Imagine you are walking through a busy city park on a sunny afternoon. As you stroll along, you notice a person lying on the ground, seemingly unconscious. There are several other people in the park, some walking by, others sitting on benches, and a few playing with their children. You stop and observe the situation for a moment, unsure of what to do.
- Explain** factors that could influence your decision to help the person lying on the ground, based on the findings of Latané and Darley’s (1969) study. (3 marks)

TOTAL MARKS

/43 marks

MODULE

15

Attitudes and bias

Introduction

Should the Australian Government allow more political refugees into Australia? Should students be allowed mobile phones in class? Is a gap year a good idea before commencing tertiary studies or paid work? Is the Gold Coast the best tourist destination in Queensland? Should gambling advertisements be banned during televised sporting events?

How you answer these questions reflects your ideas about different people, issues, events and groups. They are a direct expression of your likes and dislikes, your previous experiences and knowledge, and your sociocultural environment. During childhood, our ideas, likes and dislikes may be influenced by what we are taught and the behaviours we observe. As we interact with diverse groups of people and are exposed to different ways of thinking, our ideas become more malleable.

Sometimes, the attitudes that we form about something become internalised and we use them to make decisions and judgments about other people, groups or concepts without even knowing it. At other times, we are highly aware of the decisions and judgments we make as well as the impact that our beliefs and behaviours have on others.

Psychologists view attitudes as the tendency to make positive or negative evaluations about another person, group or concept (Burton et al., 2018). The concept of bias is related to attitudes and it also guides how we think and act. It refers to our inclinations or prejudice for or against a person or group based on quick (and sometimes unconscious) decision-making processes. In this module, we will discuss attitudes and bias in detail – how they form and operate, how they function in our everyday lives and how they affect not only us, but those around us in both positive and negative ways.

Prior knowledge



**Prior
knowledge
quiz**

Check your understanding of concepts related to attitudes and bias before you start.

Subject matter

Science understanding

- Describe the structure of attitudes using the tri-component model.
- Describe implicit and explicit attitudes.
- Describe how discrepancies between attitudes, cognitions and behaviours can lead to discomfort and a drive to reduce it, as described in cognitive dissonance theory.
- Explain social identity theory with reference to social categorisation, social identification and social comparison.
- Describe attributions, and recognise how they are used to explain behaviour, with reference to situational and dispositional attributions, and the fundamental attribution error.
- Describe self-serving and confirmation biases.

Science as a human endeavour

- Appreciate that attributions influence our interpretation of the behaviour of others, and our corresponding responses (Ross et al. 1977).
- Explain that bias may have beneficial and/or harmful and/or unintended consequences on behaviour.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - measures of uncertainty, including dispersion in a sample (range, interquartile range, standard deviation) and using a sample to make an inference about the population from which it was drawn (standard error, confidence intervals)
- select, synthesise and use evidence to
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 15.1

Attitudes

Key ideas

- The tri-component model of attitudes explains that attitudes can be composed of three parts: affective (emotions), behavioural (actions) and cognitive (beliefs).
- Attitudes can be described as implicit or explicit.
- Implicit attitudes are unconscious and automatic, influencing behaviour without our awareness, whereas explicit attitudes are conscious and deliberate, reflecting our intentional thoughts and beliefs.



Learning intentions and success criteria

Introducing attitudes

An **attitude** is a positive or negative evaluation a person makes about an object, person, group, event or idea. Gordon Allport (1935) provided a useful and enduring definition of attitude: “An attitude is a learned, stable and relatively enduring evaluation of a person, object or idea that can affect an individual’s behaviour.” This definition is useful because it includes the different dimensions of an attitude:

- an attitude is learnt. We are not born with attitudes. Instead, we acquire our attitudes through experience in our daily lives.
- an attitude is stable and relatively enduring. Stronger attitudes are most resistant to change and longer lasting.
- an attitude is an evaluation of a person, object or idea. We tend to judge these either positively or negatively.
- an attitude can influence an individual’s behaviour. Stronger attitudes are most likely to influence an individual’s behaviour. Our attitudes may drive us to behave in particular ways when we vote, buy goods, make friends, choose subjects and make decisions in general.

attitude

a learnt, stable and relatively enduring evaluation of a person, object, event or idea that can affect an individual’s behaviour

tri-component model of attitudes

the theory that an attitude consists of cognitive, affective and behavioural components

affective component of the tri-component model

how an individual feels about an attitude object

behavioural component of the tri-component model

how a person behaves towards the attitude object

cognitive component of the tri-component model

how a person thinks about the attitude object

The tri-component model of attitudes

There are several models to describe the structure of an attitude. The most commonly used is the **tri-component model of attitudes** (Rosenberg & Hovland, 1960).

According to the tri-component model, an attitude is made up of a cluster of beliefs (thoughts and ideas), feelings (likes and dislikes) and behaviours (actions and intentions). These elements fit within three components of an attitude: **affective**, **behavioural** and **cognitive** (the ABC of attitudes). Figure 1 summarises the tri-component model, and Figure 2 provides an example of a person’s attitude towards dogs using the tri-component model.

Another example of an attitude that some of us may share is a fear of spiders (affective component). This attitude is likely to involve avoiding places (e.g. attic) where you believe spiders may be present (the behavioural component) due to the belief that all spiders are harmful (the cognitive component).

Some attitudes do not include all three components; psychologists prefer to say that attitudes can have up to three components. For example, it is possible to have an attitude

that is mostly cognitive-based (such as rational thinking). This might be the case during elections, where a voter evaluates the policies of each political candidate (cognitive component) and votes (behavioural component) for whichever candidate has the appropriate policies. In this example, there is very little of the emotional component (affect) in the voter's attitude.

In addition, any one of these components can be more dominant than another for a particular attitude object. An attitude object can be defined as any target of judgments, including people, ideas and things, which have an attitude or opinion associated with it. For example, an attitude can be cognitive-based rather than affective-based. Your attitude towards smoking could be cognitive-based because you have studied and learnt about the health issues associated with smoking; whereas your attitude towards your favourite songs could be affective-based because the rhythm of the music makes you feel good.

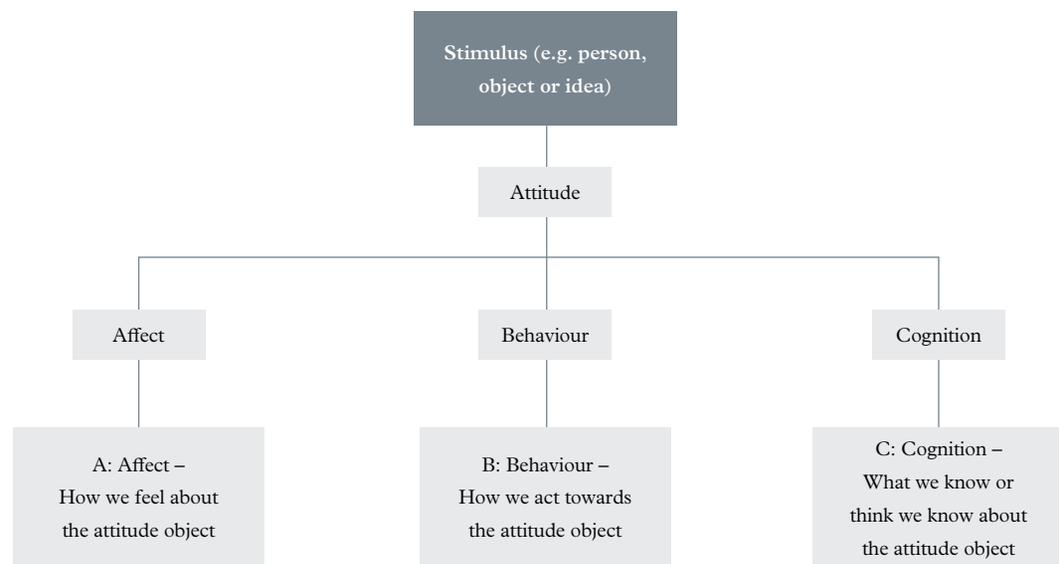


FIGURE 1 The tri-component model of attitudes



FIGURE 2 The three possible components of an attitude according to the tri-component model of attitudes

Expression of attitudes

Attitudes can operate in different forms.

Explicit attitudes are where people openly state their attitude and behave in a way that reflects this attitude. These attitudes can be consciously controlled, and are often shaped by our experiences, education and social influences. For example:

- **Attitude:** Exercise is good for my health.
- **Action (behaviour):** Visit the gym daily.

Implicit attitudes are involuntary, uncontrollable and sometimes unconscious. It is possible for individuals to be unaware that they hold a particular attitude until their actions reveal it. Implicit attitudes are often shaped by past experiences and social conditioning. For example:

- **Attitude:** Moths are harmless.
- **Action (behaviour):** A person screams upon seeing a moth.

explicit attitude
an attitude that an individual is open about and that is aligned with their behaviour

implicit attitude
involuntary, uncontrolled or unconscious attitude that an individual is often unaware they hold, even though it may influence their behaviour

Skill drill

Use of confidence intervals

Science inquiry skill: Processing and analysing data (Lesson 1.7)

A confidence interval is a mathematical technique used in statistics to express the degree of certainty or uncertainty in an estimate of a population parameter. For example, in psychology, a 95% confidence interval represents a range of values within which you can be 95% certain the true population mean lies. Because of natural sampling variability, the sample mean (the centre of the confidence interval) will differ from one sample to another. The confidence lies in the method used to construct the interval, not in any single interval itself. If we repeated the sampling process many times, about 95% of the constructed intervals would contain the true population mean. Typically, as the sample size increases, the confidence interval becomes narrower, indicating a more precise estimate of the population mean compared to smaller samples.

Figure 3 contains data on the implicit attitudes of 30 high-school students who completed a test in Year 10 and then again in Year 12. The study used the Implicit Attitude Test (IAT), which measures attitudes and beliefs that people may be unable or unwilling to report, such as the strength of association between gender and career. The specific IAT used was on gender and career, which often reveals a relative link between family and females, and between career and males. The figure contains the mean percentage (\pm 95% CI) of the students' results on one of the categories (association between career and males) in this IAT.

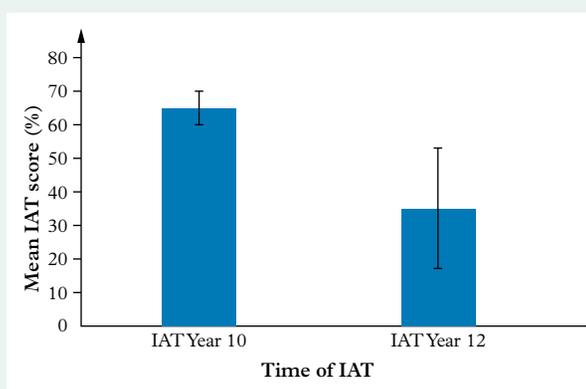


FIGURE 3 IAT mean percentage score (\pm 95% CI) in Year 10 and 12

Practise your skills

- 1 **Identify** the type of experiment carried out. (1 mark)
- 2 **Determine** which group has the greatest uncertainty. (1 mark)

Study tip

Learning is supported when you consolidate the memory to make it last longer. A good tip to help with this is to provide context through using real-world examples. In the case of attitudes, you could think of examples that apply to you or someone else, and break them down using the tri-component model of attitudes.

- ◀ **3 Describe** what the 95% confidence interval tells us about the data. (1 mark)
- 4 Explain** the link between Type I errors and the use of confidence intervals. (1 mark)
- 5 Draw a conclusion** about the mean IAT percentage scores measured in Year 10 versus Year 12. **Justify** your conclusion. (2 marks)

Function of attitudes

Without attitudes we would have difficulty dealing with events in our daily lives, making decisions and making sense of our relationships with others. Attitudes predispose us by:

- guiding us to behave in particular ways
- helping us to get what we want and avoid what we do not want
- saving us energy so that we do not have to work out our reactions to an attitude object each time we encounter it.

When we interpret, attitudes function by:

- guiding the interpretation and summary of an attitude object
- avoiding worry and confusion when faced with a new attitude object
- helping us to understand and process information.

When we evaluate, attitudes function by:

- helping us to stand up for our values and beliefs
- helping us to reflect on our values
- protecting our self-esteem when we feel threatened or uncomfortable.



FIGURE 4 The attitude that exercise is important for good health can influence a person's behaviour. It might mean they exercise regularly.

Relationship between attitudes and behaviour

It is tempting to assume that a particular behaviour is representative of a particular attitude – however, this is not always the case. For example, have you ever done something that you later regretted or felt ashamed of? Do you really think that all cigarette smokers have a positive attitude towards smoking? Sometimes, people's behaviour does not provide a reliable indication of their true attitude. However, the strength with which an attitude is held is often a good predictor of behaviour. The stronger the attitude, the more likely it will affect behaviour.

Challenge

What would you do?

In each of these scenarios, **consider** if your behaviour or attitude would change if you were with your friends or with your family. **Suggest** why/why not.

- a** After an 18th birthday party, your friend's older sister offers to drive you home. You know that your friend's sister has been drinking.
- b** Everyone around you is being rude to the other team at your Sunday sports game. They keep looking at you as though you will, too.

Check your learning 15.1



Check your learning 15.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the ABC of attitudes. (1 mark)
- 2 **Describe** an implicit attitude and give an example. (2 marks)
- 3 **Describe** an explicit attitude and give an example. (2 marks)
- 4 **Identify** the type (implicit or explicit) of attitude in each of the following scenarios.
 - a Attitude: Studying will help me pass my exams. Action: Study every night. (1 mark)
 - b Attitude: Walking alone at night is dangerous. Action: Walks with someone at night. (1 mark)

c Attitude: The ocean is harmless. Action: Refuses to swim at the beach. (1 mark)

- 5 **Explain** the tri-component model of attitudes. (3 marks)

Analytical processes

- 6 **Contrast** implicit attitudes and explicit attitudes. (1 mark)

Knowledge utilisation

- 7 **Evaluate** this statement: “The implicit attitudes that people hold are stronger than the explicit attitudes that people hold.” (3 marks)

Lesson 15.2

Cognitive dissonance

Key ideas

- Discrepancies between attitudes, cognitions and behaviours can lead to cognitive dissonance (feeling of mental discomfort).
- Cognitive dissonance theory suggests that we try to reduce this feeling of mental discomfort by altering the attitude, cognitions or behaviour to gain consistency between cognitions to restore mental comfort and balance.



Learning intentions and success criteria

Introducing cognitive dissonance

Have you ever done something and felt uncomfortable about it afterwards? You may have been experiencing cognitive dissonance. According to Leon Festinger (1957), **cognitive dissonance** is an unpleasant feeling of psychological tension that comes when we perceive that our attitudes are inconsistent with our behaviour. His **cognitive dissonance theory** proposes that we have an inner drive to hold all attitudes and beliefs in harmony, and minimise disharmony (dissonance). Dissonance arises from the inconsistency between two or more cognitions, which can include one's attitudes, thoughts about one's behaviour, or other stored information. The greater the magnitude of dissonance, the greater is the pressure to reduce dissonance.

cognitive dissonance

mental discomfort that occurs because of dissonance (inconsistency between two or more cognitions)

cognitive dissonance theory

the theory that emphasises a person will feel uncomfortable and try to maintain an internal consistency and agreement between their beliefs and behaviours by altering beliefs to match behaviours

Experiencing cognitive dissonance

People experience cognitive dissonance when they behave in a way that is contradictory to their attitude. An example of a person experiencing cognitive dissonance is a smoker who is aware of the health hazards (e.g. increased risk of certain cancers) that come with smoking

and feels guilt and shame when smoking. In terms of the tri-component model of attitudes (Lesson 15.1), their cognitive dissonance can be broken down as follows:

- Cognition: Smoker understands smoking is a health hazard.
- Behaviour: They smoke one pack per day regardless.
- Affect: The smoker feels guilt and shame for giving in to their addiction due to the conflict between their cognition and behaviour.



FIGURE 1 A smoker may feel cognitive dissonance when choosing to smoke even though they know about the dangers of the habit.

Reducing cognitive dissonance

The theory of cognitive dissonance proposes that dissonance can be reduced in three ways:

- Decrease the importance of the cognitions (attitudes, beliefs, thoughts).
- Change one or more of the attitudes, cognitions or behaviours to align the relationship between the two elements (i.e. achieve cognitive consonance).
- Attain new information that outweighs the dissonant cognitions.

effort justification

a special case of cognitive dissonance where the inconsistency experienced makes the person go to considerable effort to justify the achievement of a relatively modest goal

Effort justification

An example of cognitive dissonance in your daily life might be that you dislike dishonesty and always behave truthfully, but find yourself in a situation where you have to tell a white lie to a friend. It is likely that you will feel tense and stressed about your behaviour (cognitive dissonance). To reduce the tension, you change your attitude and devise a justification for lying under the particular circumstances (**effort justification**).



FIGURE 2 For an honest person, telling a white lie may cause feelings of discomfort and cognitive dissonance.

In some instances, effort justification can be extreme, such as where a person justifies their actions even though these might be very different from the person's previously held attitude. For example, people who join cults can sometimes undergo ghastly initiation ceremonies and give up all that they have – including, in extreme cases, their children. This experience then strengthens their attachment to the cult because they think: “I gave up so much to be in this, so I must really believe in it.”

Another, more common, example is someone who has paid for expensive concert tickets saying that the concert was fantastic, despite the reality that it was only a mediocre performance.

Attitude change

Attitude change through cognitive dissonance involves getting a person to engage in a particular behaviour that differs from the attitude the person holds. In acting this way, the person feels uncomfortable, and so begins to think (cognition) differently about an attitude object and, therefore, changes their attitude towards it.

It is difficult to get large numbers of people to perform counter-attitudinal behaviours, so persuasive approaches are more commonly used in areas such as advertising and politics.

There are many variables that will influence attitude change. In advertising, if a product is relevant to the person, it is best to use strong arguments. If a product is not personally relevant to them, then try to make it seem as if it is. Advertisers try to use emotions (affect) to change attitude. If you are trying to change an attitude, it is best to tailor your message to the kind of attitude that you wish to change.

Sometimes persuasive messages are used by advertisers for consumer goods, by political groups and by public-interest organisations such as anti-smoking and anti-drinking groups to bring about behavioural change. We can resist pressure to change our attitudes, and some attitudes are unlikely to change.

Challenge

Cognitive dissonance

As a teenager, you are likely to be figuring out who you are, what you value, and your attitudes and beliefs. Often you may have felt that your beliefs or attitudes don't match those of your friends, but you behaved the same as your friends anyway. **Identify** a time when you experienced this discomfort. **Decide** if it was just cognitive dissonance or if you also experienced effort justification.

Summary of cognitive dissonance

Figure 3 summarises the ideas we have explored about cognitive dissonance in this lesson.

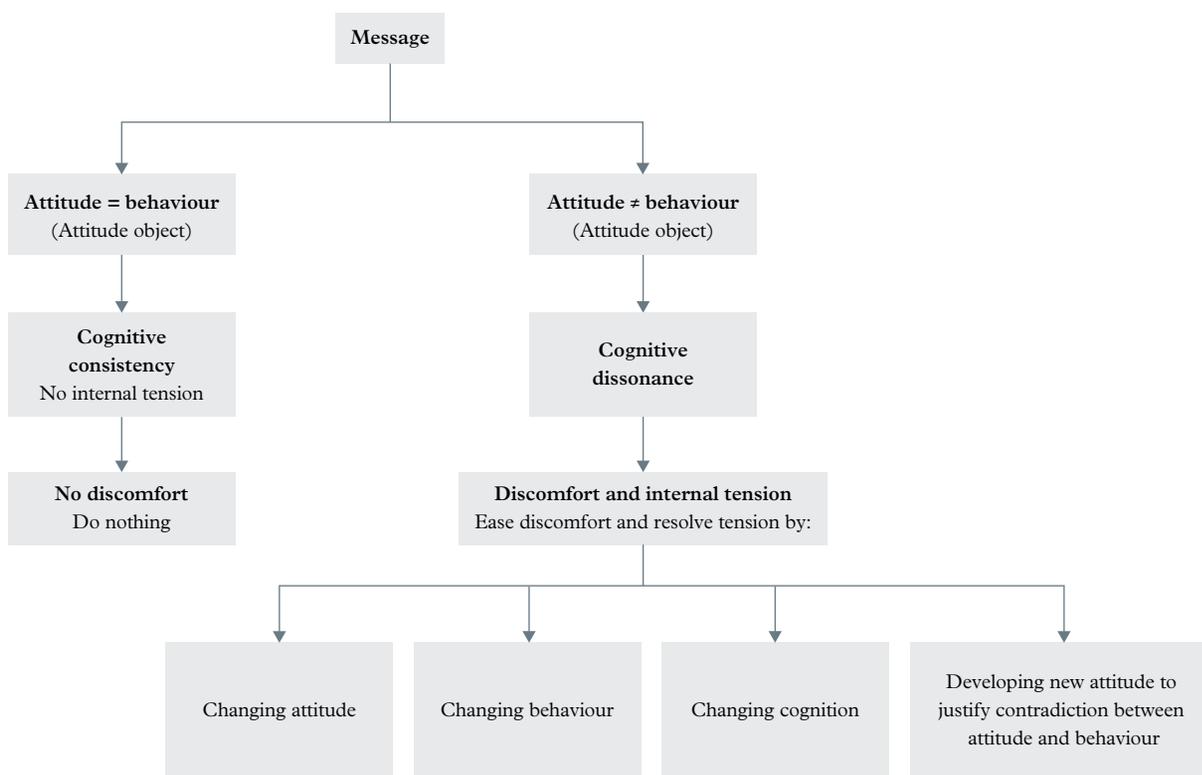


FIGURE 3 Cognitive dissonance

Check your learning 15.2



Check your learning 15.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** cognitive dissonance and provide an example. (2 marks)
- 2 **Describe** a discrepancy between an attitude and a behaviour, and what may change to reduce cognitive dissonance. (1 mark)
- 3 **Explain** effort justification in reducing cognitive dissonance. (2 marks)

Knowledge utilisation

- 4 **Design** a methodology that would test cognitive dissonance and attitude change. (3 marks)

- 5 A student believes that studying hard is essential for good grades, but they often procrastinate and spend time on social media instead of studying. **Assess** whether the student is likely to experience cognitive dissonance. (3 marks)
- 6 Imagine a person who values healthy eating but loves fast food. **Predict** the attitude, behaviour and cognition of this person after eating fast food. (3 marks)

Lesson 15.3

Social identity theory

Key ideas

- Social identity theory proposes that individuals acquire part of their self-concept from their memberships in social groups.
- Social identity theory proposes three mental processes used to determine membership of a social group (in-group or out-group): social categorisation, social identification and social comparison.
- Social categorisation refers to the tendency of people to categorise themselves and others into different social groups based on characteristics such as race, gender, religion or nationality.
- Social identification occurs when an individual adopts the identity of the group into which they have categorised themselves.
- Social comparison occurs after categorisation and identification with a group, when individuals compare their group to others.



Learning intentions and success criteria

Introducing social identity theory

Think about the things that you like and dislike. Think about the colour of your hair and the colour of your friend's hair. Think about the sports you play and the sports you don't participate in, the music that you enjoy and the music that you dislike. Now think about the people who you socialise with, compared with the people who you don't socialise with. Think about the sports team you support, and how it feels at the stadium when they are playing, and how you compare the opposition to your team.

In each of the above scenarios, you were comparing yourself to another person – or comparing your “group” to another group. Each time you did this, you were forming your identity. Our **social identity** is our sense of who we are based on our group memberships. For example, when you think about your rugby team, you may think, “I go for the Cowboys. We’re a much better team than Melbourne Storm!” In doing this, you have made yourself feel better by belonging to the Cowboys and saying that they are better than Melbourne Storm. You have also assigned worth to your team, regardless of their ability. The Cowboys may be better than Melbourne Storm, but even if they weren’t, you may still say that they are.

But why do we do this? In 1970, Henri Tajfel developed social identity theory to answer this question.

Social identity theory states that we use groups to form our social identity. According to Tajfel (1970), groups are an important source of pride and self-esteem. When we belong to a group, we experience a sense of belonging, and this provides us with an identity in the world that we may not have otherwise had.

To maintain self-esteem and pride, we increase the status of our group. We may choose to do this by stating something like “Brisbane is the best city in Australia!” In doing so, we have identified as being part of a group (Brisbane) and increased the status of our group (best city in Australia). To take this further, we can increase our image by comparing it against other groups and being discriminatory towards them; for example, “Melbourne and Sydney are awful. Who would want to live there?”

When we belong to a group, we tend to develop an “us” versus “them” mentality: we have an **in-group** and an **out-group**. Social identity theory states that our in-group will discriminate against our out-group to make us feel better and give us a better perceived self-image. The in-group will either seek out negatives in the out-group or exaggerate negatives in the out-group.

Do you identify and belong to any of the groups (social categories) below? If you do, then you could describe it as one of your in-groups:

- sport: AFL fans and rugby fans
- politics: Labor, Liberal and Greens
- social classes: Upper, middle and working classes
- religion: Christian, Jewish and Muslim
- employment: casual, full-time and part-time
- school: primary school and high school.

Tajfel proposed that there were three mental processes that we use to determine and maintain who is part of an in-group or out-group: social categorisation, social identification and social comparison (Figure 3).

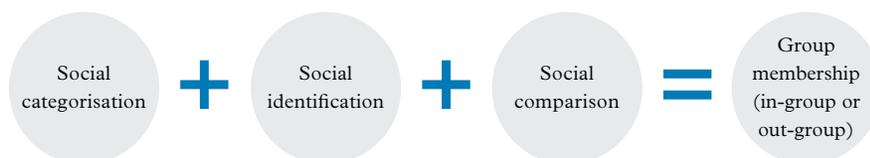


FIGURE 3 The three mental processes that we use to determine who is part of our in-group or out-group: social categorisation, social identification and social comparison



FIGURE 1 Our social identity comes from many things, such as our hair colour, what we like and don’t like, the jokes we enjoy and the music we listen to.



FIGURE 2 When you announce that your sports team is better than another, you are making yourself feel good because you belong to a group that is better than another.

social identity

a person’s sense of self based on the groups they belong to

social identity theory

a theory that suggests that groups are part of our identity and self-esteem, through three processes: social categorisation, social identification and social comparison

in-group

a group of people with a shared interest, identity or beliefs; the group with which an individual identifies

out-group

people or groups that exist outside of someone else’s group; the group with which an individual does not identify

Social categorisation

social categorisation

the tendency of people to classify similar objects and people in order to identify and understand them

Social categorisation is where we sort people and objects so that we are able to understand and identify them. We extend this to ourselves as well, so that we are able to understand our social environment and act appropriately. We determine appropriate behaviour by looking at the norms of groups we belong to, but this is only possible if we can identify who is in our group. A person can belong to many different groups.

For example, if you meet someone from Melbourne, you may assign them to the group “Victorian”. When you do this, you are probably also assigning ideas to them, such as, “They must enjoy cold weather, because Victoria is always colder than Queensland.” We also assign ourselves to groups. If you assign yourself to being a teenager, you may think that you should behave in a particular way towards adults and teachers as well as children. You may think that you are supposed to listen to a certain type of music or socialise at certain places more; for example, you may socialise at the movies instead of the playground where younger children may go. In doing this, we are basing our behaviour on how we believe our group should act.



FIGURE 4 When you assign people from Melbourne to a “Victorian” group, you might also assign to them ideas about their weather preferences. This is an example of social categorisation.

Social identification

social identification

a process where people modify their behaviour, attitudes and beliefs to match the group that they belong to

Social identification is where we adopt the behaviour, attitudes and beliefs of the group we belong to. Your identification with a group will carry emotional significance, and your self-esteem will become connected to your group membership. If you identify as being a student, you will probably study more and attend school on a daily basis – you may even complain about homework. You generally conform to the norms of the group. If you identify as an athlete, you may go to the gym a lot and try to train as much as possible. In doing so, you are affirming that you belong to a group.



FIGURE 5 When you identify as a particular role, such as student, your behaviours may also match this identification. As a student, you might choose to complain about how much homework you have.

Social comparison

social comparison

comparing our in-group with other groups to affirm our identity

The final stage of social identity is **social comparison**. Social comparison is where we compare our in-group with other groups to affirm our identity. This comparison is often biased in favour of one’s own group, leading to in-group favouritism. Tajfel (1970) states that we maintain self-esteem when our group can be compared positively with other groups.



FIGURE 6 Comparing our in-group to out-groups helps to affirm our identity.

This helps our understanding of prejudice, as once two groups have identified as being different, it is important for them to maintain this difference so that members of each group can maintain their self-esteem. Groups can compete for resources, as much as they are competing to maintain identity.

Check your learning 15.3



Check your learning 15.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Explain** social identity theory. (3 marks)
- 2 **Explain** what social comparison is and give an example. (2 marks)

Analytical processes

- 3 **Sequence** the three mental processes of social identity theory used to assign people into groups. (1 mark)
- 4 Think of one group that you belong to (e.g. your sports team, your friends, your family, your class). **Apply** your understanding of social

identity theory to **explain** your membership of this group. (3 marks)

- 5 **Discriminate** between in-groups and out-groups. (1 mark)

Knowledge utilisation

- 6 **Evaluate** the following statement with regard to social identity theory: “People do not gain their identity from others; identity is entirely from one’s self.” (3 marks)
- 7 **Assess** the role of social categorisation in forming an in-group. (2 marks)

Lesson 15.4

Attributions

Key ideas

- Attributions are inferences that people make about the causes of events or behaviours to understand social experiences.
- Situational attribution is the assumption that the cause of the behaviour is the result of external factors (e.g. environment – weather).
- Dispositional attribution is the assumption that the cause of the behaviour is due to personal or internal factors (e.g. mood).
- Fundamental attribution error is where people place too much emphasis on dispositional factors (such as personality traits) when explaining the behaviours of others.



Learning intentions and success criteria

Introducing attributions

Why do we do the things we do? Why did she react the way she did? Why does he feel that way? To help navigate our social experiences, we feel an inexplicable need to explain or determine the reason for the behaviour.

Attributions are inferences that we make about the causes of events, the behaviour of others or our own behaviour. They were first described in 1958 by researcher Fritz Heider.

attribution

inference about the causes of events or behaviours to understand social experiences

He posited that people tend to see the cause of a behaviour or action as being either located within the person (internal) or outside the person (external).

Julia invites Kim (a co-worker) and Liz (a long-time friend) to the movies. Liz arrives 30 minutes late. Kim thinks that there must have been a lot of traffic or that parking was scarce in the area, causing Liz to be delayed. Julia knows that Liz is rarely on time and thinks her friend is disorganised. Both of these responses are examples of attributions, but each is different.

Julia's attributions blame the delay on Liz's character: her poor planning and lack of time management skills. These are dispositional (personal) attributions and are internal factors. Kim blames the delay on situational attributions, where the cause of behaviour is attributed to a situation or event that is external to the person involved. Table 1 lists some of the reasons behind dispositional and situational attributions that we use to explain behaviour.



FIGURE 1 We can attribute the behaviours of others or ourselves to internal or external factors. If your friend is late to the movies, you might assume it's because she is always late, but someone else might blame it on traffic.

attribution theory

the theory that humans need to understand why people behave in certain ways, and there are two ways to explain behaviour: dispositional attributions and situational attributions

actor–observer bias

the tendency to explain our own actions by external factors, and explain the actions of others by internal factors

situational attribution

the assumption that the cause of the behaviour is due to environmental or external factors

dispositional attribution

the assumption that the cause of the behaviour is due to internal or personal factors

TABLE 1 Reasons behind dispositional and situational attributions

| Dispositional (personal/internal) | Situational (external) |
|-----------------------------------|---------------------------|
| Traits | Environmental setting |
| Ability | Situation |
| Motivation | Luck |
| Attitude | Actions of another person |
| Mood | |
| Effort | |

Attribution theory

Attribution theory formed from the idea that people have an innate need to try and understand why things happen the way they do. When we observe another's actions, we make decisions about the intention of the action and the responsibility. The attribution we use tends to be determined by whether we are performing an action, or if we are observing someone else. This is known as the **actor–observer bias**.

When we think about our own behaviour, we tend to consider the environment and external factors. When we do this, we are using **situational attribution**. Situational attribution is when we consider external factors to explain behaviour. For example, in the previous scenario where Julia and Kim are waiting for Liz, Kim is using situational attribution to explain Liz's behaviour.

When we think about the behaviour of others we tend to consider internal factors of their personality. This is called **dispositional attribution**. In the movie scenario, Julia attributes Liz's lateness as dispositional.

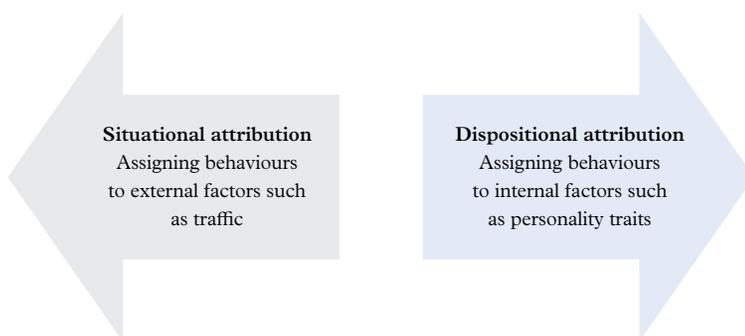


FIGURE 2 Situational and dispositional attribution

Fundamental attribution error

The premise of attribution theory is that we are more likely to explain someone else's behaviour by looking at dispositional factors than by considering situational factors. This helps us to understand the question of “why” things occur. When we underestimate the situational factors, and overestimate the dispositional factors in behaviour, we experience the **fundamental attribution error**.

For example, you may see someone in your class act responsibly, conscientiously and with kindness in front of all teachers and people who hold positions of responsibility. This may cause your teachers to believe that this student is always responsible, conscientious and kind. They have assigned this to the behaviour they see, and have not considered how this student's behaviour changes during different circumstances. In Western society, such as Australia, people are held responsible for their actions; because of this there is a tendency to typically assign dispositional attribution to their behaviour.

Ross and colleagues (1977) conducted a study to see if people would make the fundamental attribution error when they had factual knowledge to contradict this. The study used student participants who were randomly assigned to one of three roles: a game-show host, contestants on the game show and the game-show audience. Participants were told that the game-show host could design their own questions. The audience then watched the game show.

When the show was over, observers were asked to determine the intelligence of the people in the show (host and participants). They consistently determined the host to be the most intelligent, despite being aware that the host had written the questions. They attributed the host's intelligence to dispositional factors, and were unable to attribute the “intelligence” to situational factors (i.e. the host had written the questions, and therefore clearly already knew all the answers).

This study confirmed that the fundamental attribution error can happen despite people having knowledge that it is incorrect.

fundamental attribution error

when people place too much emphasis on dispositional attribution, and too little emphasis on situational attribution when trying to explain behaviour



FIGURE 3 Participants determined the game-show host to be the most intelligent in the 1977 study.

Check your learning 15.4



Check your learning 15.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Identify** the two main types of attribution. (2 marks)
- 2 **Describe** the fundamental attribution error. (1 mark)
- 3 **Identify** if the following behaviours have been attributed to situational or dispositional factors.
 - a Jenna and Kai are waiting to meet Mel for dinner. Jenna has been friends with Mel for a long time and assumes that Mel is running late because she underestimated how much time she needed to get ready. Kai has only known Mel for a few weeks and assumes that Mel got stuck in traffic. (1 mark)
 - b Kamila and Finn are watching their friend Jamie teach students to ski. Finn assumes that Jamie is really smart because of what he is saying. Kamila knows that Jamie can check his phone whenever he forgets information, so she doesn't assume Jamie is that smart. (1 mark)

- ◀ c Elsa knows that she is running late because there is snow on the road, and the bus can't go as quickly. She knows that it is not her fault, but Tomas disagrees and thinks Elsa should have gotten an earlier bus. (1 mark)

Analytical processes

- 4 **Compare** dispositional attributions and situational attributions. (2 marks)
- 5 Thea has been helping Lotte write and practise a speech all week. When Lotte is presenting the

speech, Thea still assumes that Lotte is speaking naturally, and is very clever for thinking of it on the spot, despite knowing that she helped Lotte learn the speech. **Determine** if Thea is experiencing fundamental attribution error. (1 mark)

Knowledge utilisation

- 6 **Discuss** how dispositional and situational attributions could be used to explain a student achieving a top ATAR result. (4 marks)

Lesson 15.5

Bias

Key ideas

- Bias is an opinion or belief held about an object or person.
- The use of bias helps us to understand human behaviour.
- Self-serving bias is a tendency to view ourselves more favourably than others in the same position.
- Confirmation bias is the tendency to search for and interpret information that suits pre-existing beliefs.



Learning intentions and success criteria

Introducing bias

As discussed in attribution theory, people like to have an explanation for why something occurs. When it comes to human behaviour and action, people often use mental shortcuts (known as cognitive heuristics) to simplify decision-making and make their daily lives easier. Unfortunately, these shortcuts can sometimes lead to errors in judgment or biases. A **bias** is an opinion or belief about an object, group or person.

There are two categories of biases: conscious (explicit) and unconscious (implicit). Conscious bias occurs when you are aware of your attitudes and the behaviours that stem from them. This type of bias can be beneficial as it helps to shape your identity and can guide you in making positive choices, such as eating healthy foods. However, this bias can be harmful when it takes the form of conscious stereotyping, which is discussed in Module 16.

Unconscious bias (cognitive bias) is an unintentional bias where you are unaware of your attitudes and the behaviours resulting from them. This type of bias can act to help simplify the complexities of the world, making information processing quicker and more efficient, or it can be discriminatory and cause harm.

In this lesson, we will review two types of unconscious bias: self-serving bias, which is a form of attribution error, and confirmation bias, which is involved in stereotyping.

bias

an opinion or belief held about a thing, idea, group or individual

Self-serving bias

A **self-serving bias** is a cognitive or perceptual process that serves to maintain our self-esteem by crediting ourselves for our successes but blaming others or external factors for our failures. Alternatively, it is a tendency to view ourselves more favourably than we may view others in the same position.

As people, we are more likely to attribute our success to internal factors and our failures to external factors. This is the self-serving bias (Figure 1). For example, if your netball team wins the game on the weekend, you are likely to decide that you (and the rest of your team) played really well. However, if your team were to lose on the weekend, you are more likely to blame the weather, the other team, the umpires or injuries. It is harder for people to acknowledge their flaws, as this can risk damaging their self-esteem.

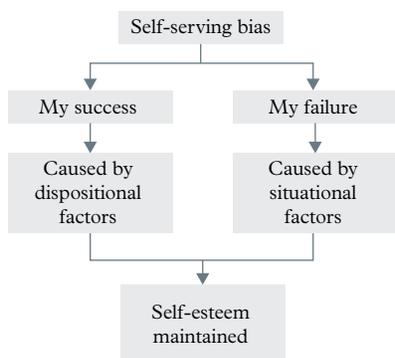


FIGURE 2 If your team loses the grand final, you might be tempted to blame the umpires or the weather, instead of accepting that the other team played better.

FIGURE 1 The self-serving bias

Comparison with fundamental attribution error

This bias is like the fundamental attribution error; however, the key differences are based on how good or bad an event is and involves you as the actor. For example, Max receives a poor grade on a science test. When Max (the actor) looks at his own performance, he might attribute the low grade to external factors, such as the test being unfairly difficult or the teacher not explaining the material well enough. This is an example of self-serving bias, where Max protects his self-esteem by blaming external factors for his failure.

On the other hand, if Max hears that another student, Jamie, also received a poor grade, Max might think that Jamie is simply not good at science or didn't study hard enough. This is an example of the fundamental attribution error, where Max attributes Jamie's poor performance to dispositional attributes (e.g. Jamie's abilities or effort) rather than considering situational attributes (e.g. loss of class time) that might have affected Jamie's performance.

Expectation of success

In 1975, Miller and Ross posed another aspect of the self-serving bias: people expect to be successful. When an outcome is consistent with our expectations, we are likely to attribute this to internal factors. When an outcome is inconsistent with our expectations, we will make situational attributions to justify the result.



FIGURE 3 If your test score is poor, you are likely to use a self-serving bias and attribute your failure to external factors, thereby protecting your self-esteem.

Study tip

Create a diagram to help support your understanding of a concept, such as self-serving bias. Using relevant images together with words is another strategy to support your memory.

Confirmation bias

confirmation bias

tendency to search for, recall and interpret information to suit pre-existing beliefs

Confirmation bias is the tendency that people have to search for, recall and interpret information to affirm their pre-existing beliefs. People often remember information selectively, or only seek out information that confirms their suspicions. They may also give disproportionately less consideration to alternatives. Ambiguous information usually does not retain its ambiguity, as people interpret this information to support their existing position or thought. This is particularly obvious when it applies to an emotionally charged stimulus. For example, your sports team lost but you think it was the umpire's fault; you will recall all the times an umpire has made the wrong call previously. You will also indulge in new information that proves your point.

Certain instances of confirmation bias can be particularly damaging, especially within the legal system. For example, a detective might pinpoint a suspect early in an investigation, actively look for evidence that supports their suspicion, and minimise or ignore evidence that contradicts it. Therefore, it is an important aspect of law enforcement training to be aware and alert to the effects of biases.

Self-serving and confirmation biases help to explain how attitudes can be maintained. Confirmation bias is known to make stereotypes resistant to change. They both contribute to errors in understanding of behaviour.

Challenge

Are you responsible?

Imagine that you have spent the past month studying for an important mathematics test. You have revised every night by completing at least 10 practice questions. On the day of the test, you believe that you have done really well, but when you get your mark back, you have only scored a D+, when you thought you would get an A. Instantly, you decide the teacher is wrong and has marked your test incorrectly. Your

teacher informs you that you actually studied the wrong material. Based on this you decide that your teacher didn't tell you the correct information to study. Your classmates support your decision and tell you that they have never got a good mark with that teacher.

Determine what type of bias you are using and **propose** how you could change this perception.

Real-world psychology

Do you know your own biases?

How can we unconsciously hold beliefs that we know on a conscious level to be morally, socially and politically unjust? Such were the questions asked by the owners of the American Starbucks coffee chain in 2018 when a store manager had two African American men wrongfully arrested for "refusing to make a purchase or leave" (Sukhera, 2018). These men were simply waiting for other people to arrive for a business meeting before ordering. Although the charges were later dropped, and an apology issued, Starbucks management chose to close a number of their stores and engage staff in "anti-bias" training.

Why did the store manager appear to make a rash, uninformed and unconscious decision about the two men? This decision-making process is related to a phenomenon known as implicit bias. Implicit bias can be defined as a negative attitude that lies outside our conscious awareness or control, against a specific social group. In other words, we don't know that we hold these implicit biases. We form them from our early childhood experiences and from what we are taught and observe in our social environments (Golden, 2017). Harvard University researchers uncovered implicit gender

bias in high-school students regarding female leadership roles. The researchers surveyed nearly 20,000 high school students, assessing whether or not they agreed to give power to student councils based on the gender, race and ethnicity of the leaders (Harvard Graduate School of Education, 2015). The findings revealed that both male and female teenagers favoured male-led councils over female-led councils.

Sometimes, however, implicit bias can lead to reverse discriminatory behaviour. Such was the case with a recent Australian study assessing whether women and people from minority groups were discriminated against in the public service recruitment process (Hiscox et al., 2017). They examined whether anonymity reduced discriminatory recruitment practices for senior positions. The researchers found that when the records were identifiable, female candidates were more likely to be shortlisted than male candidates.

Apply your understanding

- Describe** implicit bias and give an example. (2 marks)
- Explain** how implicit bias can affect behaviour. (2 marks)
- Discuss** how implicit bias in relation to gender roles could develop during childhood. (3 marks)



FIGURE 4 Unless we are aware of it, bias can outweigh the truth.

This trend was strongest for Indigenous female candidates. Hiscox concluded that screening candidates anonymously may hinder efforts to encourage diversity in the Australian workforce rather than reduce discrimination.

Check your learning 15.5



Check your learning 15.5: Complete these questions online or in your workbook.

Retrieval and comprehension

- Describe** self-serving bias and give an example. (2 marks)
- Describe** confirmation bias and give an example. (2 marks)

Analytical processes

- Compare** self-serving bias and confirmation bias. (2 marks)
- Determine** which bias may be used in the following situations.
 - James's football team won, the weather was wet and Drago's team had injuries and were playing at James's team's field. (1 mark)
 - Sian expected to get a high score on her exam. When she received her results, she hadn't achieved the score that she expected. (1 mark)

- Shahil believes that dogs are superior to cats. When presented with information that cats may be more friendly and social, Shahil ignores this and focuses on the playful nature of dogs. (1 mark)

- Differentiate** between self-serving bias and fundamental attribution error. (1 mark)

Knowledge utilisation

- Predict** two effects of bias in the legal system. **Justify** your response with reference to bias. (4 marks)
- Evaluate** the following claim: "Confirmation bias is more prominent in everyday life than self-serving bias." (5 marks)

Lesson 15.6

Review: Attitudes and bias

Summary

- 15.1 • The tri-component model of attitudes explains that attitudes can be composed of three parts: affective (emotions), behavioural (actions) and cognitive (beliefs).
- Attitudes can be described as implicit or explicit.
- Implicit attitudes are unconscious and automatic, influencing behaviour without our awareness, whereas explicit attitudes are conscious and deliberate, reflecting our intentional thoughts and beliefs.
- 15.2 • Discrepancies between attitudes, cognitions and behaviours can lead to cognitive dissonance (feeling of mental discomfort).
- Cognitive dissonance theory suggests that we try to reduce this feeling of mental discomfort by altering the attitude, cognitions or behaviour to gain consistency between cognitions to restore mental comfort and balance.
- 15.3 • Social identity theory proposes that individuals acquire part of their self-concept from their memberships in social groups.
- Social identity theory proposes three mental processes used to determine membership of a social group (in-group or out-group): social categorisation, social identification and social comparison.
- Social categorisation refers to the tendency of people to categorise themselves and others into different social groups based on characteristics such as race, gender, religion or nationality.
- Social identification occurs when an individual adopts the identity of the group into which they have categorised themselves.
- Social comparison occurs after categorisation and identification with a group, when individuals compare their group to others.
- 15.4 • Attributions are inferences that people make about the causes of events or behaviours to understand social experiences.
- Situational attribution is the assumption that the cause of the behaviour is the result of external factors (e.g. environment – weather).
- Dispositional attribution is the assumption that the cause of the behaviour is due to personal or internal factors (e.g. mood).
- Fundamental attribution error is where people place too much emphasis on dispositional factors (such as personality traits) when explaining the behaviours of others.
- 15.5 • Bias is an opinion or belief held about an object or person.
- The use of bias helps us to understand human behaviour.
- Self-serving bias is a tendency to view ourselves more favourably than others in the same position.
- Confirmation bias is the tendency to search for and interpret information that suits pre-existing beliefs.

Review questions 15.6A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 What is a relatively permanent, integrated system of beliefs, thoughts and behaviours?
 - A A value
 - B A theory
 - C An opinion
 - D An attitude
- 2 How is the fundamental attribution error best described?
 - A Making unfair judgments about someone due to their race, age or gender
 - B The belief that a person doesn't always act the same way in different circumstances
 - C Placing too much emphasis on dispositional factors and too little emphasis on situational factors
 - D Placing too much emphasis on situational factors and too little emphasis on dispositional factors
- 3 When people affirm their identities by comparing their in-group with other groups, what is this known as?
 - A Attribution theory
 - B Social comparison
 - C Social identity theory
 - D Cognitive dissonance
- 4 Which of the following statements best describes the difference between attitudes and attributions?
 - A Attributions are inferences, whereas attitudes are ideas.
 - B Attitudes are inferences, whereas attributions are ideas.
 - C Attributions help us make sense of our social world, whereas attitudes help us evaluate our actions.
 - D There is no difference – both attributions and attitudes help us identify the cause of events in our social world.
- 5 What are the three processes associated with social identity theory?
 - A Attitudes, cognitions, behaviours
 - B In-groups, out-groups, social comparison
 - C Categorisation, identification, comparison
 - D Implicit attitudes, explicit attitudes, prejudice
- 6 Which of the following scenarios best illustrates cognitive dissonance?
 - A A teacher praises a student for good behaviour in class.
 - B A student studies hard for an exam and receives a high grade.
 - C A person donates to charity and feels good about helping others.
 - D A person believes in healthy eating but regularly eats fast food, then justifies it by saying they're too busy to cook.
- 7 Implicit attitudes are
 - A a person's conscious opinions about people, objects or concepts.
 - B ideas we have learnt about ourselves, others, objects and experiences.
 - C positive and negative judgments that are not within our conscious awareness.
 - D simplified stereotypes of individuals in a particular group, making them seem more alike than they actually are.
- 8 According to cognitive dissonance theory, how might people try to reduce dissonance?
 - A Distracting themselves with unrelated tasks
 - B Accepting the discomfort as a normal aspect of life
 - C Ignoring the inconsistency and hoping it goes away
 - D Changing one or more of their inconsistent cognitions
- 9 The tri-component model of attitudes consists of
 - A cognitive, affective, physical.
 - B active, behavioural, cognitive.
 - C affective, behavioural, cognitive.
 - D cognitive, assertive, behavioural.
- 10 A study observed that the location of work groups influenced the formation of in-groups and out-groups. This led to a greater tendency to attribute the behaviour of out-group members to their personal traits, particularly when it cast them in a negative way. Which two social psychology processes does this illustrate?
 - A Social identification and self-serving bias
 - B Social comparison and confirmation bias
 - C Social categorisation and self-serving bias
 - D Social comparison and the fundamental attribution error

- 11 Cognitive dissonance theory predicts that after people have behaved in a way that contradicts their attitude, they will
- A do nothing.
 - B change their attitude to make it more consistent with their behaviour.
 - C change their behaviour to make it less consistent with their attitude.
 - D change their behaviour by adding new thoughts that reduce the inconsistency.
- 12 Claire recently tried out for a regional sporting team. She attributed her selection in the team to her dedication to training. However, she suggested the coach was playing favourites when she wasn't selected to play the first game of the season. What might Claire be using?
- A Prejudice
 - B Self-serving bias
 - C Internal attribution
 - D Social comparison
- 13 Which of the following best explains bias?
- A A positive or negative action against someone in a minority group
 - B A short-cut in decision-making based on prior knowledge of a concept
 - C How attitudes form and can result in negative actions towards a group, object or person
 - D An opinion or belief about an object, group or person that can be positive or negative in nature
- 14 What is social identification?
- A When people group similar objects and people to help identify and understand them
 - B When people modify their behaviour, attitudes and beliefs to match those of the out-group
 - C When people modify their behaviour, attitudes and beliefs to match those of the in-group
 - D When people modify their behaviour, attitudes and beliefs to match the group they belong to
- 15 Explicit attitudes are
- A a person's conscious opinions about people, objects or concepts.
 - B ideas we have learnt about ourselves, others, objects and experiences.
 - C positive and negative judgments that are not within our conscious awareness.
 - D simplified stereotypes of individuals in a particular group, making them seem more alike than they actually are.

Review questions 15.6B Short answer



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 16 **Identify** the components of the tri-component model of an attitude. (1 mark)
- 17 A person who has recently been on a health kick is trying to decide between a salad and a hamburger for lunch.



- a **Describe** the cognitive dissonance likely to be experienced by the person if they choose to eat the hamburger. (1 mark)
- b **Describe** two ways in which the person could reduce their cognitive dissonance. (2 marks)
- 18 **Explain** why people's behaviour is often not a true indication of their attitudes. (2 marks)
- 19 **Explain** the processes involved in social identity theory and give an example. (2 marks)

Analytical processes

- 20 **Apply** the processes of social identity theory to **explain** how someone can become a member of a cult. (3 marks)
- 21 **Compare** implicit and explicit attitudes. (2 marks)
- 22 **Differentiate** between dispositional and situational attributions. Provide an example to support your answer. (2 marks)

23 Paulo decided to go on a gap year before starting university despite his belief that it is better to complete his degree before taking time off from study. He later felt uncomfortable and justified his decision by telling his parents he would get better grades if he took time off from studying. **Apply** your understanding of cognitive dissonance theory to explain Paulo's comments. (2 marks)

24 Distinguish between self-serving bias and confirmation bias. Give an example of each. (3 marks)

Knowledge utilisation

25 Discuss how people tend to maintain self-esteem and pride. Use social identity theory and a specific example in your response. (4 marks)

26 Discuss how attributions can be used to explain behaviour, with reference to dispositional attribution, situational attribution and fundamental attribution error. (3 marks)

Data drill

Festinger and Carlsmith

Cognitive dissonance was first demonstrated in a famous study by Festinger and Carlsmith (1959), where participants were paid either \$1 or \$20 to tell the next participant that they had enjoyed being in the experiment, which had been deliberately designed to be very boring.

The subjects provided a rating on a scale of -5 (not enjoyable) to +5 (enjoyable).

TABLE 1 Results of Festinger and Carlsmith (1959) study

| Group | Task | Payment | Reported enjoyment | Mean rating | Standard deviation of rating |
|---------------|--|---------|--------------------|-------------|------------------------------|
| Control group | Performed monotonous tasks | None | Low | -0.45 | 1.1 |
| \$1 group | Told next participant tasks were enjoyable | \$1 | High | 1.35 | 0.8 |
| \$20 group | Told next participant tasks were enjoyable | \$20 | Low | -0.05 | 1.2 |

Apply understanding

1 Identify the group that experienced the highest mean rating of enjoyment. (1 mark)

Analyse data

2 Sequence the mean rating scores of enjoyment from lowest to highest. (1 mark)

3 Contrast the standard deviation scores of the \$1 and \$20 groups. (1 mark)

Interpret evidence

4 Deduce which condition from Table 1 had the greatest variability in enjoyment ratings. (1 mark)

5 Draw a conclusion, using evidence from Table 1, regarding which group experienced the most cognitive dissonance. (2 marks)



Module 15 checklist: Attitudes and bias

16

Stereotypes, prejudice and discrimination

Introduction

What do you think when you hear the word “lawyer”? Do you imagine someone who is well educated, dressed in a suit and wealthy? The collection of ideas that we form about individuals who belong to a particular group are referred to as stereotypes.

We often use these ideas to make quick, and sometimes very inaccurate, decisions about a person simply because they belong to a certain group.

Prejudice involves people expressing preconceived and irrational attitudes and beliefs about members of another group, while discrimination involves behaviours directed against another group. Prejudice and discrimination have led to the mistreatment of many groups of people worldwide, including atrocities such as the persecution of Jewish people and others by the Nazis in the Second World War. Closer to home, European colonisation, cultural displacement and discrimination have at times disadvantaged First Nations peoples, with many Indigenous peoples continuing to experience discrimination and social disadvantage today.

In this module, we will describe stereotypes and their advantages and disadvantages, and the formation of prejudice. We will contrast prejudice and discrimination, and explore how they influence our interactions with others based on such characteristics as age, gender, race and sexual orientation.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to stereotypes, prejudice and discrimination before you start.

Subject matter

Science understanding

- Describe stereotypes and identify their advantages and disadvantages.
- Describe the formation of prejudice in terms of: scapegoating, direct experience and personal prejudice, group prejudice, and the prejudiced personality.
- Contrast prejudice and discrimination.
- Interpret data about the relationship between stereotype priming and behaviour from a modification of experiment 2 in Bargh, Chen & Burrows’ (1996) study.

Science as a human endeavour

→ Consider that stereotypical, prejudiced and/or discriminatory attitudes are influenced by social, economic, cultural and ethical contexts.

Science inquiry skills

- identify, research and construct questions for investigation
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - descriptive statistics
 - measures of central tendency: mean and median
 - parametric inferential statistics, e.g.
 - p -value from Pearson r
- select, synthesise and use evidence to explain findings
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- suggest improvements and extensions to minimise uncertainty, address limitations and improve the overall quality of evidence.

Science inquiry

→ Investigate the effect of stereotype priming on behaviour by modifying experiment 2 in Bargh, Chen & Burrows' (1996) study.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

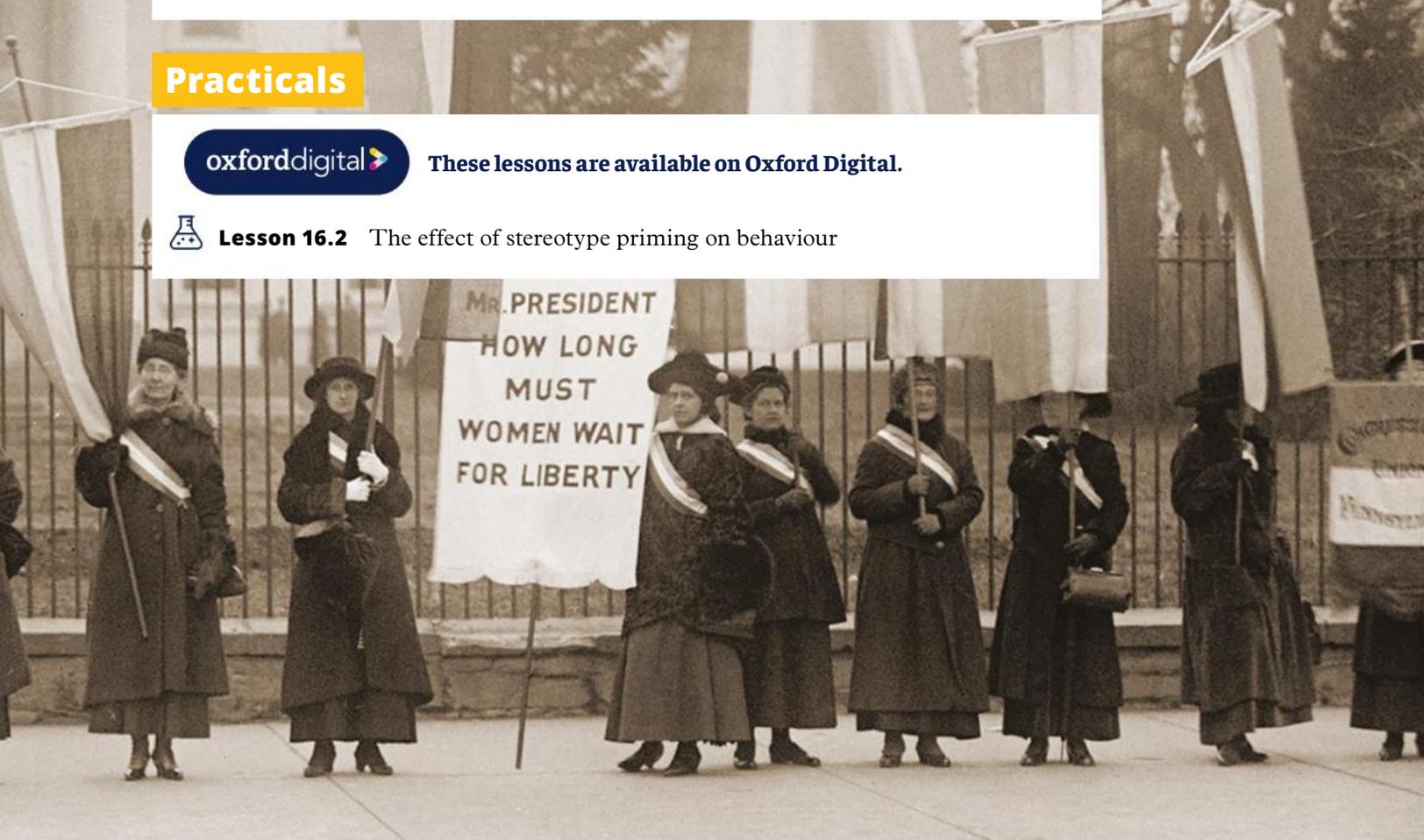
Practicals

oxforddigital

These lessons are available on Oxford Digital.



Lesson 16.2 The effect of stereotype priming on behaviour



Lesson 16.1

Stereotypes

Key ideas

- Stereotypes are generalised and simplified beliefs about a group of people or person based on their membership of a group.
- Stereotypes can be advantageous when they help individuals recognise and challenge biased thinking, but can also be disadvantageous when they are inaccurate and play a role in prejudice.
- Stereotyping involves categorising people into groups based on common characteristics such as age, sex, ethnicity and occupation.
- Stereotypes are generally resistant to change and persist over time.



Learning intentions and success criteria

Stereotypes

Module 15 discussed attitudes and how they relate to identity and behaviours. This lesson will look at how our attitudes relate to the stereotypes we use on a daily basis and their advantages and disadvantages.

Social categorisation is our natural human tendency to classify people into groups based on characteristics that we perceive them to have in common. It is the first process in forming our social identity (as discussed in Module 15). Categorising people is a means of organising the information that we have about them through the use of labels, such as hipster, bogan, hoon, bimbo, nerd and snob.

Some people are under the impression that certain groups have particular characteristics that are typical of them: these are **stereotypes**. The most common stereotypes are based on age, gender, ethnicity and occupation. Stereotyping is a normal human thought process that is usually automatic and efficient, because it saves time and effort when forming an opinion of someone. Put simply, stereotypes are a convenient way of simplifying our social world. However, there is a problem with this simplification, because it leads to inaccurate generalisations. It causes us to prejudge people according to the categories we put them into based on our past experiences and the influence of others (e.g. **ageism**), including social and traditional media outlets. Figure 1 shows common stereotypes in Western cultures.

Stereotyping includes:

- categorising people into groups, often on the basis of appearance; for example, gender, ethnicity, race, physical ability or disability and age, but this categorisation can also be based on culture, sexuality, social class, occupation, intelligence and so on
- the assumption that all members of the group are the same; for example, Homer Simpson is a stereotypical stupid, white, middle-aged American father; Crocodile Dundee is a stereotypical Aussie.

stereotype

a set of generalised and simplified beliefs about a group of people or a person based on their membership of a group

ageism

prejudice and discrimination on the basis of age (typically youth or elderly)



FIGURE 1 *Crocodile Dundee* influenced the Australian stereotype, but how much does this reflect the majority of Australians? The hippie movement was associated with stereotypes such as loving peace, taking drugs, and being free-spirited and promiscuous – but were these accurate?

Function of stereotypes

One advantage of stereotypes is that they help us quickly organise information about people, especially when meeting someone for the first time. Unfortunately, stereotypes tend to be incorrect or over-generalisations about group members.

Advantages of stereotypes:

- simplify social interactions by helping us to make quick judgments in new situations
- aid memory by helping us to categorise and remember information about people
- make the world more predictable and easier to understand
- help individuals fit in with their social group, supporting their sense of belonging.

Disadvantages of stereotypes:

- may promote prejudice, leading to unfair and harmful generalisations about people and individuals
- reduce individuality by overlooking personal differences and unique traits
- often inaccurate, as they are based on incorrect or oversimplified information
- may cause distress and self-doubt in those stereotyped, resulting in negative impact on self-esteem
- may encourage division and conflict between groups by creating an “us” vs “them” mentality.

Stereotypes can be both positive and negative. Positive stereotypes are generalisations that attribute favourable characteristics to a group (e.g. Asians are good at maths), whereas negative stereotypes attribute unfavourable characteristics to a group (e.g. women are bad drivers). Negative stereotypes play a large role in prejudice. Research suggests that prejudicial stereotypes are very accessible and tend to operate automatically without conscious thought.

Some common negative stereotypes associated with population groups in Western cultures include:

- women: emotional, submissive, irrational, physically weak
- men: unemotional, dominant
- young adults and teenagers: risk-takers, impulsive, promiscuous, binge-drinkers, irresponsible
- elderly people: feeble, forgetful, slow, intolerant, deaf.

Stereotypes may be difficult to change, and they persist for several reasons. They are highly subjective – believing a stereotype means the person is likely to see only what they expect to see in other people. This can cause societal issues, especially regarding minority groups.

Biases may help perpetuate stereotypes where positive aspects of group members are explained for reasons other than the good qualities of the minority group. For example, when a female employee succeeds in a male-dominated industry, someone sexist might attribute her performance to support she has received from her male colleagues, rather than to her own aptitude.

Unfortunately, most people – regardless of education, socioeconomic background or religion – hold some form of prejudice. There are certain groups that have been victims of prejudice because they have lacked power in society or because of certain characteristics. Lesson 16.4 describes how prejudice can form.

Stereotypes and the tri-component model of attitudes

The tri-component model of attitudes can be applied to stereotypes. When people hold stereotypes about other groups of people, there is usually consistency between how they think (cognitions), feel (affect) and act (behaviours) towards people in these groups. For example, Irish people are often thought to be funny, friendly, easygoing people, who love a good chat. This stereotype “fits” in the cognitive component of the model. If we met an Irish person, we would likely behave in a friendly manner towards them and be motivated to engage in conversation.

When the stereotype is negative, however, the tri-component model can explain how affect, behaviour and cognition (the ABC of attitudes) can be linked to lead to prejudice and discriminatory behaviour, examples of which are summarised in Table 1. For example, perhaps a young leader in a senior management position sees older employees as inferior. They view older people as not being “up with the latest technologies” (negative cognition; stereotype), they generally dislike older staff members (negative affect; prejudice) and choose not to promote them as often as younger people (negative behaviour; discrimination). This is called ageism and can be identified as either a prejudice or a form of discrimination. The concepts of prejudice and discrimination are contrasted further in Lesson 16.3.

TABLE 1 The tri-component model of attitudes applied to stereotypes

| Component of attitude | How it applies to stereotypes | Example |
|-----------------------|--|--|
| Cognitive | Assumptions (usually thoughts or ideas) are made about a group of people or person. | Older people in the workplace are not as good as younger people as they have bad memories. This is a stereotype. |
| Affective | Feelings are either friendly or hostile towards a group of people based on the assumption. | Older people are judged as not being as good at their jobs and less liked compared to younger people. This is a form of prejudice. |
| Behavioural | Behaviour towards a group of people is influenced by the assumption. | Older people are not promoted in the workplace. This is a form of discrimination. |

Nevertheless, our thoughts, feelings and behaviours are not always consistently played out this way. For example, LaPiere’s (1934) study showed how negative thoughts or beliefs held by restaurant owners about Chinese people did not prevent them from serving Chinese guests in their restaurants (Lesson 16.3).



FIGURE 2 A young employee might think that the older employee isn't proficient with new technology (cognitive) and that they shouldn't be working in the same role (affective). This might make them act rudely towards the older employee (behaviour).

Check your learning 16.1



Check your learning 16.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** stereotypes and provide an example. (2 marks)
- 2 **Describe** an advantage and disadvantage of a stereotype. (2 marks)

Analytical processes

- 3 **Determine** if the following stereotypes are positive or negative.
 - a Old people are bad drivers. (1 mark)
 - b Americans are loud and arrogant. (1 mark)
 - c Women are nurturing. (1 mark)

Knowledge utilisation

- 4 **Investigate** a common stereotype (e.g. stereotypical Australian, student). Using the tri-component model of attitudes, **evaluate** the stereotype you have chosen. (3 marks)
- 5 **Evaluate** this statement: "Attitudes can be based entirely on affect and cognition; behaviour is not important." (4 marks)

Practical

Lesson 16.2

Practical: The effect of stereotype priming on behaviour

oxforddigital

This practical lesson is available on Oxford Digital. It is also provided as part of a printable resource that can be used in class.

Lesson 16.3

Prejudice and discrimination

Key ideas

- Prejudice is an unfavourable or negative attitude towards a group of people, based on insufficient or incorrect information.
- Discrimination is prejudice expressed through behaviour, often directed at individuals from a particular group.
- Common effects of prejudice and discrimination include low self-esteem, disadvantage or failure, self-fulfilling prophecies and violence.
- Prejudice can exist without discrimination.



Learning intentions and success criteria

prejudice

an unfavourable or negative attitude towards members of a group, based solely on their membership of that group

discrimination

prejudice expressed through positive or negative behaviour directed towards a social group and its members

Prejudice (literally pre-judgment) is an unfavourable or negative attitude towards a group of people, based on insufficient or incorrect information about the group to whom it is directed – it often arises from stereotyping. Note that prejudice is directed towards an identifiable group or identifiable member of a group, not towards an isolated individual. Prejudice is a form of antisocial behaviour, and it is a cause for concern in all communities. It is present in most cultures and has been evident throughout history. While it can cause stress and tension between social groups, it also does not contain the behavioural component of the tri-component model of attitudes. **Discrimination** is the action/behaviour that expresses the attitude of prejudice, and it is often an individual who is the victim.

A negative attitude towards a group is not necessarily prejudice. For example, it is common for members of a society to have a negative attitude towards a group of people who have been found guilty in a court of law for committing criminal activity, such as murder.

To be able to moderate and prevent the effects of prejudice, it is important to understand why people are prejudiced, and how prejudice may be formed. The formation of prejudice is described in Lesson 16.4.

The interrelationship between attitudes, prejudice and discrimination

Lesson 16.1 covered the tri-component model of attitudes. It is important to remember that an attitude may not have all components. Prejudice is an example of an attitude that does not contain a behavioural component. For example, prejudice against elderly people (ageism) includes negative beliefs about elderly people (cognitive component) and a strong feeling of dislike towards the elderly (affective component). However, only the action of discriminating against the elderly (behavioural component) is known as discrimination. Read the material in Lesson 16.1 on negative stereotypes associated with population groups.



FIGURE 1 A bilingual sign from the apartheid era of South Africa designates a beach “for whites only”.

Study tip

Prejudice can result in acts of discrimination. Prejudice is a feeling/thought, whereas discrimination is an action. Try to familiarise yourself with “real” examples of prejudice and discrimination to make remembering the concepts easier.

Examples of prejudice and discrimination

The most obvious examples of prejudice and discrimination are based on race (Figure 1), gender, ethnicity, age, sexual preference, physical or intellectual disability, or mental illness. Remember, when prejudice results in action (our behaviour), it is called discrimination. This is why ageism can be used as an example of both prejudice and discrimination (as well as a stereotype).

Some examples of prejudice include:

- only men can lift heavy objects (sexism)
- old people can't learn new skills (ageism)
- people with a mental illness are unreliable (ableism).

In most Western nations, much has been done to try to reduce these prejudices through education and legislation. There is still much work to do because prejudice can be difficult to prevent and difficult to eradicate once it has been established.

Although laws in Australia prevent discrimination, some prejudice can be difficult to detect. It is also subtly embedded in our everyday language, culture and social dialogue. Table 1 presents some types of discrimination.

TABLE 1 Examples of discrimination

| Discrimination | Description | Example |
|------------------------|---|---|
| Reluctance to help | Reluctance to help other groups improve their position in society by passively or actively declining to assist their efforts | Providing inadequate facilities for physically disabled employees in a workplace |
| Tokenism | Publicly giving trivial assistance to a minority group in order to avoid accusations of prejudice and discrimination | Employing one woman in a predominantly male organisation |
| Reverse discrimination | Publicly being prejudiced in favour of a minority group in order to deflect social accusation of prejudice and discrimination | Deliberately favouring a minority group by making it company policy to employ a percentage of minority group members – but this sometimes turns out to be discriminatory because the members of the minority group are singled out and treated differently once employed by the company |

Victims of prejudice and discrimination may suffer a range of effects that include physical, psychological and social disadvantage, low self-esteem, limited ambition, and physical and verbal abuse. Some examples of the effects of discrimination are outlined here.

- Low self-esteem: crude acts of discrimination on a regular basis can damage self-esteem (e.g. insults, denial of equality, violence).
- Disadvantage/failure: Being denied access to resources in society that are necessary for success is more likely to lead to failure (e.g. education, health, housing, employment).
- Self-fulfilling prophecies: Expectations and assumptions about group members will influence interaction with members of that group and eventually change their behaviour so that it is in keeping with the original expectations and assumptions.
- Violence and genocide: Overt acts of discrimination can include physical harm (e.g. apartheid in South Africa, segregation in the United States and, in some cases, deliberate acts of extermination such as the Holocaust in the Second World War).

Table 2 contrasts prejudice and discrimination.

TABLE 2 Prejudice versus discrimination

| Aspect | Prejudice | Discrimination |
|--------------------|---|--|
| Definition | An unfavourable or negative attitude towards members of a group, based solely on their membership of that group | Prejudice expressed through positive or negative behaviour directed towards a social group and its members |
| Nature | Internal attitude or belief | External behaviour or action |
| Components | Cognitive (beliefs) and affective (emotions) | Behavioural (actions) |
| Examples | Believing that a certain race is less intelligent | Refusing to hire someone because of their race |
| Legal implications | Generally, not subject to legal action | Can be subject to legal action if it violates anti-discrimination laws |
| Impact | Influences thoughts and feelings towards others | Directly affects the opportunities and treatment of individuals or groups |
| Basis | Based on stereotypes and generalisations | Based on prejudiced attitudes leading to unequal treatment |

Challenge

Prejudice but not discrimination

During the 1930s in the United States, racism towards ethnic minorities was common. Richard LaPiere (1934) travelled throughout the nation with two Chinese friends. The trio dined at 184 restaurants and were not refused service at any. Six months later, LaPiere surveyed the same restaurants, asking whether they would serve Chinese patrons. The results of this survey found that approximately 50 per cent of the restaurateurs returned the survey and, of these, 90 per cent said they would not serve Chinese patrons. LaPiere had found that people who

expressed prejudice had not actually behaved in a discriminatory way.

One fault with LaPiere's study is that the people who served the Chinese customers might not have been the same people who completed the survey later. Yet, since LaPiere's study, there have been numerous studies that have found that people express attitudes that contradict their behaviour.

Research a more recent study that has similar findings to LaPiere's. **Analyse** the evidence and **identify** limitations in your selected study.

Challenge**What's your experience?**

Without knowing it, or doing it intentionally, your parents, teachers, family, friends and possibly your sports team or employer may be behaving in a certain way towards you because of your age or gender.

Consider your daily experiences. If you have personally felt ageism directed towards you, write

a brief paragraph about the event, how it made you feel, and why you think you were treated this way. If you don't think you have experienced ageism, **discuss** common stereotypes and prejudices related to your age or sex and consider how these could be prevented.

Real-world psychology**Women's education**

Women have been denied an education throughout history, and in parts of the world this still occurs. From a young age, Malala Yousafzai advocated for girls' education while growing up in Pakistan. After the Taliban started to attack girls' schools, Malala presented a speech titled "How dare the Taliban take away my basic right to education?". At the age of 15 in 2012, Malala was on a bus travelling home from school, when the Taliban attempted to assassinate her for her advocacy. After surviving the assassination attempt, Malala has continued to advocate for women's education around the world. One of her goals is to reduce sexism (prejudice and discrimination on the basis of an individual's sex) to help women gain access to education. She has since graduated from Oxford University in 2020, and also received the Nobel Peace Prize in 2014 for her work in women's rights.

Malala's advocacy demonstrates the lack of equality in the treatment of women around the world. Much of this comes from prejudice about the role of women in society and culture. Many cultures hold onto gender roles that have existed for centuries that are not applicable in today's society. Thanks to people such as Malala, many countries are acknowledging a need for girls' education.

Apply your understanding

- 1 **Describe** the gender role that Malala was trying to change in Pakistan. (1 mark)
- 2 **Identify** the ABC components of the attitude to women that was faced by Malala in Pakistan. (3 marks)
- 3 **Explain** the concept of sexism as prejudice and discrimination using Malala's story. (2 marks)



FIGURE 2 Malala Yousafzai advocates for women's right to an education.

Check your learning 16.3

Check your learning 16.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Describe** prejudice and provide two examples. (3 marks)
- 2 **Describe** discrimination and provide an example. (2 marks)

Analytical processes

- 3 **Contrast** prejudice and discrimination. (1 mark)

◀ Knowledge utilisation

- 4 Sarah, a manager at a tech company, has two candidates for a promotion: John and Maria. Both have similar qualifications and performance records. However, Sarah decides to promote John because she believes men are generally better suited for leadership roles. **Determine** if Sarah's decision is based on prejudice or discrimination. Give a reason for your decision. (2 marks)
- 5 An employee overhears their boss making derogatory comments about older workers, saying they are slow and resistant to change. **Determine** if this is an example of prejudice or discrimination. Give a reason for your decision. (2 marks)

Lesson 16.4

Forming prejudice

Key ideas

- Scapegoating refers to the idea that people will express prejudice by blaming others for socially frustrating conditions. Scapegoating often leads to aggressive verbal and physical acts against minority groups.
- Direct experience with people, objects or ideas can contribute to the formation and maintenance of prejudice.
- Prejudice can be formed and maintained on a personal level or on a group level. Personal prejudice results from an individual's direct experiences or through social learning, whereas group prejudice develops when members of an in-group hold negative attitudes towards members of an out-group.
- Personality characteristics can explain why some people are more prone to holding prejudiced ideas.



Learning intentions and success criteria

Scapegoating

scapegoating

blaming a person or group for a negative action, event or result

Scapegoating is sometimes referred to as the “frustration-aggression theory” (Dollard et al., 1939). The theory contends that any aggressive behaviour is the release of frustration. It suggests that when people feel frustrated, they engage in behaviours to relieve the frustration, and that any form of aggressive behaviour is always preceded by frustration (Berkowitz, 1989; Burton et al., 2018). People often use scapegoating to explain failures, misfortunes or poor behaviour, blaming it on another person or another group, as shown in Figure 1. Scapegoating can involve socially frustrating conditions, such as economic depression and unemployment. An example of this was the increase in lynching against Black Americans that occurred



FIGURE 1 You might have blamed your brother or sister for something that you were getting in trouble for – this is a form of scapegoating.

in the United States during the Great Depression. As economic hardship increased in the 1930s, racial tensions intensified. Many White Americans, struggling with unemployment and poverty, projected their frustrations onto Black communities. Stereotypes portraying Black men as criminal or dangerous were used to justify racial violence, including lynching. This demonstrates how frustration can result in blame being directed towards a “scapegoat” – usually a minority out-group – leading people to discriminate against and perpetrate verbal and physical abuse towards that group.

Direct experience

Direct encounters with a person, object or idea can influence the formation of an attitude (Fishbein & Ajzen, 1975). Direct experiences that are negative or unpleasant can result in strong attitudes. For example, if a person has a wound and the doctor stitching it causes a lot of pain, this may result in a negative attitude to all doctors in future. Observing the behaviour and attitudes of influential figures, such as parents and peers, can contribute to the development of prejudice if internalised by the observer.



FIGURE 2 A person who experiences a lot of pain from a doctor treating their wound may develop a negative attitude to all doctors.

Personal and group prejudice

Personal prejudice can be held by individuals towards other people or groups. It results from an individual’s direct experiences, or through early childhood interactions with parents, friends and social groups (social learning). Group prejudice involves the collective negative attitudes held by a group towards other people or groups. Group prejudice is often reinforced by social norms, cultural beliefs and institutional practices. These two forms of prejudice often influence and strengthen each other. For instance, an individual’s negative attitudes can shape the group’s overall prejudiced culture, and the group’s prejudiced norms can, in turn, reinforce the individual’s attitudes.

According to American psychologist Herbert Blumer (1958), there are four basic characteristics that can be observed in prejudiced groups:

- 1 They tend to believe that they are superior to the minority group to whom the prejudice is directed.
- 2 The majority group sees the minority group as different and believes that they “do not belong”.
- 3 The majority group sees themselves as more powerful and important than the minority group.
- 4 A majority group displaying prejudiced attitudes tends to be insecure and fearful of the minority group becoming more important and powerful than they are themselves.

The prejudiced personality

Some social psychologists suggest people with certain personality types and characteristics are likely to hold prejudiced attitudes. Gordon Allport argued that prejudice involves a general cognitive style (way of thinking), and that prejudice is more about how a person thinks rather than an evaluation of a specific group of people (Roets & Van Hiel, 2011).

Study tip

Try to familiarise yourself with “real” examples of predictors of prejudice – this will make remembering the concept easier. You could add them to Table 1.

Other researchers use “authoritarian personality” to explain why some people are attracted to racist-type thinking (Burton et al., 2018; Roets & Van Hiel, 2011). It was first used by researchers who had escaped from the Nazis during the Second World War and describes how people have tendencies to project hate and blame on people from different social groups. People described as having an authoritarian personality tend to hold very conventional beliefs, have high regard for obedience and authority, and are very resistant to change. Other key traits often associated with a prejudiced personality are rigid thinking, stereotyping, ingroup favouritism and resistance to change.

There are some criticisms of this approach; for example, it doesn’t explain why people can hold prejudices against some groups but not others (McLeod, 2017).

TABLE 1 Key predictors of prejudice

| Predictor | Definition | Influence on prejudice |
|------------------------------|---|---|
| Scapegoating | An individual or group is blamed for a particular action, even though it could be the fault of others. It is a result of frustrating conditions, where people feel they need to release their frustrations by blaming others. | Scapegoating increases the chances of prejudice towards the blamed party, as they are ascribed negative traits. They are usually a minority group. |
| Direct experience | This is experiencing firsthand negative actions or behaviours from a particular group of people. | These experiences will increase the chances of an individual forming a negative attitude towards the person, and the group that person belongs to. |
| Personal and group prejudice | A person’s social identity and their social group characteristics affect who they think of negatively. | Personal and group prejudices can influence the way we feel about others. We tend to take our social identity from our groups, and if they have a negative attitude towards a group, we are also likely to hold that prejudice. |
| Prejudiced personality | Personality characteristics such as an authoritarian personality can influence how likely someone is to hold negative attitudes towards certain groups of people. | Having personality types that are more likely to generalise and ascribe negative traits to a group of people will increase the chances of prejudice forming. |

Challenge**Inclusive interventions**

Discuss how the traits associated with a prejudiced personality influence an individual’s interactions in

diverse social settings. **Propose** what interventions can be implemented to promote inclusive behaviours.

Check your learning 16.4

Check your learning 16.4: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** scapegoating. (1 mark)
- 2 Explain** what is meant by a prejudiced personality. (2 marks)

Analytical processes

- 3 Compare** personal prejudices and group prejudices, providing an example of each. (4 marks)

Knowledge utilisation

- 4 Investigate** how authoritarian personality was used to explain the atrocities the Nazis committed against Jewish people in the Second World War. **Comment** on the roles of prejudice and discrimination that were present during the Second World War. (4 marks)

Lesson 16.5

Review: Stereotypes, prejudice and discrimination

Summary

- 16.1 • Stereotypes are generalised and simplified beliefs about a group of people or person based on their membership of a group.
- Stereotypes can be advantageous when they help individuals recognise and challenge biased thinking, but can also be disadvantageous when they are inaccurate and play a role in prejudice.
- Stereotyping involves categorising people into groups based on common characteristics such as age, sex, ethnicity and occupation.
- Stereotypes are generally resistant to change and persist over time.
- 16.2 • Practical: The effect of stereotype priming on behaviour
- 16.3 • Prejudice is an unfavourable or negative attitude towards a group of people, based on insufficient or incorrect information.
- Discrimination is prejudice expressed through behaviour, often directed at individuals from a particular group.
- Common effects of prejudice and discrimination include low self-esteem, disadvantage or failure, self-fulfilling prophecies and violence.
- Prejudice can exist without discrimination.
- 16.4 • Scapegoating refers to the idea that people will express prejudice by blaming others for socially frustrating conditions. Scapegoating often leads to aggressive verbal and physical acts against minority groups.
- Direct experience with people, objects or ideas can contribute to the formation and maintenance of prejudice.
- Prejudice can be formed and maintained on a personal level or on a group level. Personal prejudice results from an individual's direct experiences or through social learning, whereas group prejudice develops when members of an in-group hold negative attitudes towards members of an out-group.
- Personality characteristics can explain why some people are more prone to holding prejudiced ideas.

Review questions 16.5A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 What is a stereotype?
 - A Favourable attitudes held towards a group of people
 - B A flexible set of ideas and attitudes towards a group of people
 - C A generalised and simplified set of beliefs about a group of people
 - D An idea to help us understand the characteristics of a group of people
- 2 Which of the following statements best describes discrimination?
 - A The affective component of stereotypical attitudes
 - B Negative actions directed towards people in another group
 - C Negative attitudes directed towards those in minority groups
 - D Stereotyping people as part of a group rather than as an individual

- 3 Jacinta applies for a job promotion after being with a firm for 2 years. She is told that her application is rejected as she needs to have worked for the company for at least 3 years to be considered. Jacinta knows male staff members whose applications have been accepted after only being employed for a year. What is this an example of?
- A Prejudice B Stereotyping
C Discrimination D Unfair treatment
- 4 Which one of the following correctly identifies the three components of the tri-component model of attitudes?
- A Cognitive, behavioural and active components
B Social, cognitive and behavioural components
C Affective, cognitive and behavioural components
D Behavioural, affective and emotional components
- 5 “Only women are good at multi-tasking.” What is this statement an example of?
- A Bias B Prejudice
C Tokenism D Discrimination
- 6 People tend to blame other people or groups for their hardships. What is this an example of?
- A Blaming B Discrimination
C Scapegoating D Personal prejudice
- 7 Maisie believes that all dentists are cruel because of the many painful visits she had with her childhood dentist. This is an example of _____ prejudice. Maisie believes that brown-eyed people are smarter than blue-eyed people. Maisie has brown eyes. This is an example of _____ prejudice.
- A personal; group B group; personal
C individual; group D systematic; group
- 8 Andrei is opposed to poker machines in sporting clubs and gets agitated when reading about poker-machine addiction. Andrei will sometimes play a poker machine when out with friends at their local sporting club. How does this fit with the tri-component model of attitudes?
- A Andrei’s behaviour is inconsistent with cognition and affect.
B There is inconsistency between beliefs and actual behaviour.
C There is consistency between thoughts, feelings and behaviour.
D There is consistency between thoughts and behaviours, but not feelings.
- 9 Which example best illustrates how direct experience can lead to the development of prejudice?
- A A person hears negative stereotypes about a group on social media.
B A child learns biased attitudes from observing their parents and older siblings.
C A person avoids interacting with people from different cultures due to fear of the unknown.
D A student has a negative encounter with a classmate from a different background and begins to generalise that experience to others from the same group.
- 10 Which of the following statements is an example of a stereotype?
- A All engineers are good at maths.
B Some people enjoy reading books.
C A few musicians play multiple instruments.
D Many athletes train hard to improve their skills.

Review questions 16.5B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 11 **Describe** stereotypes and provide an example. (2 marks)
- 12 **Describe** some of the effects of prejudice and discrimination, using examples to support your answer. (3 marks)
- 13 **Describe** two influences that contribute to prejudice formation. (2 marks)
- 14 **Describe** a form of discrimination. Use an example from Australian culture to show how

this form of discrimination can be embedded in everyday society. (2 marks)

Analytical processes

- 15 **Consider** the function of stereotypes. (2 marks)
- 16 Chanin doesn’t like peanuts. He doesn’t like the taste and thinks that they are a useless nut. Chanin discourages everyone at work from eating peanuts. **Determine** if Chanin has a prejudiced attitude towards peanuts, or if he just doesn’t like them. Provide reasoning. (2 marks)

17 **Differentiate** between prejudice and discrimination. Give an example of each. (3 marks)

Knowledge utilisation

18 **Propose** a research question for the following claim: “Ageism has greater effects on those older than 65 than it does for teenagers.” (1 mark)

19 **Discuss** the role of ageism in society, and determine if you think it has any benefits. You might want to consider survival and the role of nature versus nurture. (3 marks)

20 **Investigate** one of the following historical cases of prejudice and discrimination and **evaluate** the influence of stereotypes, prejudice and discrimination in these movements. Make sure to **evaluate** how attitudes were involved.

- The US Civil Rights movement (5 marks)
- Nazi Germany (5 marks)
- South African apartheid (5 marks)

21 Biological perspectives in psychology suggest that human behaviours and attitudes are a result of survival needs. **Propose** a reason for prejudice and discrimination from a biological perspective. In your response, **identify** two potential benefits for prejudice and discrimination. (3 marks)

Data drill

Priming stereotypes on behaviour

Bargh, Chen and Burrows (1996) investigated the effects of priming stereotypes on behaviour. Their investigation consisted of three experiments testing the hypothesis that “social behaviour is often triggered automatically on the mere presence of relevant situational features; this behaviour is unmediated by conscious perceptual or judgmental processes” (p. 231). Experiment 2a involved 30 New York University undergraduate students randomly allocated into either an elderly primed stereotype condition or a neutral primed condition. The experiment was replicated with another 30 students, hence experiments 2a and 2b. The students’ walking time after completing a scramble sentence task, which contained either the elderly priming or not, was recorded. This data is displayed in Figure 1 and Table 1.

Apply understanding

- Identify** the priming condition (elderly or neutral) that had the slowest walking time. (1 mark)
- Determine** the mean walking time for the elderly primed condition in experiment 2a. (1 mark)

Analyse evidence

- Contrast** the mean walking times of the elderly primed condition in experiment 2a and 2b. (1 mark)

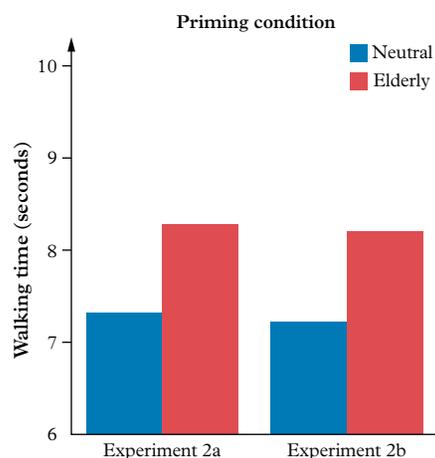


FIGURE 1 The walking time of elderly and neutral priming conditions from Bargh, Chen and Burrows (1996) Experiment 2

TABLE 1 The *t*-test results from experiment 2a and 2b

| | |
|---------------|------------|
| Experiment 2a | $p < 0.01$ |
| Experiment 2b | $p < 0.05$ |

- Compare** the *p*-values of experiment 2a and 2b. (2 marks)

Interpret evidence

- Draw a conclusion**, with reference to the data in Figure 1 and Table 1. (2 marks)
- Infer** which experiment (2a or 2b) had the greatest chance of a type I error. (1 mark)



Module 16 checklist: Stereotypes, prejudice and discrimination

Topic 3 review

Multiple choice

(1 mark each)

- 1 Which is the best definition of an implicit attitude?
 - A Where you justify your behaviour with thoughts
 - B An attitude that individuals are open about, which matches their behaviour
 - C When an attitude is more likely to be incongruent with highly specific behaviour
 - D An attitude that is involuntary and an individual may be unaware that it can influence behaviour
- 2 It is argued that addicted cigarette smokers who are unwilling or unable to change their smoking habits end up developing a set of attitudes to justify their behaviour. How does cognitive dissonance theory explain this?
 - A Smokers convince themselves that smoking is bad for them but they smoke because it looks good.
 - B Smokers will always argue they were forced into smoking and, as such, do not feel the need to justify their reasons.
 - C The health risk involved with smoking has nothing to do with smokers shifting their attitudes to match their behaviour.
 - D The greater the health risk that smokers face, the more likely they are to defend their behaviour by claiming how much they like smoking and how it is good for them psychologically.
- 3 Assigning all favourable traits to the groups we belong to is identified as
 - A self-categorisation.
 - B social comparison.
 - C in-group bias.
 - D personal relevance.
- 4 Which of the following are predictors of prejudice?
 - A Individual prejudice, bias and direct contact
 - B Personal prejudice, direct experience and prejudiced personality
 - C Individual prejudice, group prejudice and direct contact
 - D Direct experience, group contact and prejudiced personality
- 5 Which of the following is a dispositional attribute?
 - A Luck
 - B Situation
 - C Motivation
 - D The attitude of another
- 6 Which is an example of the affective component of the tri-component model of attitudes?
 - A Picketing at a rally
 - B Thinking that animal testing is wrong
 - C Running every day for health reasons
 - D Liking Greenpeace for the work they do
- 7 Which definition best describes the cognitive aspect of the tri-component model of attitudes?
 - A How a person creates a stereotype
 - B How a person thinks about the attitude or object
 - C How an individual feels about an attitude or an object
 - D How a person behaves towards the attitude or object
- 8 Which is the best definition of prejudice?
 - A A negative attitude towards a group of people
 - B An oversimplified attitude towards a group of people
 - C Feeling uncomfortable around people or groups you do not know
 - D Acting against a group of people based on your stereotype of them

- 9 Which is the best definition of ageism?
- A Prejudice and discrimination based on age
 - B Prejudice and discrimination based on sex
 - C Prejudice and discrimination based on race
 - D Prejudice and discrimination based on culture
- 10 Carson feels strongly against people who are racist, but he laughed at a racist joke his boss told at lunch. Which parts of the tri-component model of attitudes are contradicting?
- A Affective and cognitive
 - B Cognitive and attitudinal
 - C Affective and behavioural
 - D Cognitive and behavioural
- 11 Stephen is 55 years old and has just been made redundant from his job as an electrician at Elektrin, which he has had for 35 years. Although he has applied for many jobs since, he continues to be rejected. Stephen believes this is because of his age. If this is correct, the employers advertising for positions are showing
- A ageism.
 - B sexism.
 - C prejudice.
 - D an attitude.
- 12 Prejudice is only directed towards
- A groups.
 - B women.
 - C children.
 - D individuals.
- 13 When people are stereotyped into groups
- A they are not seen as being similar.
 - B individual differences are overlooked.
 - C they are always seen in a positive light.
 - D some of the members are viewed negatively.
- 14 Which of the following is not a component of prejudice according to the tri-component model of attitudes?
- A Affective
 - B Cognitive
 - C Receptive
 - D Behavioural
- 15 A study completed by Minard (1952) found that 80 per cent of white miners were friendly towards black miners when working below ground, but this decreased to 20 per cent when they were above ground. Which type of behaviour did the miners display above ground?
- A Prejudice
 - B Stereotyping
 - C Discrimination
 - D Cognitive dissonance

Short response

- 16 The theory of cognitive dissonance can be used to help explain behavioural change.
- a **Describe** an example of cognitive dissonance. (1 mark)
 - b **Describe** how you would reduce this cognitive dissonance. (1 mark)
- 17 **Describe** prejudice in terms of ageism. (2 marks)
- 18 **Describe** the fundamental attribution error and provide an example. (2 marks)
- 19 **Describe** attributions and how they influence behaviour. Give an example of both types of attributions in your description. (3 marks)
- 20 **Differentiate** between prejudice and discrimination. (1 mark)
- 21 **Explain** social identity theory and **determine** what individuals are looking for when they join groups. (3 marks)
- 22 Shahil believes that dogs are superior to cats. When presented with information that cats may be more friendly and social, Shahil ignores this and focuses on the playful nature of dogs.
- a **Determine** which bias may be used by Shahil in the scenario. (1 mark)
 - b **Describe** the bias. (1 mark)
- 23 **Describe** the tri-component model of attitudes using an example that relates to your everyday life. (2 marks)
- 24 **Contrast** implicit and explicit attitudes. Give an example of each. (3 marks)

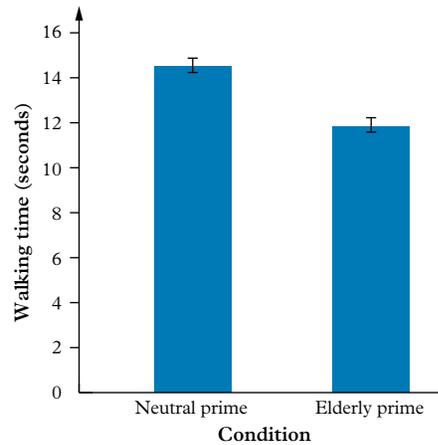
25 Jason enjoys eating healthy food because it helps him to perform as an elite athlete. **Identify** each component of the tri-component model of attitudes in the example of Jason's attitude towards food. (3 marks)

26 Charlie was raised in rural Queensland and believes that everyone from Melbourne is snobbish and uncaring. Charlie has never been to Melbourne, but recently met someone from Melbourne and was reluctant to speak to the person. When he did have to speak with them, he said horrible things and refused to let them sit down.

a **Differentiate** between prejudice and discrimination with reference to Charlie's behaviour and provide examples. (2 marks)

b **Describe** two reasons for how Charlie's prejudice may have formed. (2 marks)

27 The results of a modification of experiment 2 from Bargh, Chen and Burrows' (1996) study examining the effect of stereotype priming on behaviour are presented in the graph. In this experiment, participants were primed with either an elderly stereotype or none and their walking time over 10 metres was measured. The figure shows mean walking time (\pm SE) of elderly primed and neutral primed conditions.



a **Describe** the elderly stereotype used in the experiment. (1 mark)

b **Identify** the condition with the slowest walking time. (1 mark)

c **Predict** if there is a significant difference between the two conditions. Provide a reason for your answer. (2 marks)

d **Draw a conclusion** about the effect of stereotype priming on behaviour, using evidence from the figure. (2 marks)

TOTAL MARKS

/48 marks

MODULE

17

Community and culture

Introduction

There are many factors that influence the unitedness of a particular group of people. These factors determine the sense of community that individuals can experience within a group, including how accepted they feel within a culture. In this module, we will delve into how the elements of membership, influence, integration and fulfilment of needs, and shared emotional connection contribute to a sense of community. You'll learn how these factors create bonds among individuals, fostering a supportive and cohesive environment.

“Culture” is a difficult term to define as it can incorporate a variety of elements within a geographical, religious and social environment. Key aspects that help define a culture include its values, ideals, customs and rituals. It can be difficult to become part of another culture if values and ideals are so different that they are in opposition to each other. Additionally, you'll explore the concept of culture from a psychological perspective, examining how behaviours, beliefs and values shape individual and collective identities. We'll discuss the differences between individualist and collectivist cultures, highlighting how these cultural orientations influence people's interactions and worldviews.

This module will open your eyes to the dynamic ways in which societies can embrace diversity and foster inclusivity. Multiculturalism and pluralism describe ways in which individuals from one culture can integrate into a community of a different culture. We will distinguish between multiculturalism and pluralism and shed light into understanding how the presence or absence of a dominant culture affects societal dynamics. Diverse cultures can coexist and interact, enriching our understanding of the world and each other. By the end of this module, you'll have a comprehensive understanding of how communities and cultures shape human experiences and interactions.

Prior knowledge



Prior knowledge quiz

Check your understanding of concepts related to community and culture before you start.

Subject matter

Science understanding

- Explain how membership, influence, integration and fulfilment of needs, and shared emotional connection lead to a sense of community.
- Describe the concept of culture in the psychological context, with reference to behaviours, beliefs and values, and to individualist and collectivist cultures.
- Discriminate between multiculturalism and pluralism, on the basis of the absence or presence of a dominant culture.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- identify, research and construct questions for investigation
- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - parametric inferential statistics, e.g.
 - two-sample t -test (unpaired and paired)
 - p -value from Pearson r
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - draw conclusions, using p -values to infer significance, allowing for the possibility of type I and II errors
- suggest improvements and extensions to minimise uncertainty, address limitations and improve the overall quality of evidence.

Science as a human endeavour

- Appreciate that most psychological research has been performed in a specific cultural context (i.e. Western, educated, industrialised, rich and democratic societies) and may not be fully applicable in other contexts.
- Recognise the importance of international collaboration when investigating cross-cultural phenomena.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 17.1

Sense of community

Key ideas

- Sense of community can be determined by aspects such as membership, influence, shared emotional connection, and integration and fulfilment of needs.
- These elements can increase the sense of ownership and compliance within a group and can dictate the longevity of a group.



Learning intentions
and success criteria

Community

A definition for **community** describes not only the geographical locations in which people live but must also include an explanation of the relationships that exist within that particular group of people (McMillan & Chavis, 1986).

McMillan and Chavis investigated this idea of community, and their research suggests four factors that add up to make a community: membership, influence, shared emotional connection, and integration and fulfilment of needs.

community
a group of people
with common
characteristics

Membership

Membership can be defined as feeling a sense of belonging to a group or a society. Membership usually also requires an individual to invest a part of themselves in the group so that they feel a right to belong to that group. An individual gives something to the group and the group gives back (McMillan & Chavis, 1986).

A vital part of determining group membership is perceived benefits in joining the group. For example, membership in groups usually comes with some set boundaries, meaning that there are people who can be part of the group and people who cannot be part of the group. This gives the members of the group a feeling of security that only those who have similar characteristics or investment in the group can benefit, and those who do not are thought of as outsiders. The role of boundaries in forming a group is especially relevant when we consider a neighbourhood, as there is also a physical boundary.

For example, consider the Amish communities in the United States. Due to their religious beliefs, the Amish choose to live in communities where there is no electricity, and where farming and selling goods from their labours are their sole means of survival.

membership
inclusion in a group or
society of people and a
sense of belonging



FIGURE 1 A community is formed by common characteristics or interests.



FIGURE 2 Being part of a team or sports club can give you a feeling of belonging or membership as well as benefits such as exercise, friends and having a team.

This unique environment often isolates the Amish from more technologically developed communities, which creates a safe environment to live as they wish. This provides the Amish community with emotional safety, as outsiders who may shun the way that they think generally refrain from engaging with the Amish, which protects the group's values and traditions. By sharing a way of dressing, religion, language and rituals, the Amish share a sense of belonging, deriving their identity from those shared values of the group.

In addition, each member of the Amish community contributes to the system, whether that be churning butter, milking cows or tending to the fields, which increases the personal investment each member has within the group, and therefore strengthens the group as a whole. The Amish also use their own language system with a different set of symbols for communication, which increases their feeling of belonging and membership within the group.

Membership of a group includes five key attributes, which provide a sense of community among people:

- boundaries, which can lead to emotional safety
- a sense of belonging
- a sense of identity
- personal investment
- a common communication system.

FIGURE 3 The mutual shunning of technology in Amish communities has enabled their sense of membership as a group, and their shared values promote emotional safety so that they are free to live out their beliefs and behaviours.



Influence

The second factor that contributes to the creation of a sense of community is the idea of **influence**. Influence can be defined as individuals exerting an impact on the decisions made for the group as a whole. For example, the Maasai community in Kenya and Tanzania is known for its strong social structure and cohesive group dynamics. Influence within the Maasai community is primarily exerted through traditional leadership roles, such as elders and warriors. These leaders play a crucial role in guiding the community, making decisions and resolving conflicts. The influence of these leaders is respected and accepted because it aligns with the community's values and traditions.

However, there is a fine line between having an effective leader who can influence others and maintaining group cohesion so that the group can function well. For example, if the group has conflicting ideals, then it would be difficult for the group to present a united front and convince other members to join or to follow them in their pursuits. Therefore, it is important that there is some **conformity** (being influenced by others to perform the same action) in the group to enhance a sense of community within the group. For example, the Maasai practice

influence

convincing individuals to do something that you want them to do

conformity

adjusting our attitudes, beliefs and behaviours to align with group norms

of age-set systems groups individuals of similar ages together, creating a sense of unity and shared purpose. These age-sets are led by elders who influence the group's activities and decisions, ensuring that the community functions smoothly and cohesively (Mukherjee & Awasthi, 2022). This system promotes conformity and cohesion, as members of each age-set work together towards common goals, such as cattle herding and protecting the community.

Research has found that influence can be a factor that predicts community formation in the following ways:

- Individuals are most attracted to a community if they feel they can exert some sort of influence over the group, even if it is just to share an opinion or their ideas.
- There is a positive correlation between influence leading to conformity by group members and the level of cohesion within a group. Both conformity and influence affect the strength of social bonds within a community.
- The need for conformity is determined by the group as a whole and leads to increased cohesion. Thus, the pressure to present a united front works to enhance closeness within the group rather than reflect a struggle for power.
- The influence of one member of the group and the influence of the community as a whole are closely connected. The more individuals within a group who present as a united front, the more connected and influential the community is perceived to be.

These ideals suggest that influence from an individual is high when their own goals match the goals of the group. In turn, group cohesion amplifies the membership and the investment of the group towards a common goal. Group cohesion and shared goals of individual members increase the sense of community, as group members function as a whole rather than as separate parts.

Shared emotional connection

Shared emotional connection is defined as the individual members of a group feeling a sense of connectedness to the community's history or emotional past. Individuals need not have lived the history of the community to share the emotional connection. However, to strengthen a community, its members should have shared experiences that can then generate a shared understanding and emotional response to specific events and thereby increase investment in the group.

There are seven features that can be used to assess shared emotional connection:

- **Contact hypothesis:** This is similar to the mere exposure effect discussed in Module 14. The more people are physically exposed to each other, or close to each other, the higher the likelihood they will experience shared events and share emotional connectedness. For example, in the kibbutz communities of Israel, members live and work closely together, sharing daily activities and responsibilities. This constant physical proximity fosters strong social bonds and a sense of shared purpose, enhancing their emotional connection (The Jewish Agency for Israel, n.d.).
- **Quality of interactions:** Positive experiences will lead to stronger bonds between individuals. For example, in Japanese tea ceremonies, the meticulous and respectful interactions between participants create a serene and harmonious atmosphere. These positive experiences strengthen the bonds between individuals, fostering a deep sense of community and mutual respect (Moments Log, n.d.).
- **Closure to events:** If the experience between members is neither positive nor negative and the community's goal is not reached, it can hinder group cohesion. For example, in Rwandan communities, the Gacaca courts were established post-genocide to address crimes and promote reconciliation (Clark, 2010). The process of seeking justice and closure through these community-based courts has helped to rebuild trust and cohesion among community members.

- **Shared valent event hypothesis:** The more vital or important an event is, the more likely it will increase the bond between members. For example, the 2011 floods brought a lot of Queenslanders closer together as they shared an emotional loss and connection through the event itself and the rebuilding phase.
- **Investment:** This signifies emotional risk as individuals trust others in the group by sharing a part of themselves, or by contributing financial, physical or emotional investment towards its members. Increased investment can again allow members to feel a greater sense of community. For example, in Indian joint families, members often share financial resources, responsibilities, and emotional support (Tiwari et al., 2022). This high level of investment in each other's wellbeing fosters a strong sense of community and interconnectedness.
- **Effect of honour and humiliation on community members:** If individuals are humiliated in front of other community members, this will decrease the likelihood that they will join the group or feel close group cohesion. However, if reward or honour is shared with community members, group cohesion increases as does the sense of community within a group. For example, in Maasai communities in Kenya and Tanzania, public ceremonies such as the Eunoto (warrior graduation) honour young men transitioning to elder status (Al Jazeera, 2023). These ceremonies enhance group cohesion by publicly recognising and celebrating individual achievements.
- **Spiritual bond:** This bond can be experienced in a community through shared religious practices or beliefs. Shared spiritual beliefs increase the sense of group membership and belonging. For example, in Balinese Hindu communities, shared religious practices and rituals, such as temple ceremonies and offerings, create a strong spiritual bond among members (Bali Gram, n.d.). These shared spiritual experiences reinforce their sense of belonging and community.

These seven features, combined with the three other factors, can determine if a group will feel a sense of community or if a community will fail to form.

Real-world psychology

The People's Temple: "Jonestown"

Rev. Jim Jones, an ordinary and unexceptional man, rose to prominence as the leader of a cult by the name of the "People's Temple". This man, however, will now forever be notorious not for his religious doctrine, but for the largest mass suicide in cult history. Jones was able to convince more than 900 of his followers to drink cyanide-laced cordial, which caused death in less than 5 minutes. Now, 40 years later, many researchers and journalists are still trying to find reasons for how one man could have convinced so many to form a community around his beliefs and, most of all, to end their lives at his request (it is disputed whether many followers voluntarily ended their lives or were coerced). Jones convinced his followers that if they did not follow him, or were not part of the group, they were the enemy. He instilled in them an "us against them" mentality, thus increasing

the sense of membership in the group. Jones also censored what his members saw from the outside world, which in turn increased his influence over them. He would limit access the members had with their families and removed media influence from their lives. Interestingly, Jones also aligned himself with powerful politicians so that he could increase his power among the group. The farm that he had created for his members served as a means for survival with food production and the promise to give to the poor, a noble goal that attracted many of his followers. This created the fulfilment of needs and a shared emotional connection as all members worked together towards a common goal. By using these concepts, he was able to create a sense of community. This particular case is one of the most notorious in history for demonstrating an example of cult behaviour.



FIGURE 4 In 1978, Jim Jones convinced more than 900 followers to drink cyanide-laced cordial.

Apply your understanding

- 1 **Identify** one strategy Jones used to increase his influence over the members of the People's Temple. (1 mark)
- 2 **Explain** how the farm created by Jones served to fulfil the needs of his followers and integrate them into the community. (2 marks)
- 3 **Explain** how Jones created a shared emotional connection among his followers. (2 marks)

Skill drill

Constructing research questions from a claim

Science inquiry skill: Understanding the scientific method (Lesson 1.3)

Memberships in a group or community have many perceived benefits, such as boundaries that can lead to emotional safety, a sense of belonging and identity, personal investment and a common vested interest in the group's success. Individuals are often attracted to certain communities if they feel they can exert some sort of influence over the group. There is also a strong element of conformity. Finally, membership in communities provides emotional connection and a sense of fulfilment of needs. Could this sense of community motivate certain people to join cults? Are certain types of people more vulnerable to the influence of cults?

The following claim is provided: A sense of community creates cult behaviours.

Practise your skills

- 1 **Identify** the key words in the claim and create a flow chart about the claim; this will help you consider each key term in the claim. (3 marks)
- 2 **Create** three research questions for the claim using the opening statements provided.
 - a To what extent ... (1 mark)
 - b Can ... (1 mark)
 - c Does ... (1 mark)
- 3 Research one resource for this claim that supports your research questions. **Summarise** the following
 - a aim (1 mark)
 - b method (1 mark)
 - c results (1 mark)
 - d how the research links to your research questions (1 mark)
 - e strength of the research (1 mark)
 - f limitation of the research. (1 mark)
- 4 Research one resource for this claim that refutes your research questions. **Summarise** the following
 - a aim (1 mark)
 - b method (1 mark)
 - c results (1 mark)
 - d how the research links to your research questions (1 mark)
 - e strength of the research (1 mark)
 - f limitation of the research. (1 mark)

Integration and fulfilment of needs

The role of integration and fulfilment of needs in a community can also be thought of as the role of reinforcement (Module 9) or in other words, keeping group members happy and content within the community by solidifying their mission or rewarding certain behaviours. Reinforcement in this case represents methods or ways to motivate individuals within a community to behave in a particular way.

Empirical research has suggested that reinforcement and needs fulfilment is a large part of a successful community, and to increase group success, rewards must be available to the members of the group to encourage and to motivate them to behave in particular ways. Some of the most common rewards that are available within a community include status within a group (e.g. being given a leadership role within a community), overall success of the community (e.g. gaining a national title for softball) and benefiting from the competence of other members.

Competence as a motivator is demonstrated by the research of Zander and Havelin (1960), who established that individuals are attracted to others who have skills that can benefit them in some way. This is especially the case if the other members of the group have competencies that the individual lacks. This attraction is due to an increased chance of success for the group because of the increased and diversified skills of the members. There is a sense of community between them because the members rely on each other to fulfil their needs.

The Zapatista movement in Chiapas, Mexico, which began in the 1990s, focused on indigenous rights and autonomy. In these communities, members work together to meet their collective needs through cooperative farming, education and healthcare systems. The Zapatistas have established autonomous municipalities where resources are shared, and decisions are made collectively. This communal approach ensures that everyone's basic needs are met, fostering a strong sense of community and mutual support (Vey, 2019). For instance, they have created their own schools and clinics, which are run by community members, and serve to educate and care for the population. This system of shared responsibilities and mutual aid reinforces the sense of belonging and cohesion among members. By integrating their efforts and fulfilling each other's needs, the Zapatista communities have built a resilient and supportive network that empowers individuals and strengthens the community as a whole.

FIGURE 5 Indigenous boys dancing at Cape York Peninsula, Queensland



Real-world psychology

First Nations peoples

Australia is home to more than 300 different First Nations clan groups, each one with unique languages, Dreaming beliefs and traditional cultural practices. These are the original peoples of Australia, with histories dating back over 65,000 years before colonisation.

The Torres Strait region, located between Cape York in Queensland and Papua New Guinea, consists of over 200 islands, with only 17 being inhabitable. There are also five distinctive language group regions. These regions include the mainland communities of Bamaga and Seisia on Australia's

most northern peninsula of Queensland and is home to the Aboriginal Kaurareg Nation. Torres Strait Islanders typically identify with their specific island, tribe or sea country. They often maintain ties to multiple islands and communities, even when living elsewhere.

First Nations peoples usually identify by their language group and traditional Country. Some describe themselves as “saltwater people” or “desert people”, depending on their environment. Others use broader regional terms like Koori (southern New

South Wales and Victoria), Nunga (South Australia) or Murri, which is commonly used by Aboriginal peoples from Queensland and northern New South Wales. This, in turn, gives cultural connection to the ancestral Lands/Country their families originate from.

Queensland is home to over 150 First Nations languages, reflecting its cultural diversity. Prominent First Nations groups from Queensland include the Yidinji people from the Cairns area, the Yuggera and Turrbal people of Brisbane, and the Wakka Wakka people from the inland Burnett region. Each group maintains a deep connection to their land, laws, stories and traditions.

A strong sense of community among First Nations peoples is shaped by four key elements: membership, influence, integration and fulfilment of needs, and shared emotional connection.

Acceptance into Australian First Nations communities is deeply rooted in knowing a family's kinship ties, cultural heritage and connection to land and cultural heritage. These relationships form well-defined community boundaries based on deep ancestral family connections and shared Traditional Stories, which reinforce identity and belonging (Sonn et al., 1999).

Governing influence within First Nations communities is exercised through Elders and respected leaders who guide cultural practices and decision-making. This ensures the preservation and transmission of knowledge across generations. Influence also comes from a shared voice in advocating for rights, particularly over land and waters (Mabo decision, 1992), which

has increased significantly in recent years (Australian Institute of Health and Welfare, 2023).

Connection to cultural Land or Country through a family or community can build a stronger individual sense of belonging knowing that you have the knowledge of generations of foundational learning. This cultural connection fosters fulfilment of personal needs, supporting overall health and wellbeing within a family and community.

Practices such as bush medicine and spiritual healing often work alongside modern healthcare, contributing to holistic wellbeing.

Shared emotional connection is built through storytelling, ceremony, language, art and a collective history. Despite enduring the impacts of colonisation and intergenerational trauma, the strength and resilience of First Nations communities remain central to their identity.

By understanding these elements, we gain deeper insight into how First Nations Australians – especially in culturally rich regions like Queensland – maintain strong communities through deep cultural ties and enduring social structures.

Apply your understanding

- 1 **Describe** a regional identity that Aboriginal peoples might use to describe themselves. (1 mark)
- 2 **Explain** how influence is typically exercised within First Nations communities. (2 marks)
- 3 **Explain** how shared emotional connection is established within First Nations communities. (2 marks)

Challenge

Exploring your sense of community

Apply your knowledge of the factors that lead to a sense of community to a group that you belong to.

- 1 **Identify** a group you belong to. This could be a sports team, a club, a class, a family, or any other community.
- 2 For each of the four elements listed below, write a brief reflection on how it applies to your group.
 - a Membership: How does being a member make you feel included?
 - b Influence: How do you influence the group and vice versa?
 - c Integration and fulfilment of needs: How does the group meet your needs and how do you contribute?
 - d Shared emotional connection: What shared experiences and emotional connections do you have?
- 3 Share your reflections with a partner or small group and **discuss** how these elements contribute to your sense of community.

Check your learning 17.1



Check your learning 17.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Define** the concept of community. (1 mark)
- 2 **Describe** the feature of membership and suggest how this can increase the sense of community. (2 marks)
- 3 **Explain** how a spiritual bond can increase the likelihood of cult communities forming. Use the People's Temple as an example (Real-world psychology). (2 marks)

Analytical processes

- 4 Punk-rock fans in the 1970s and 1980s (and today) were known for their distinctly

recognisable dress and symbols. Some notable features included studded belts, black leather and mohawk hairstyles. **Explain** which feature that leads to a sense of community is a particular trait of this group. (2 marks)

Knowledge utilisation

- 5 **Investigate** a group or community from another country. Select at least three of the features that lead to a sense of community (membership, influence, integration and fulfilment of needs, and shared emotional connection) that apply to make this group feel like a community. (3 marks)

Lesson 17.2

Culture

Key ideas

- Culture is hard to define, but can include a collection of ideals, values, items and ethics that belong to a group of people and are passed on from generation to generation.
- Psychological research needs to consider other cultures because it helps develop a more comprehensive understanding of human behaviour and mental processes by considering diverse cultural perspectives.
- Cultural norms define the rules by which members of a culture must live. This can include food preparation and daily behaviour.
- Cultural dimensions are a measure of the core values in a group and how these core values can help you to predict the behaviour of the members within the culture.
- Different cultures can have unique ways of thinking, feeling and behaving, and cross-cultural research highlights these differences and challenges the assumption that findings from WEIRD (Western, Educated, Industrialised, Rich and Democratic) populations are universally applicable.



Learning intentions and success criteria

culture

a collection of ideals, values, belongings and ethics that belong to a group of people and are passed on from generation to generation

Cultural beliefs, perspectives and values

Culture is a word that is difficult to define because it is a complex interplay of many factors and ideas. **Culture** includes beliefs, behaviours, surroundings, belongings and other characteristics that are the same for all members of a particular group. It is a dynamic system

that is fluid, changing with each generation, and it also encompasses many aspects such as subcultures and cultural dimensions. **Beliefs** are the convictions or acceptances that certain things are true or real. They form the foundation of a culture's worldview and influence how people interpret their experiences. For instance, cultural beliefs about health can affect how individuals approach medical treatment and wellness practices (Matsumoto & Hwang, 2021). These beliefs are often passed down through generations and can be deeply ingrained in a society's collective consciousness.

In psychology, a **cultural perspective** evaluates an individual's behaviour by considering the culture they are from. Scientists using this perspective will often look at a person's interactions, ideals, morals and values that originate from their cultural background. **Values** are the principles or standards of behaviour that are considered important in a society. They guide decision-making and behaviour by providing a framework for what is considered right and wrong. For example, in many cultures, particularly in Asian, African and Indigenous communities, honouring and respecting elders is a core value. This value emphasises the importance of showing deference to older individuals, recognising their wisdom, experience and contributions to the community. This value system shapes social interactions and family dynamics, ensuring that elders are treated with dignity and respect, and their contributions to society are acknowledged and honoured. Values are central to a culture's identity and influence various aspects of life, including social norms, laws and personal relationships. The interplay between behaviours, beliefs and values creates a dynamic cultural system. These elements are not static; they evolve over time as societies adapt to new challenges and influences. Understanding this interconnectedness helps psychologists and researchers appreciate the diversity of human experiences and the role culture plays in shaping them (Morin, 2017).

belief

the conviction or acceptance that certain things are true or real

cultural perspective

psychological investigation that considers the culture from which an individual came in order to explain behaviour

value

a principle or standard of behaviour considered important in a society

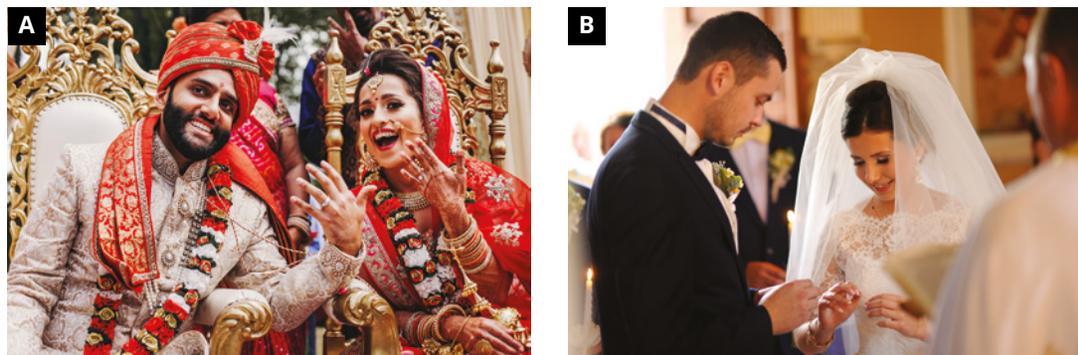


FIGURE 1 (A) Indian cultural norms include bright, colourful weddings, whereas (B) weddings in many Western cultures feature white dresses and neutral-coloured suits.

In Unit 1, you learnt that Lev Vygotsky suggested that cognitive development is affected by the beliefs one holds and these are, in turn, shaped by the person's surroundings. Therefore, an interpretation of culture is needed to understand a person's behaviour, because actions stem from cognitive processes or thoughts about particular concepts. Culture plays a key role in society because it can influence how people display their cultural beliefs and values in everyday life. Language, customs, rules and technologies that come from our culture can influence how we exist within society. Culture can also determine how we mix with people of different cultural backgrounds and how well we might integrate into a different culture. For example, it is traditional practice in some parts of Burma for women to wear rings around their necks (Figure 2). It is considered



FIGURE 2 Different cultures can have very different ideals and values and for this reason, it can be difficult to define culture and what is considered the “norm”.

beautiful in that culture; however, if we saw women wearing these same neck rings in the central business district of Brisbane or on the streets of Roma in South West Queensland, we might do a double take and think the behaviour strange. Thus, understanding culture is vital to understanding human behaviour.

Defining culture

Culture can be defined as a collection of ideals, values, items and ethics that belong to a group of people and are passed on from generation to generation. It includes elements within society such as music, clothing and food, which are considered the surface culture or observable part of the culture. Culture also comprises elements such as beliefs, values and behaviours as part of the deep culture, which is invisible to an observer. As there are elements that can be seen and some that are hidden, it is very difficult to define culture; however, we can identify common elements. For example, Lonner (1995) defined culture as a set of guidelines that dictate the way members of a group interact or behave with one another. Similarly, Hofstede (1980) determined that culture was like a piece of programming that exists in our minds, which allows us to feel part of a society or a community by knowing the rules and regulations within a particular group of people.

Both definitions suggest a community that has collective or common rules so that the members of the community know the rules of their environment and can live by them. There are also certain elements that are common to all cultures, though differently expressed, which define them and set them apart from social groups. These elements are summarised here.

- 1 Culture is all-encompassing; it is comprehensive and people within a culture all have their place and fit together in a logical fashion. For example, the practice of taking off your shoes when you enter someone's house is the physical manifestation of the importance of respecting others in a particular culture.
- 2 Culture is not innate; it is something that is taught and learnt by each person.
- 3 Culture determines the limits of acceptable and unacceptable behaviour, and any violations of the rules may result in punishment. This can be punishment in terms of embarrassment or using the legal system to sanction those who have violated the rules.
- 4 Cultures hold many invisible standards and rules; for example, there is a story of an American spy during the Second World War who spoke perfect German but was caught because he held his fork differently from the cultural expectations of the Germans at the time.
- 5 Cultures are dynamic; they are ever-changing, although it might take years for a change to become evident. For example, modern Australian culture is largely influenced by similar changes in other Western societies; however, the culture of Egypt has changed much more slowly over history.

FIGURE 3 Australia's dominant culture includes enjoying the beach and a "fair go" attitude.



Given the universal aspects of culture, it is important that if you are visiting a culture or shifting to live within a different culture, you know the rules and regulations that are acceptable in that culture. These are called “cultural norms” and they dictate acceptable behaviours within a society. These cultural norms guide how individuals interact with each other and their environment.

Subcultures

A **subculture** is a cultural group that exists within a larger culture, with alternative lifestyles, rules and expectations. One such example is vampire subculture, which has evolved into a large underground movement around the world. This is not the same as the vampires you read about in *Twilight* or *The Vampire Diaries*. Instead, these are regular people who choose to live an alternative lifestyle inspired by gothic ideals, as shown in Figure 4.

This subculture has its own set of beliefs and morals. People who commit to this type of lifestyle often participate in rituals as a means of increasing their social currency within the group. The unique lifestyle draws from ideas in gothic novels (e.g. *Dracula*, *Interview with the Vampire*) and horror films, and much of the subculture is inspired by Victorian England and earlier eighteenth-century gothic traditions. It is very much a Western-based subculture.

There are many types of vampires within the large vampire subculture, including those who believe they need to drink blood to survive. There are pseudo-religions based on vampirism, and there is also a type of vampire called “transcendental vampires”, who believe they are immortal. Although some members may become involved in crime, this controversial subculture is not necessarily only about violence or blood. It is sometimes about finding like-minded people to feel a sense of community, and it is sometimes used to find a belief system that is more in tune with a person’s needs and demands. Many also find a sense of unity through their appreciation of gothic art, architecture and literature.

Cultural norms

Cultural norms are the set of rules that a specific group assigns to decide if behaviours are appropriate or inappropriate. These cultural norms are derived from the culture we live in and can include values, beliefs and attitudes towards each other and the outside world. These rules are put in place to create order and control for each individual within the group. The norms can dictate communication style, marriage rules, child-rearing techniques and even where to stand or sit during a meal. Cultural norms can be visible to everyone, such as legal policies, or they can be internal to the culture, such as ritual practices. Cultural norms can also act as gatekeepers to keep norms in place. For example, in North Korea, the media is censored so that cultural norms within the country are maintained and free from corruption from external news sources around the world. Figure 5 shows the differences in freedom of the press worldwide.

subculture
small alternative culture or norms that exist within a larger community



FIGURE 4 Vampire subculture is a Western-based subculture.

cultural norms
shared rules set by a specific group to guide behaviour

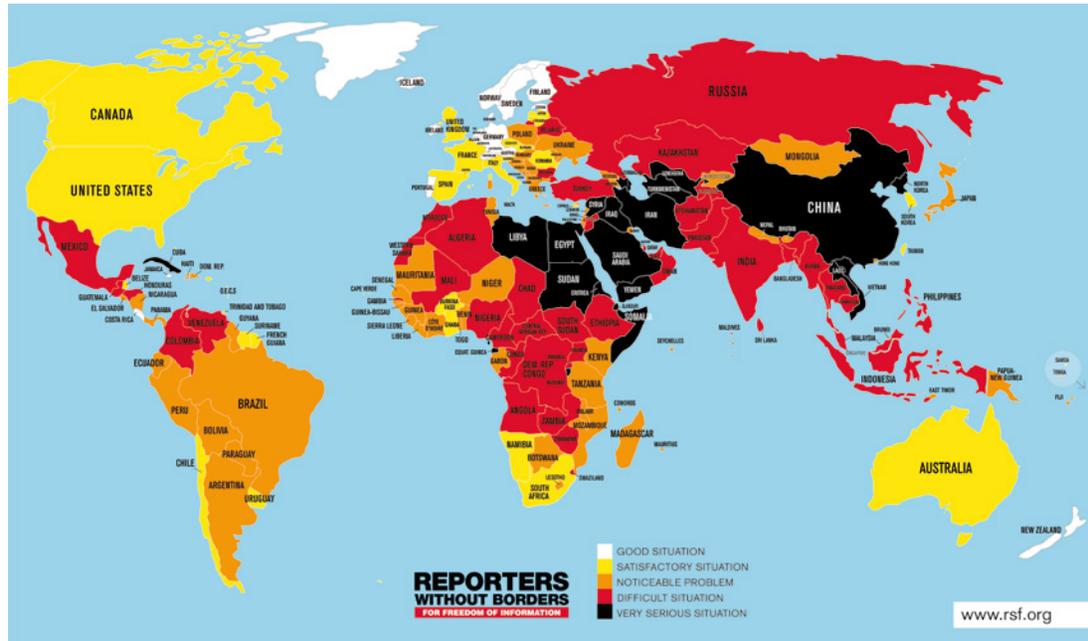


FIGURE 5 Freedom of the press around the world. The media that you are exposed to can shape your culture.

Cultural dimensions

cultural dimension

used to group cultures into categories based on values and overall beliefs

Cultural dimensions are dichotomous extremes that exist in cultures seen across the world. For example, Asian cultures tend to have values that promote the whole community (i.e. collectivist cultures) whereas Western cultures tend to be more focused on the self (i.e. individualist cultures).

Cultural dimensions were developed by Geert Hofstede when he conducted a study on 60,000 IBM employees from more than 50 countries so that he could use their self-reported data to classify their behaviours according to their cultures. He asked all his participants to complete surveys and tallied the results. Hofstede (1980) found that cultural differences can generally be categorised into four key dimensions:

- individualist versus collectivist
- power distance
- masculinity versus femininity
- uncertainty avoidance.

He concluded from this research that there are cultural differences in overall behaviours and, therefore, these dimensions are important to consider when working with and understanding people from differing cultures. The individualist versus collectivist will be explored further so that cultural differences in behaviour can be examined.

individualist culture

the importance of oneself achieving goals is prioritised over the needs of society

collectivist culture

priority of society's goals as a whole are emphasised above personal goals

Individualist versus collectivist

This dimension is a measure of whether people within a particular culture are more likely to work alone or in groups. **Individualist culture** refers to the belief that certain cultures, or at least most individuals within that culture, act in a way to benefit primarily themselves rather than the collective whole. **Collectivist culture** refers to individuals within a culture acting in a way that benefits the group as a whole.

The characteristics that are common within the extremes of the cultural dimensions are generalisations; however, these differences are supported by research. Bond and Smith (1996) utilised Solomon Asch's paradigm (see Module 11) to test the cultural differences in conformity

between collectivist and individualist countries. They performed a meta-analysis of 133 studies using the Asch protocol and covered results from 17 different countries around the world.

The researchers found that individualistic societies such as the United States, the United Kingdom and France had lower rates of conformity compared to collectivist countries such as China, Fiji and Brazil. The study concluded that the cultural dimension of individualist versus collectivist societies affected results from a well-known experiment (Asch's conformity test), confirming the differences in behaviour due to culture (Table 1).

TABLE 1 Comparing individualist and collectivist societies

| Category | Individualist societies | Collectivist societies |
|------------|---|---|
| Beliefs | Decisions aim to benefit the individual | Decisions aim to benefit the most people within the group |
| | Strong self-identity | Low self-identity but high social identity |
| | Easier to persuade as they are not committed to their group's opinions | Harder to persuade as they are only interested in the opinions of their group |
| | Research suggests they exist in colder climates | Research suggests they tend to exist in warmer climates |
| Values | Independence and personal achievement | Community and group harmony |
| | Wealthier as individuals and as a society | Less wealthy as individuals and as a community |
| Behaviours | Relationships between individuals not very strong | Relationships between individuals very strong |
| | People care about those who are immediate to them (i.e. family members within their home) | People live geographically closer together |
| | Lower birth rate | Higher birth rate |
| | Less likely to conform | More likely to conform for the sake of harmony |
| | Low compliance | More likely to comply with requests (especially from those in positions of authority) |
| | More expression of emotion | Less expression of emotion |
| | Less tendency for groupthink | Greater tendency for groupthink |

Challenge

Language and culture

Language is a key communication tool within a culture. Depending on the region, sometimes even within the same country, there can be marked differences in the way language is used. For example, even though Brazil and Argentina are very close geographically, one country speaks Portuguese and one speaks Spanish.

There are also subtle non-verbal means of communication that are specific to different cultures. For example, some cultures use a head nod to indicate yes, whereas in other cultures that same action can mean no.

There can be very large variations within regions in the same country as well. For example, there are some regions of China where the people speak

Cantonese, whereas in most of the cities people speak exclusively Mandarin. There can be large differences in word usage from one culture to the next. For example, the game that Australians call soccer is known as football in Britain and many other parts of the world. There are also differences in slang and writing patterns.

- 1 Identify** two cultures that have similar but different communication styles and compare the languages within these two cultures.
- 2 Explain** how and why the development of language illustrates the importance of culture and provide evidence for the sociocultural perspective of psychology.

The need for psychological research to consider other cultures

International communication is vital for successful cross-cultural research. It is vital because differing cultures have vastly different values, and without open and transparent communication, misperceptions and misunderstanding can hinder accurate research across different cultures. For example, in collectivist cultures, the values of the community are valued over those of an individual, and violation of such values may hinder cooperation from that culture or even lead to inaccurate interpretation of research findings. One such example includes a multicultural assessment of the Asch conformity paradigm, which was covered in Module 11.

One of the key limitations of Asch's conformity study was that the findings of the study lacked cross-cultural relevance. A study performed by Berry (1967) aimed to rectify this limitation by using the same test as Asch to establish if the same results in conformity are found in different cultures. The same test was used to test conformity (Figure 6) where participants were deceived and asked to judge the length of the test line compared with the reference lines in the presence of confederates who gave the incorrect answer each time. If the participant agreed with the confederates, this suggested conformity, but if they did not agree with the confederates and chose the correct line instead, this indicated a lack of conformity from the participants.

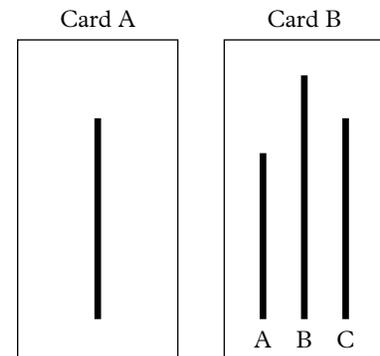


FIGURE 6 This is an example of Asch's line test for conformity.

Instead of testing Americans (like in the original study), Berry chose participants from the Temne tribe in Sierra Leone in Africa and Inuits of Baffin Island in Canada. The Temne people are an agricultural people who are a collectivist society; they need cooperation from the community in their farming practices. In contrast, the Inuits of Baffin Island are solitary hunters who come from an individualist culture.

The results of this variation of the Asch test found that the Temne people were more likely to conform when compared to the Inuit peoples. It is suggested that because of the need to work with others in the community, the Temne people trusted the judgments of the confederates or the “community” consensus and thus increased their conforming behaviour. The Inuits, however, depend on their own skill for survival and, therefore, value their individual judgment over those of the group, thus showing a decrease in conformity.

This cross-cultural difference in the social behaviour of conformity highlights the importance of understanding cultural differences and cultural values in conducting research in psychology and the need for international collaboration. Without such collaborations, research findings may not be able to be generalised to other cultures and may be misinterpreted, which can affect the understanding that is fundamental to psychology, the understanding of human behaviour.

WEIRD populations in psychological research

In psychology, the term “WEIRD” stands for Western, Educated, Industrialised, Rich and Democratic. It refers to the demographic profile of the majority of participants in psychological research. This focus on WEIRD populations has led to a significant bias in the field, as these groups do not represent the global diversity of human experiences and behaviours (Pazhoohi, 2024). Most psychological theories and findings are based on WEIRD

samples, which can limit their applicability to non-WEIRD populations. By including diverse cultural groups, researchers can develop a more comprehensive understanding of human psychology and challenge the assumption that findings from WEIRD populations are universally applicable. Including a variety of cultural perspectives can improve the validity and reliability of psychological theories and practices.

Always consider the cultural context of research findings. When reviewing a study, ask yourself:

- who were the participants? Check if the sample is primarily from WEIRD populations.
- how might cultural differences impact the results? Think about how people from different cultural backgrounds might respond differently.
- are the conclusions universally applicable? Be critical of claims that suggest findings apply to all humans if the study only included WEIRD participants.

By keeping these questions in mind, you'll develop a more nuanced understanding of research and its broader implications.

Check your learning 17.2



Check your learning 17.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Define** culture, with reference to behaviours, beliefs and values. (3 marks)
- 2 **Describe** how beliefs shape cultural practices, using an example. (2 marks)
- 3 **Explain** the concept of culture in the psychological context. (2 marks)
- 4 **Identify** the results found in Berry's 1967 study and **explain** why the results may have differed from Asch's original study. (2 marks)

Analytical processes

- 5 **Explain** why it is important to understand the interconnectedness of behaviours, beliefs and values in a culture. (2 marks)
- 6 **Distinguish** between the concept of individualist versus collectivist using three key characteristics. (3 marks)

Knowledge utilisation

- 7 **Interpret** the results found in Berry's 1967 study and apply the results to a group of Australian participants. **Predict** the results of Asch's study being applied to Australian culture by writing a discussion. (2 marks)
- 8 Some people say that Australia is too individualistic and competitive, while other people say these values are part of what makes Australia great. **Discuss** this statement by providing an argument for each side. (4 marks)

Lesson 17.3

Multiculturalism versus pluralism

Key ideas

- Multiculturalism and pluralism are concepts to describe how different cultural groups coexist but differ in the presence or absence of a dominant culture.
- Dominant cultures set widely accepted and influential cultural norms, values and practices that shape the behaviour and attitudes of the majority.
- Multiculturalism is a societal framework where multiple cultural groups coexist without a single dominant culture, celebrating cultural diversity and maintaining distinct identities; in pluralism there is a coexistence of multiple cultural groups within a society that has a dominant culture.
- In Australia, while multiculturalism is prevalent, there are elements of pluralism, with the dominant Anglo-Australian culture influencing societal norms and practices.



Learning intentions and success criteria

multiculturalism

individuals from multiple cultural groups coexist without any single group being dominant

pluralism

the coexistence of multiple cultural groups within a society that has a dominant culture

dominant culture

the set of cultural norms, values and practices that are most widely accepted and influential

Dominant cultures

Consider the active migration of people into Australia today. Asylum seekers and migrants arrive from various parts of the world, and this can lead to a variety of cultures living within the same geographical area. The ideas of **multiculturalism** and **pluralism** are concepts that describe how different cultural groups coexist within a society, but they differ significantly in terms of the presence or absence of a dominant culture. A **dominant culture** in a society is the set of cultural norms, values and practices that are most widely accepted and influential. This culture shapes the behaviour and attitudes of the majority of people and often reflects the interests of the most powerful groups in society (Drew, 2023). For example, in many societies, dominant cultures tend to be heteronormative (the assumption that everyone is heterosexual), which can lead to marginalisation of those who identify as LGBTQIA+. They are also often patriarchal, meaning men typically hold more power than women in areas such as family life, workplaces, and broader economic and political systems.

Characteristics of dominant culture

Understanding the characteristics of a dominant culture is essential to grasp how it influences various aspects of society. The dominant culture is the prevailing cultural practices, values and norms that are widely accepted and followed by the majority of the population. Here are some key characteristics of dominant culture:

- 1 **Widespread acceptance:** The values and practices of the dominant culture are widely accepted and followed by a large portion of the population. For example, in the United States, the celebration of Thanksgiving is a widely accepted cultural practice. It is a national holiday that reflects the dominant culture's values of gratitude and family gatherings.
- 2 **Power and influence:** The dominant culture holds significant power and shapes institutions, policies and social structures. For example, the influence of the English language globally is a result of historical British colonialism and current American cultural dominance.

- 3 Visibility:** It is highly visible in various aspects of society, including media, education and politics. For example, Hollywood movies are a significant part of the dominant culture in many parts of the world. They shape global perceptions of beauty, success and lifestyle, making American culture highly visible internationally.
- 4 Exclusionary:** It can marginalise or suppress other cultural practices and values that do not align with its own (Edwards, 2024). For example, in Australia, the dominant culture has historically marginalised First Nations people through policies like assimilation, which aimed to integrate Indigenous Australians into white society by erasing their cultural identities. This included removing children from their families and restricting their access to land and resources (Song, 2020).

Multiculturalism and pluralism may even divide communities and cause political change, especially in immigration policies. Figure 1 and Table 1 explain the difference between the two concepts and the way they are able to integrate cultures into an existing, often larger, culture.

Multiculturalism

Multiculturalism refers to a societal framework where multiple cultural groups coexist without any single group being dominant. In a multicultural society, cultural diversity is celebrated, and each group maintains its distinct cultural identity. Each culture retains its unique characteristics while contributing to the overall diversity of the society. There is no pressure for cultural assimilation, and all cultural groups are seen as equal. An example of multiculturalism can be seen in the historical Austro-Hungarian Empire, where various ethnic groups coexisted without a single dominant culture.

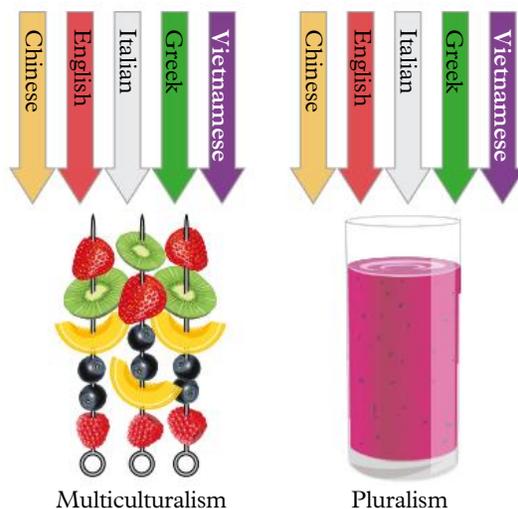


FIGURE 1 The left shows an example of multiculturalism, where each culture retains its unique characteristics while contributing to the overall diversity of the society. The right is an example of pluralism, where different cultures blend into the dominant culture while still preserving some of their unique traits.

Pluralism

Pluralism involves the coexistence of multiple cultural groups within a society that has a dominant culture. In a pluralistic society, minority cultures maintain their distinct identities but also participate fully in the broader society, which is influenced by the dominant culture. For example, the United States is a pluralistic society where many minority groups exist within the larger American society, with people of different cultural backgrounds able to keep their own traditions.

Australia is widely recognised as a multicultural society. This means that we embrace and celebrate the coexistence of diverse cultural groups without any single group being dominant. We have a long history of immigration, and today, nearly half of our population is either born overseas or has at least one parent born overseas (Global Centre for Pluralism, 2023). This diversity is reflected in the wide range of cultural practices, languages and traditions present in Australian society. Multiculturalism in Australia is supported by government policies that promote cultural diversity and inclusion. For example, the Australian Government has introduced initiatives that allow individuals to maintain their cultural heritage while fully participating in Australian society (Rajadurai, 2018). As a result, Australia is often seen as one of the most successful multicultural nations in the world.

However, it is important to recognise that despite this cultural diversity, a dominant Anglo-Australian culture still influences many aspects of social and institutional life. This reflects elements of cultural pluralism, where minority cultures are respected and preserved, but a dominant culture remains influential (Global Centre for Pluralism, 2023). Australia is primarily a multicultural society with some aspects of pluralism. In this way, Australia can be understood as a multicultural society that also exhibits characteristics of pluralism where diverse cultures coexist and are valued, even as certain cultural norms remain more influential than others.

TABLE 1 Key differences between multiculturalism and pluralism

| Category | Pluralism | Multiculturalism |
|--|---|--|
| Definition | A system where different cultural groups coexist within a shared society while maintaining their distinct identities (Kymlicka, 2001) | A system that recognises, promotes, and celebrates cultural diversity, encouraging the retention of distinct cultural identities (Taylor, 1994) |
| Dominant culture | Coexistence of multiple cultural groups within a society that has a dominant culture | Cultural groups coexist without a single group being dominant |
| Description with reference to assimilation | Encourages coexistence and tolerance but does not necessarily promote the preservation of cultural differences. Assimilation into the broader society may be expected in some aspects (e.g. language or public life), but cultural distinctions are tolerated in private or community spheres (Parekh, 2000). | Actively promotes and supports the retention of different cultural practices, languages and identities. Assimilation is not expected; instead, diversity is celebrated as a central feature of society (Modood, 2013). |
| Political structure | Different cultural groups coexist under a common legal and political system, with shared governance. Policies focus more on equality and coexistence than on promoting cultural diversity (Kukathas, 2003). | The political system actively supports and promotes diversity through legislation, funding and cultural programs. Minority groups have institutional recognition, and there may be policies protecting and promoting cultural expression (Vertovec, 2010). |
| Rights of different cultures | Minority groups have the right to maintain their cultural practices, but there is less emphasis on formal government support for diversity. Rights are often framed around individual freedoms rather than group-based recognition (Walzer, 1997). | Minority groups are given formal support to maintain their cultural identity, including anti-discrimination laws, bilingual programs and cultural funding. Rights are often expanded to protect and promote group identity (Levey, 2012). |
| Examples | France (emphasis on secularism and integration) (Parekh, 2000), India (coexistence of various religious and ethnic groups under a unified political system) (Kukathas, 2003) | Canada (official multiculturalism policy that supports cultural diversity) (Taylor, 1994), Singapore (formal recognition and support of different ethnic communities within a single nation) (Vertovec, 2010) |

Check your learning 17.3



Check your learning 17.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- Define** “multiculturalism” and give an example of this type of culture. (2 marks)
- Explain** what pluralism is. (2 marks)

Analytical processes

- Reflect** on multiculturalism and pluralism in Australian society, and provide an example of characteristics that make it both a multicultural and pluralist society. (2 marks)

- Differentiate** between multiculturalism and pluralism. (1 mark)

Knowledge utilisation

- Investigate** a culture that has vastly different values from your own to determine if it is multicultural, pluralist or both using the information from Table 1. **Justify** your decision. (2 marks)

Lesson 17.4

Review: Community and culture

Summary

17.1

- Sense of community can be determined by aspects such as membership, influence, shared emotional connection, and integration and fulfilment of needs.
- These elements can increase the sense of ownership and compliance within a group and can dictate the longevity of a group.

17.2

- Culture is hard to define, but can include a collection of ideals, values, items and ethics that belong to a group of people and are passed on from generation to generation.
- Psychological research needs to consider other cultures because it helps develop a more comprehensive understanding of human behaviour and mental processes by considering diverse cultural perspectives.
- Cultural norms define the rules by which members of a culture must live. This can include food preparation and daily behaviour.
- Cultural dimensions are a measure of the core values in a group and how these core values can help you to predict the behaviour of the members within the culture.
- Different cultures can have unique ways of thinking, feeling and behaving, and cross-cultural research highlights these differences and challenges the assumption that findings from WEIRD (Western, Educated, Industrialised, Rich and Democratic) populations are universally applicable.

17.3

- Multiculturalism and pluralism are concepts to describe how different cultural groups coexist but differ in the presence or absence of a dominant culture.
- Dominant cultures set widely accepted and influential cultural norms, values and practices that shape the behaviour and attitudes of the majority.
- Multiculturalism is a societal framework where multiple cultural groups coexist without a single dominant culture, celebrating cultural diversity and maintaining distinct identities; in pluralism there is a coexistence of multiple cultural groups within a society that has a dominant culture.
- In Australia, while multiculturalism is prevalent, there are elements of pluralism, with the dominant Anglo-Australian culture influencing societal norms and practices.

Review questions 17.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- What are two factors that can influence sense of community?
 - Influence and pluralism
 - Influence and fulfilment of needs
 - Fulfilment of needs and conformity
 - Sense of community and multiculturalism
- Which is an example of membership, according to McMillan and Chavis (1986)?
 - A membership card to a store you rarely go to
 - Feeling like your voice is being drowned out by a much larger group
 - Being a part of a group with people who have the same goals and values as you
 - A sense of conformity because everyone else is doing one thing even though you want to do the opposite

- 3 Which of the following is an example of influence within a community?
- A Feeling a sense of belonging to a group
 - B Sharing a common communication system
 - C Experiencing shared events and emotional connectedness
 - D Exerting an impact on the decisions made for the group as a whole
- 4 What does the term “reinforcement” in fulfilment of needs suggest?
- A Members need to be punished for inaction towards the group goals.
 - B Members of a group need to be praised for actions that are against the group goals.
 - C Members of a group are praised for actions that help the community to achieve a group goal.
 - D Members of a group avoid punishment when they perform actions that satisfy the needs of the group.
- 5 How can influence predict formation of a group?
- A By having trust for other members of a group
 - B By having individuals feeling like they can exert some sort of influence over the group
 - C By having a leader who wants one goal while members of the group may prefer another goal
 - D By having the rules for conformity determined by the group so that there is increased cohesion
- 6 Which is a possible definition of culture?
- A Social groups interacting with each other
 - B A set of rules that dictate daily lives for a group of people
 - C A static environment where rules and regulations stay the same
 - D A set of values and ideals for a particular group of people that is passed to offspring
- 7 What is an example of a cultural norm?
- A Avoiding eating pork on a daily basis
 - B The values your family holds about religion
 - C A yearly ritual related to fertility for the tribe
 - D Following the laws of the country that you are a part of
- 8 Which is the best definition for individualism?
- A Acting based on the collective goals of a society
 - B Acting for your own goals and taking credit for your own efforts in a project
 - C Relying on your community to help you find a profession
 - D Refusing to conform to others as it is against the values of your group
- 9 What does pluralism involve?
- A No cultural diversity
 - B A single dominant culture
 - C Complete assimilation of minority cultures
 - D Coexistence of multiple cultural groups within a society with a dominant culture
- 10 How does cultural perspective in psychology investigate phenomena?
- A Genetic testing to determine behaviour
 - B Research methods, especially experiments, to find results
 - C Memory tests and tests that rely on attention in order to test thinking processes
 - D Researchers who are immersed in different cultures in order to understand the background and reason for behaviours based on specific cultures
- 11 What does multiculturalism in Australia promote?
- A Cultural assimilation
 - B Isolation of minority cultures
 - C Dominance of a single culture
 - D Cultural diversity and inclusion
- 12 Which of the following is a characteristic of a dominant culture?
- A Invisibility in media and politics
 - B Lack of influence on societal norms
 - C Marginalisation of other cultural practices
 - D Equal power distribution among all cultures
- 13 What does pluralism encourage in terms of cultural differences?
- A Complete assimilation
 - B Coexistence and tolerance
 - C Isolation of minority groups
 - D Eradication of cultural distinctions
- 14 What is a key difference between pluralism and multiculturalism regarding assimilation?
- A Multiculturalism expects assimilation.
 - B Pluralism promotes complete assimilation.
 - C Multiculturalism discourages cultural retention.
 - D Pluralism tolerates cultural distinctions in private spheres.

Review questions 17.4B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 15 Define** “culture”, using an example. (2 marks)
- 16 Describe** the four key attributes of membership according to McMillan and Chavis (1986). (4 marks)
- 17 Explain** the difference between individualist and collectivist societies, using examples. (3 marks)
- 18 Explain** how the Australian Government supports multiculturalism, using an example. (2 marks)
- 19 Identify** a cultural norm in your culture and use this example to **explain** the value it is based on. (2 marks)

Analytical processes

- 20 Analyse** Berry’s 1967 study and explain how culture changes conformity behaviour with reference to the results of the study. (2 marks)
- 21 Analyse** an example in your own life to identify where your sense of community applies to your group membership. (2 marks)
- 22 Distinguish** between how a person from an individualist country versus a person from a collectivist country may attribute a reason for a student coming to class late. (1 mark)
- 23 Apply** your understanding of culture to compare behavioural differences between people from two cultures and suggest a reason for these differences. (3 marks)

- 24 Apply** your knowledge of sense of community to the Jim Jones cult and **explain** how such a cult could have existed. (2 marks)
- 25** A study found that African children could not remember a list of words like American children of the same age could. However, when the list of objects was presented as a visual diorama around their tribe lands, they were able to remember as many as the American children. The children from the African tribe come from a culture that hunts for food around their land.
Apply your knowledge of cultures to explain the results (2 marks)

Knowledge utilisation

- 26** The United States is often described as a melting pot of cultures. **Justify** this statement using your knowledge of culture. (2 marks)
- 27 Investigate** the following claim: “Behaviour depends on culture.” Suggest a possible research question that can be used to assess this claim. (1 mark)
- 28 Discuss** culture and how culture can lead to changes of behaviour. You may use Berry or other research to support your perspective. (2 marks)

Data drill

Comparing sense of community in different neighbourhoods

The design of a neighbourhood plays a significant role in building and maintaining local community connections. The size and layout of neighbourhoods can impact how community networks function. For example, physical features like gates can affect local relationships. A study by Sakip and colleagues (2012) compared the sense of community in two neighbourhoods in Thailand: Putrajaya (non-gated) and Bandar Baru Bangi (gated), using face-to-face interviews and

questionnaires measuring the four dimensions adapted from McMillan and George (1986). The study found that married respondents at individual gated residential areas (IGR) ($M = 6.46$) have a higher sense of community compared to single respondents ($M = 5.53$) as shown in Figure 1. Researchers used a t -test to find that marital status has a significant influence on sense of community in IGR ($t(88) = -2.22$; $p = 0.02$), but no significant influence on sense of community in individual non-gated residential areas (INGR) ($t(6.43) = 0.75$; $p = 0.47$).

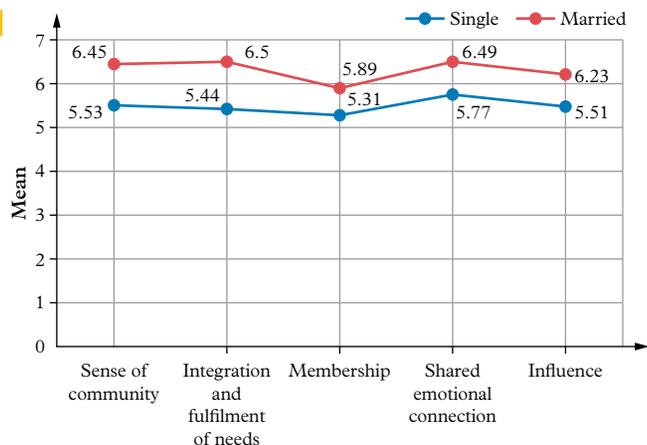


FIGURE 1 Comparison between sense of community and their dimensions with marital status in individual gated residential areas (IGR).

Overall, the findings of the study demonstrated that the sense of community in INGR is higher ($M = 6.47$) compared to sense of community in IGR ($M = 6.39$), as seen in Figure 2.

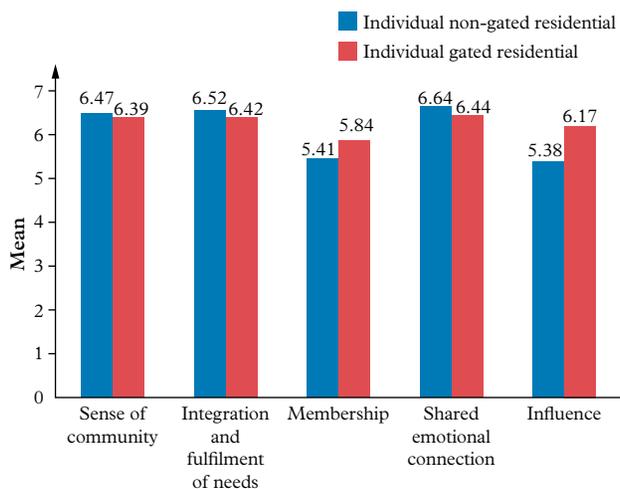


FIGURE 2 Comparison of sense of community and their dimensions in individual gated and non-gated residential areas.

Apply understanding

- 1 Calculate** the difference between single and married individuals in IGR for the integration and fulfilment of need dimension using Figure 1. Show your working. (2 marks)
- 2 Identify** the sense of community dimensions that had the highest nurturing of local community ties in IGR and INGR, with reference to Figure 2. (2 marks)

Analyse data

- 3 Distinguish** between the dimension of membership for IGR and INGR. (1 mark)
- 4 Contrast** the dimension with the largest difference between IGR and INGR. (1 mark)

Interpret evidence

- 5 Determine** if there was a significant difference in the sense of community in IGR between married and single respondents. Use evidence to support your answer. (2 marks)
- 6 Draw a conclusion** about the sense of community in INGR compared to IGR, using evidence to support your answer. (2 marks)



Module 17 checklist: Community and culture

MODULE

18

Cultural diversity

Introduction

To achieve a holistic understanding of human behaviour, we need to consider both the variability and invariance of human behaviour and mental processes under diverse cultural conditions. This can include examining the cultural ideals within a society, including the challenges faced by individuals entering a different culture. Adjusting to a new culture can also be a source of conflict and we will examine how conflicts can arise due to members of different cultures living together in society.

Recent immigrants, whether they have entered the country based on humanitarian needs or by choice, typically face a range of psychological challenges that can affect their integration into their new country. The psychological challenges of immigration and acculturation (adapting to a new culture) include culture shock, assimilation and marginalisation.

People who were born and live in their home country may express fear that the society is changing due to immigration. This can lead to prejudice towards the new arrivals. Sometimes, this prejudice can show itself as discrimination in the form of racism, which can be detrimental to the mental health and wellbeing of immigrants, refugees and asylum seekers.

Psychologists have explored ways to decrease prejudice, based on the contact hypothesis as well as cognitive approaches. This module will explore these ideas and outline different approaches for minimising prejudice and hate.

Prior knowledge


**Prior
knowledge
quiz**

Check your understanding of concepts related to cultural diversity before you start.

Subject matter

Science understanding

- Describe the psychological challenges of immigration and acculturation, including culture shock, assimilation and marginalisation.
- Explain how cultural diversity can be a source of conflict, with reference to prejudice expressed as implicit and explicit racism.
- Describe ways to reduce prejudice, with reference to intergroup contact that is sustained, with superordinate goals, mutual interdependence and equality of status.

Science as a human endeavour

- Appreciate that most psychological research has been performed in a specific cultural context (i.e. Western, educated, industrialised, rich and democratic societies) and may not be fully applicable in other contexts.
- Recognise the importance of international collaboration when investigating cross-cultural phenomena.
- Recognise that the challenges of Australian First Nations peoples in responding to the processes of colonisation and settlement are ongoing.
- Appreciate that conflict resulting from cultural diversity can be alleviated by increasing intercultural understanding.
- Explore ways to increase intercultural understanding in order to reduce conflict that may result from cultural diversity.

Science inquiry skills

This lesson provides support for the following science inquiry skills:

- use mathematical techniques to summarise data, establish relationships and identify uncertainty through
 - parametric inferential statistics, e.g.
 - p -value from Pearson r
- analyse data to identify trends, patterns and relationships; recognising error, uncertainty and limitations of evidence
- select, synthesise and use evidence to
 - construct scientific arguments.

Source: *Psychology 2025 v1.2 General Senior Syllabus* © State of Queensland (QCAA) 2024

Lesson 18.1

Psychological challenges of immigration and acculturation

Key ideas

- Immigration is the movement of people from their original homeland to a new country or place where they do not possess citizenship.
- Acculturation is a process where an immigrant embraces the laws and customs of their new country, while retaining their own cultural ideals at the same time.
- The psychological challenges of immigration and acculturation include culture shock, assimilation and marginalisation.
- Culture shock can lead to a lack of integration by immigrants because massive differences between cultures can overwhelm individuals.
- Assimilation is the adaptation of a new immigrant taking on all the aspects of the host culture and giving up their own.
- Marginalisation occurs when individuals or groups are treated as unimportant, leading to exclusion from social, economic and cultural activities. This can result in significant psychological challenges, identity struggles, discrimination and economic hardship, particularly for immigrants.



Learning intentions
and success criteria

Immigration

In Module 17, we looked at how countries can adapt their policies and governance to include people coming from other cultures, through pluralism and multiculturalism. But how do people feel when they move from their home to a new country through the process of immigration?

Immigration is the movement of people from their original homeland to a new country or place where they do not possess citizenship (and at times may not have rights to work or to even stay permanently). There are many reasons for immigration (Figure 1), including reuniting with family members who have already moved to the new country, searching for work or for humanitarian protection (e.g. from war or political persecution, or due to natural disaster). For example, a common lived experience for families from Syria moving to Australia is to escape the ongoing conflict in their homeland. When they arrive, they do not initially have citizenship or the right to work. The parents might be seeking asylum due to the dangerous conditions back home and already have extended family members living in Australia to connect with. This family represents immigrants who have moved to Australia for humanitarian protection and to reunite with family members.

immigration

the act of moving to a new country to find a new home



FIGURE 1 People migrate to countries for a variety of reasons and may then hope to gain citizenship when they are there.

Acculturation

acculturation

the process where people from one culture encounter another culture, and start adjusting the cultural and social values, beliefs, ideas and behavioural patterns of their culture of origin to those of a different culture

Acculturation is the process where people from one culture encounter another culture and start adjusting their cultural and social values, beliefs, ideas and behavioural patterns of their culture of origin to those of a different culture (American Psychological Association, n.d.). This involves a mutual exchange and adaptation of cultural elements between different groups. It is a dynamic process in which both cultures can have an influence on one another. It can happen on both individual and group levels, encompassing a variety of experiences such as learning a new language, adjusting to new social norms, and incorporating new cultural practices into everyday life.

Acculturation is the cultural change and adaptation that takes place when different groups interact. It can be measured in various ways, but typically involves shifts in language, clothing, cuisine and other cultural elements. Members of the minority culture will retain most of their cultural norms, however, they may still adopt some small aspects of the majority culture. Individuals who acculturate can be said to be bicultural because they have customs and aspects of both cultures, even though their original culture is the one that dominates. These cultural aspects include:

- language
- cultural identity
- values
- food
- social interactions
- customs.

Consider an international student from China who moves to Brisbane to complete their Year 12 studies. Over time, they start adopting Australian customs, such as celebrating Australia Day, enjoying barbecues and using Australian slang. At the same time, their Australian classmates learn about Chinese New Year and might even participate in celebrations. This mutual exchange of cultural practices and values is an example of acculturation, where both the student and their peers influence each other's cultural experiences. Importantly, acculturation is a dynamic, two-way interaction where both cultures can influence each other.

Acculturation indicates an individual adapting to both cultures (their original and the new). If you live in a neighbourhood that is predominantly one culture but go to school or work where there are many different cultures, you are likely to retain your traditions at home but adjust to the majority culture during school or work, and therefore show an example of acculturation. A key benefit of acculturation is that the individual gains access to resources that they may otherwise not have had. For example, if someone is feeling anxious about their home life, they can get social support from their neighbourhood or people from their culture who understand their pride and rituals. However, if their anxiety stems from school, they can access school-based assistance, which is provided by the majority culture.

acculturation gap

the difference that can arise between the level of assimilation of migrants compared to their children

Acculturation can be limited by a phenomenon known as a family **acculturation gap**. This occurs when there is a difference in acculturation between parents and their children. Migrant parents may be consistently surrounded by their community and therefore be less exposed to the majority culture of their new country. Their children, though, may attend school with the majority culture, and so may find it easier to embrace. This can make it difficult for parents to understand their children, and also can make it difficult for children to live with two sets of expectations: one at home and one at school. Children may choose to assimilate with the majority culture, rather than maintain their parents' culture, which can put pressure on family relationships.

Moving to a new place, whether by choice or necessity, can be daunting and challenging, both physically and mentally (Figure 2). Imagine you are a refugee spending your last night in your home country, huddled with your family, listening in fear as bombs are dropped overhead, hoping against all odds that you will survive the night. Now, contrast this with a

night in Australia, where you might be watching Netflix, playing on your phone, or working on an assignment due tomorrow.

While it may seem like a blessing to be taken away from war or famine and placed in Australia, it's important to acknowledge that refugees are displaced from their homes. They leave everything behind, including their families, friends and work, to escape. Many have experienced significant trauma, and in their new country, they may face various psychological challenges and often need to learn to speak and write in a new language. These psychological challenges include culture shock, assimilation and marginalisation. How well new arrivals navigate these challenges can determine how well they transition to their new place of residence and is often a focus for cross-cultural research.



FIGURE 2 Escaping Syria may have been a relief for this family, but it may have also meant leaving behind family, friends and cultural customs.

Real-world psychology

Refugee immigrant to Australia

Najeeba Wazefadost was 12 years old when she was smuggled out of Afghanistan to avoid an active war zone. Her journey was not without danger, and before she could reach Australia, the Australian Navy intercepted her vessel, and Najeeba was detained as a humanitarian refugee.

“I had to leave my country Afghanistan in 2000 because of the war and persecution. I am from an ethnic minority called Hazara. Hazaras have been persecuted ever since around 1891. Hazaras still face massacres by officials and warlords in Afghanistan. There was no other choice for us than escaping the country and going to somewhere safe.

“We left Afghanistan without knowing that we were coming to Australia. Sometimes we had to walk barefoot, sometimes we had to get into a truck and hide within a truck, sometimes we were walking in the night. But then we did make our way, it was very difficult to get out of Afghanistan, but we finally got to Pakistan. From Pakistan we went to Indonesia and then to Australia by boat.

“It was a horrifying journey to come to Australia by boat, or I should actually call it a piece of wood. We had to sit in the boat for more than a week, just hoping to survive. We risked being drowned in the Pacific Ocean.



FIGURE 3 Najeeba Wazefadost

“I am a refugee, but that no longer defines who I am. And I thank the education that I've had for that.”

Najeeba has since been granted humanitarian refugee status and today lives in Western Sydney where she is an ambassador for Amnesty International and Welcome to Australia.

Najeeba experienced culture shock and racism when she settled in her new community. She assimilated into Australian society and began helping fellow refugees from her home town as a means of retaining her cultural identity. However, she has also integrated into Australian culture and earned her medical science degree – she was even a finalist in the 2010 Australian Human Rights Person of the year! ▶

◀ Najeeba is just one of many to have faced challenges adapting to a new culture. She was able to overcome these challenges with social support and the aid of many kind Australians who helped her adjust to her new environment.

Apply your understanding

1 **Describe** the challenges that Najeeba faced during her journey to Australia. (2 marks)

2 **Identify** the support systems that help Najeeba maintain her cultural identity while integrating into Australian society. (2 marks)

3 **Describe** the ways Najeeba maintained her cultural identity while integrating into Australian society. (2 marks)

Culture shock

culture shock

feeling overwhelmed by the differences in the culture of a new country that has a very different set of ideals or values from your country of origin

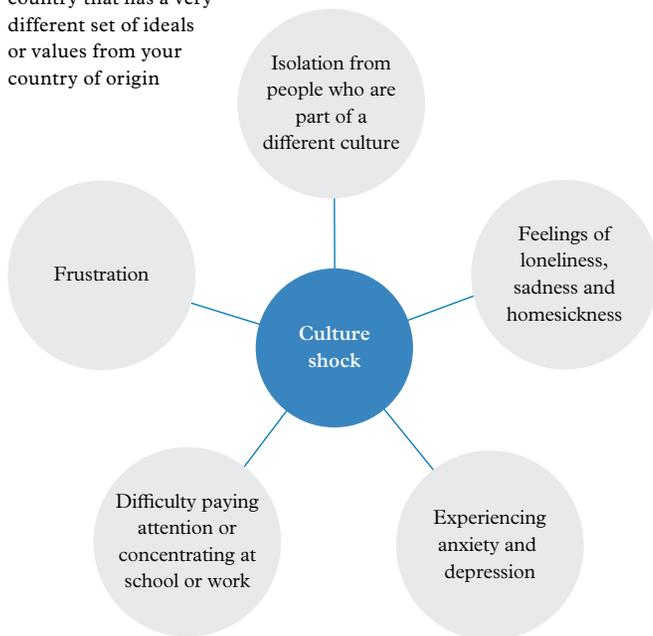


FIGURE 4 Culture shock can have many emotional effects.



FIGURE 5 These fried insects are a local delicacy in Thailand.

Culture shock is a description of how someone might feel when they first migrate to a new country. It is a way to describe the confusion and nervousness a person may have when they arrive in a country that they have never even visited before, and it is the place they must now call home. The cultural disparity between their homeland and their new home may be so large that they feel overwhelmed.

People who experience culture shock experience it in different ways, but some common emotions include feelings of frustration, feeling isolated from their new cultural environment, loneliness, sadness and feeling homesick (Figure 4). People experiencing culture shock may also have difficulty paying attention or concentrating at school or work.

Although culture shock is one of the challenges of immigration, it is a very normal response. In fact, many people travelling abroad even for a short amount of time feel this same sense of confusion that immigrants feel when they move permanently. For example, in some South-East Asian countries, you will see street stalls selling scorpions, grasshoppers and even spiders as food (often fried and on a stick; Figure 5), which is very different from food in Australia. The foreignness of the new cuisine may scare some travellers, which can lead to feelings of homesickness or perhaps feeling sad or unsettled.

Culture shock involves the difficulty in dealing with, or adjusting to, an unfamiliar culture. You may have experienced this yourself, or seen it with international students at your school. The way other people have grown up may be quite different from your experience – the flip side is that they feel the same way about your culture being unfamiliar. Although culture shock can be upsetting and difficult to adjust to, it is temporary. Culture shock can be overcome with time. As a person gets used to their new country and the culture, they feel happier and less homesick at the prospect of living in the new country.

Helping with culture shock

Given the challenges that immigrants face when they start to live within an unfamiliar culture, research has aimed to find ways to make the transition easier. There are many ways in which to improve the ease of transition, some of which are offered here.

- **Education within the majority culture:** In order to prevent an anti-immigrant climate, or **xenophobia** (which can be defined as a fear of strangers or a fear of other cultures), government policies and education could include cultural understanding and diversity in order to minimise discrimination from the majority culture.
- **Creation of new neighbourhoods and communities:** Often when individuals migrate, they leave behind their social support network including family and friends. Not having social support in a new place can be very disorienting and often scary. Therefore, introducing migrants to small communities where others of their culture live can prevent cultural isolation, which can then increase psychological adjustment to immigration and increase the chances of acculturation or even assimilation, and decrease culture shock.
- **Resilience skills:** **Resilience** is the ability of individuals to cope with a potential trauma or startling situation by controlling their reactions and finding means to manage their fear or using strategies to continue to function. This can increase their ability to cope with culture shock and therefore decrease the impact culture shock may have upon them.
- **Learning the language:** Culture shock can be reduced if programs are in place for arriving individuals to learn the local language. This can reduce the disparity between the original culture and the new culture, which can, in turn, decrease the distress at leaving their original home. There are organisations like VoRTCS (Volunteer Refugee Tutoring and Community Support) that provide in-home English language tutoring to refugee families in Brisbane, helping them build language skills and ease the transition into their new culture, thereby reducing culture shock and distress (St Vincent de Paul Society, n.d.).
- **Knowing what to expect:** If an immigrant knows what it may feel like to live in their new culture from friends who may have moved, or even through television and movies, this can often help to reduce the fear of immigration and therefore decrease culture shock.
- **Having friends and family move together:** If a social network can move together to the new place, it will increase resilience and social support, as the group can understand each other and empathise with the changes they are all experiencing.
- **Maintaining culture:** By holding onto their cultural ideals and customs, migrants' fear of losing their cultural identity will decrease, which makes adapting to a new environment and culture easier.

These strategies may help those migrating to Australia to adapt to the majority culture.

xenophobia

fear of, or strong animosity towards, people of different races or cultural backgrounds

resilience

the ability to cope with a difficult situation using mental strategies

Challenge

Social support networks for migrants

To understand the significance of social support networks for migrants and the positive impact of community creation on their adjustment process, research examples of programs or initiatives that help create these communities. Consider how the creation of new neighbourhoods and communities helps migrants adjust psychologically and culturally to their new environment. An example of successful migrant communities in Australia includes the

Ethiopian community in Alice Springs, who have brought their unique cuisine to the area, enriching the local culture and creating a sense of belonging for other Ethiopian migrants (Department of Home Affairs, n.d).

Explain the importance of community creation for migrants and **describe** how these communities can help reduce cultural isolation and improve psychological adjustment.

Assimilation

Once culture shock has passed, a new immigrant to Australia may then adopt parts of the culture. For example, a new immigrant to Australia may choose a cricket or rugby team to support, enjoy the local cuisine and may even adopt some of the local customs.

These changes in immigrant populations, where migrants adopt local cultural ideals, is called **assimilation**. This means that the migrants slowly lose aspects such as language, food and rituals that separate their culture from the dominant Australian culture, and eventually the minority and majority culture have little difference.

Assimilation is not an all or nothing event. It can happen in degrees, so even though there are some majority cultures that may totally assimilate a minority culture, it is not often that cultures are completely absorbed into the majority. In fact, most cases of assimilation are a two-way process, meaning that even though there are drastic changes to the minority culture, there are also changes in the majority culture during this process. Australia has been referred to as a “melting pot” of cultures; in some ways this is correct. Think of assimilation like a stew. When salt is added to the stew, it is absorbed, and the taste remains in the final meal. With assimilation, the minority culture has added elements to the majority culture over time.

However, while assimilation can be a positive experience for some, it can be a negative experience for others if it is forced. Historically, forced assimilation policies had devastating effects on Australian First Nations Peoples. The assimilation policy, created by the Commonwealth Government in 1937, aimed to absorb First Nations people into the rest of the population, effectively attempting to erase Aboriginal culture, family ties and communities (Evolve Communities, n.d.). This policy led to the forced removal of Aboriginal and Torres Strait Islander children from their families, known as the Stolen Generations. These children were placed in government-approved foster homes or religious institutions (known as Missions), often facing significant trauma and loss of cultural identity (Anthony & Blagg, 2020). The negative effects of forced assimilation included the loss of language, cultural practices and connection to land and family. Many First Nations people were also subjected to lower wages, no social security and segregation from mainstream society (whites-only venues). The impact of these policies is still felt today, with ongoing efforts being focused towards reconciliation and recognition of the injustices faced by Indigenous communities.

If assimilation is the seasoning in a stew, multiculturalism is like a salad bowl.

Multiculturalism holds that minority culture groups should be able to retain some of their original cultural norms, values and practices even within the majority culture’s framework. When you think of multiculturalism as a salad bowl, a minority culture may need to embrace a new culture (the salad) but is able to retain some of its original cultural norms (the seasoning/dressing for the salad).

Multiculturalism is thought to decrease prejudice and increase migrants’ self-esteem as it preserves some of their traditions, while respecting the laws and traditions of the culture they have migrated into. An example is shown in Figure 6 where an Australian police officer is dressed in the hijab as part of her cultural traditions – but with the official uniform and responsibilities of the Australian police – showing assimilation with the majority laws and rules but keeping part of her culture as part of Australia’s multicultural “mosaic”.



FIGURE 6 Maha Sukkar is the first Australian police officer to wear the hijab. This is an example of a migrant embracing the traditions of her own culture and also assimilating into the majority culture of her adopted homeland, contributing to cross-cultural communication and safety in Australia.

Marginalisation

Marginalisation occurs when a person, group or idea is treated as unimportant or pushed to the edges of society, which can prevent them from fully engaging in the social, economic and cultural activities of the country they live in. Immigrants often experience marginalisation by being excluded from participating fully in the social, economic and cultural life of the host country. This exclusion can lead to significant psychological challenges, including feelings of isolation, depression and anxiety. Marginalised individuals often feel isolated because they are not fully accepted by the majority culture and may also feel disconnected from their own cultural group. This lack of belonging can lead to loneliness and social withdrawal (Andronic & Constantin, 2024).

Immigrants experiencing marginalisation may struggle with their identity. They might feel torn between their original culture and the new culture, leading to confusion and stress about where they fit in. They may also face discrimination and stigma, which can severely impact their mental health and can limit access to job opportunities, education and social services. For example, immigrants often face discrimination in the workplace, including being overqualified for their jobs, experiencing harassment and being subjected to unfair labour practices. For instance, one study found that 22 per cent of migrants in the US were employed in private households where they faced long hours, no overtime pay, and even abuse (United Way NCA, n.d). This economic disadvantage can exacerbate stress and anxiety, making it harder for individuals to improve their situation. The cumulative effect of social isolation, identity confusion, discrimination and economic hardship can lead to serious mental health issues, including depression, anxiety and even post-traumatic stress disorder (PTSD).

marginalisation when a person, group or idea is treated as unimportant or pushed to the edges of society

Skill drill

Evaluating evidence from a scoping review

Science inquiry skill: Evaluating evidence (Lesson 1.8)

A study conducted by Manderson and Allotey (2003) investigated how asset-based community development (ABCD) approaches can enhance resilience among refugees and recent migrant communities in Australia. It sought to identify the existing literature on ABCD and its effectiveness in promoting community resilience.

A scoping review was conducted, examining 33 sources that met the inclusion criteria. A scoping review is a type of research synthesis that aims to map the existing literature on a broad topic to identify key concepts, research gaps and types of evidence. Scoping reviews differ from systematic reviews in that they are more exploratory in nature. Instead of focusing on specific research questions, scoping reviews aim to map out the breadth of existing evidence, clarify key concepts and guide

future research. They are particularly valuable when dealing with complex topics or areas that have not been thoroughly reviewed before (McLeod, 2023).

The literature was reviewed across six themes: integration and identity, health, mental health, education, employment and community planning. The review involved searching research databases for relevant articles and synthesising the findings. It found that ABCD approaches can significantly alleviate issues within the six themes. Effective approaches included:

- enhanced integration and identity through community support networks
- improved health and mental health outcomes due to culturally appropriate programs
- increased educational and employment opportunities facilitated by community initiatives
- effective community planning that incorporates the needs of refugees and migrants.

◀ The study concluded that ABCD approaches are promising for boosting resilience among refugee and migrant communities in Australia. It recommended that service providers incorporate culturally appropriate programs and that government policies focus on improving community engagement. The findings suggest that a sustained and broader approach is necessary to achieve widespread change, and further research and funding are required to explore and implement effective responses. This study highlights the importance of community-based

strategies in supporting the psychological and social adjustment of migrants, ultimately reducing cultural isolation and enhancing their overall wellbeing.

Practise your skills

- 1 **Identify** the aim of the study conducted by Manderson and Allotey (2003). (1 mark)
- 2 **Explain** the key finding from the study relating to ABCD approaches. (2 marks)
- 3 **Describe** how community-based strategies support migrants, according to the study. (1 mark)

Check your learning 18.1



Check your learning 18.1: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 **Define** “culture shock” and give an example of how someone might feel if they had culture shock. (2 marks)
- 2 **Describe** marginalisation. (1 mark)
- 3 **Identify** a difference between acculturation and assimilation. (1 mark)

Analytical processes

- 4 **Analyse** the cultural policy of the United States and suggest if it is more likely to favour assimilation or acculturation. (2 marks)
- 5 **Apply** your knowledge of discrimination and prejudice as well as the strategies given to aid migrants and come up with an activity that could

be done at school to help migrants at your school. (2 marks)

- 6 Assimilation can be a positive experience for some individuals and groups but a negative experience for others. **Describe** examples of positive and negative experiences of assimilation. (2 marks)
- 7 **Compare** marginalisation and assimilation. (2 marks)

Knowledge utilisation

- 8 **Discuss** the statement “Australians who dislike acculturation are racist” from a balanced perspective and give examples to support each side of the argument. (4 marks)

Lesson 18.2

The challenges of cultural diversity

Key ideas

- Cultural diversity is the range of cultural norms or cultural traditions that exist within a society. It can be a very beneficial aspect of a society, but it can also lead to conflict, especially if the ideas and values of the cultures are very different.
- Cultural diversity can contribute to the formation of stereotypes and prejudice. There are several theories about how and why prejudice is formed.

- People can express prejudice in several ways, including xenophobia, racism and ethnocentrism. This behaviour can increase hostility and lead to conflicts.
- Racism is negative actions geared towards those from a different group based on their race. Implicit racism includes unconscious or covert actions, whereas explicit racism is outward or overt racist action.
- Dunn (2004) investigated racism in Australia and how it can be decreased by increasing exposure to people from other cultures. His research established that the quality of the interactions doesn't matter; as long as there is increased contact, this will serve to decrease prejudice.



Learning intentions
and success criteria

Cultural diversity

Cultures around the world are unique and often have been shaped by historical factors. With cultures differing so markedly from each other, it is not surprising that there can be aspects of one culture that may be the polar opposite to the core values of another culture. Therefore, if these conflicting cultural beliefs cannot be assimilated or negotiated, it can lead to the formation of stereotypes, which can increase the occurrence of prejudice and racism.

Cultural diversity is the range of cultural norms or cultural traditions that exist within a society. This cultural diversity can be a very beneficial aspect of a society; however, it can also be detrimental if conflicts arise due to the differences between cultures, and this can lead to stereotypes, prejudice and discrimination.

cultural diversity
the many cultural,
racial and ethnic
groups in a society

Formation of stereotypes and prejudice

In previous modules, we have explored how attitudes are formed and how they are experienced. We explained attitudes by exploring three components: the cognitive (how we think), the affective (how we feel) and the behavioural (our actions and behaviours). These interact and help us to assess our perspectives and attitudes about a given situation.

Prejudice involves having negative thoughts and feelings towards another group, and these thoughts, feelings and actions are not based on logical reasoning (Allport, 1954). Prejudice can also lead to discrimination, which is the action or behaviour that stems from these negative thoughts and feelings. For example, someone shouting a racial slur at someone from a different race is racism, an example of discrimination. Discrimination is based on the behavioural aspect of the ABC model of attitudes.

Stereotypes, on the other hand, are based on the cognitive aspects of attitudes. A stereotype is a long-lasting belief that all members of a particular group have a particular characteristic in common (Bartlett, 1932). Sometimes these stereotypes are true or partly true, but most of the time it is an over-generalisation, and this can lead to prejudice and discrimination due to the lack of understanding of a particular culture or group of people (Figure 1). For example, the stereotype that all people from a certain country are unfriendly is not true for everyone from that country. However, this stereotype could lead to people from other cultures avoiding interactions with them or treating them unfairly in social or professional settings. This lack of understanding and over-generalisation can create barriers and contribute to discrimination against individuals from that cultural group.



FIGURE 1 Culturally diverse groups can discourage discrimination, but they can also increase chances of prejudice and racism.

schema

an organised mental framework about a person, place or thing

Historically, having stereotypes allowed us to respond quickly to situations by allowing our brains to use previous experiences to assess a situation quickly in order to potentially increase our chances of survival. Even though they can lead to discrimination and prejudice, stereotypes can also be helpful in certain situations. Depending on our previous experiences, we may develop **schemas** (social categorisation or having a set of characteristics that are common for a specific group of people) for a certain cultural group, which can lead to the formation of stereotypes. Therefore, the role of culture in prejudice, and the subsequent actions that result in discrimination, must be considered to fully understand the role of culture in behaviour.

Role of culture in prejudice

Prejudice can be defined as an opinion about a person or group of people that is negative and not based on logical reasoning (cognition aspect of attitudes). There are many factors that can cause cultural misunderstanding, which can lead to prejudice towards a particular group of people. Some of the key factors are discussed here:

- **Cultural insensitivity and lack of awareness:** Educators, healthcare professionals and other workers may lack cross-cultural experience or understanding, and may offend people from a different culture with certain advice or methods of interaction. This includes cultural practices such as dietary requirements (Figure 2), as well as lifestyle factors, such as not being able to work on certain days for cultural reasons. If an employer or individual misunderstands these cultural differences as a person not wanting to eat their food, or perceiving their inability to work on a certain day as lazy, this can increase the chance of conflict.



FIGURE 2 Different religions avoid certain meats; Catholics typically do not consume meat except for fish during Lent, Jewish people typically don't eat pork, and Hindus typically don't eat beef. If this were to be misinterpreted as simply being a fussy eater, it could cause offence or create frustration.

- **Different verbal and non-verbal communication styles:** The use of words may vary greatly between one culture and another. For example, in Australia a person saying “Yes” to performing a task is accepted as a verbal agreement, but in another culture, it may actually mean that the person is not resistant to the idea and will think it over, or the person may have only said yes because it would be considered rude not to. Therefore, this could lead to misunderstanding and the development of prejudice towards another culture, seeing people of that culture as unreliable. In addition, differences in non-verbal communication can be a source of conflict. For example, in some Aboriginal cultures, it is impolite to look directly into someone's eyes when you are speaking with them; however, in the dominant Australian culture, a lack of visual contact is often perceived as rude or untruthful, leading to misunderstanding and potential conflict (Queensland Health, n.d.). (Note: Some Aboriginal and Torres Strait Cultures also have restrictions with direct communication between males and females. For example, females cannot speak to males directly and must have male representation with them.)

- **Work ethic and approaches to completing tasks:**

There are generally two types of people when it comes to task completion: those who are task-oriented and those who are relationship-orientated. This may cause frustration if individuals from a culture that values one type of task completion are working with people who favour the other type of task completion. For example, have you ever heard of “Fiji Time”? This means the task you are waiting on will take a while, as Fijians tend to be relaxed when it comes to time and value making strong relationships with their customers rather than completing the task quickly (Figure 3). If you are not used to waiting or forming relationships, this can cause conflict because you think the task is not being performed quickly enough.



FIGURE 3 Fijian culture focuses more on building relationships than on completing work quickly.

- **Decision-making styles:** Different cultures have different ways of making decisions. For example, in Indigenous Australian cultures, people achieve a majority in their clan, especially with the support of their elders, before making a decision. The time needed for a consensus to be reached may delay decisions, and become frustrating for someone who does not understand this cultural norm, especially someone from a more individualistic culture where a person can make a decision on their own (National Indigenous Australians Agency, n.d.). This may then lead to conflict between the cultures.

The factors discussed here suggest that culture can affect the amount of tolerance and frustration individuals may feel due to misunderstandings related to cultural differences. This frustration may lead to formation of stereotypes of a particular cultural group and in turn may develop into prejudice. This prejudice can be expressed as xenophobia, ethnocentrism and racism. From a psychological standpoint, there are three main perspectives that can explain this formation of prejudice: biological, cognitive and sociocultural.

Expressions of prejudice

Three different expressions of prejudice are xenophobia, ethnocentrism and racism.

Xenophobia

Prejudice in the form of xenophobia is derived from a fear of unfamiliar situations or strangers. This fear is often attributed to individuals perceived as a part of an out-group or those who are physically different or have different values. This type of prejudice can lead to conflict. New immigrants may be from a land that is culturally very different from the host country. For existing people in the host country, this can sometimes lead to distrust and discrimination due to the fear that the foreign cultural ideals will affect the status quo in the majority culture.

Ethnocentrism

Ethnocentrism is prejudice or negative feelings towards a whole culture. This type of prejudice stems from the feeling that one’s own culture is superior to that of another. People who display this type of prejudice may protest the inclusion of any other culture into their current society. They may also highlight concerns about national security as a prime reason for stopping people from other countries migrating into their country.

Study tip

You can evaluate the cultural context of the research when conducting your research investigation. Consider whether the study’s design, participants and interpretations are influenced by the researchers’ own cultural biases. Being mindful of this can help you assess whether the research findings are universally applicable or if they might be limited by ethnocentric perspectives. This approach helps ensure a more comprehensive and fair evaluation of psychological research.

ethnocentrism

valuing one’s own ethnicity or culture more than others, and acting with prejudice towards other groups or people

Racism

racism

negative emotions or actions towards someone based on their race

race

the grouping of people based on common descent

Racism is a form of prejudice towards someone based on race or religion. It is similar to ethnocentrism because this prejudice towards race comes from the belief that one's own race is superior to another race. **Race** suggests grouping humans according to their common descent. By displaying acts of racism, an individual is judging another person by their race or their physical attributes, and having negative attitudes towards a person based solely on what can be seen rather than anything known about the individual.

There are two types of racism: implicit and explicit. They each display their negative acts upon individuals differently.

Implicit racism

implicit racism

negative actions towards members of a different cultural group that are covert and often unconscious

Implicit racism refers to the unconscious biases and attitudes that individuals hold towards people of different racial or ethnic groups. It occurs when individuals use unconscious biases when making their decisions and judgments about people from different cultures or ethnic groups. These biases can influence perceptions, behaviours and decisions without the individual being consciously aware of them. Examples of this type of racism are:

- people fearing or mistrusting people who do not look the same as themselves (Figure 4)
- police pulling someone over due to the colour of the person's skin or the way they look
- juries being more likely to bring in a guilty verdict for suspects who have a particular colour of skin
- dismissing job applicants based on a foreign-sounding name
- media presenting people of particular ethnicity in a negative way.



FIGURE 4 Trayvon Martin was shot after an individual allegedly became suspicious of Martin on the basis of his skin colour.

explicit racism

negative actions towards members of a particular cultural group that are overt, such as a racial slur

- actions of hate groups such as neo Nazis, the Ku Klux Klan and white nationalists
- political parties that support racist policies and openly attack certain cultures
- racial slurs, slang or derogatory terms to refer to a particular race
- supporting racism openly by talking negatively about particular cultural groups.

This type of racism is still very present in the world today. Even though it would be nice to think that explicit racism no longer has a place in Australia or anywhere around the world, further education and political changes are needed in order to reduce this type of prejudice.

All of these acts are considered to be implicit in nature. They can often be due to xenophobia, especially when seen in children, and can be learnt from the media, family members or the local community. This type of racism is very difficult to correct as often the person is unaware of the bias they have towards people of a particular ethnicity, and therefore will deny having such racist thoughts or ideas. However, implicit racism is common.

Explicit racism

Explicit racism exhibits in a different way from implicit racism. This type of racism is overt and very intentional in nature. It is blatant racial prejudice of a group of people. Examples of explicit racism are:

Challenge**Racism in Australia**

Research online to investigate an incident of racism in Australia. **Determine** if the incident was caused by xenophobia, implicit racism, explicit racism or several of these options. As a class, **discuss** how racism can be reduced.

Real-world psychology**Prejudice expressed as racism in Australia**

In 2004, Kevin Dunn investigated 5,056 Queenslanders and residents from New South Wales using telephone surveys to obtain data on “racist attitudes” and “experiences of racism”, including asking if the respondents had ever experienced discrimination due to their race or ethnicity. This question about discrimination reflected experiences of racism across a variety of settings such as the workplace, educational institution, when renting or buying real estate, when approached by police, as well as everyday situations such as at the shops, restaurants and going to a football game or other public event. The results showed that the overall experiences of racism were higher for Aboriginal and Torres Strait Islander peoples (twice as often as non-Indigenous Australians). Those who were born overseas or speak a language other than English experienced racism almost four times more than native-English-speaking Australians.

Apply your understanding

- 1 Identify** potential challenges in addressing the implicit forms of racism identified in the study, and describe how each might be overcome. (4 marks)
- 2 Explain** the implications of the higher rates of racism experienced by Aboriginal and Torres Strait Islander peoples for policymakers and community leaders in Australia. (2 marks)
- 3 Discuss** how the the findings of Kevin Dunn’s 2004 study could be used to develop strategies to reduce racism in various settings such as workplaces and educational institutions. (2 marks)

In addition, more than 15 per cent of Australians had experienced racism in the workplace, in an education setting or both, and 25 per cent had experienced racism in shops, restaurants or public events where they were targeted either implicitly or explicitly by other individuals. Interestingly, there was also an age effect in the results, where younger Australians were more aware of the racism that goes on around them and were less likely to experience incidents of racism from same-aged peers. This is likely due to awareness-raising programs and other strategies that have been put in place in Australia in recent years. However, even given the decreased incidents, Dunn has clearly identified that racism is very much still alive as a form of prejudice in Australia. It therefore needs to be further explored in order to educate and put strategies in place to decrease racism.

Real-world psychology**Implicit racism**

When two African American men asked to use the bathroom at a Starbucks in the United States, the white manager refused them access by stating that only customers were permitted to use the facilities. The two men then sat at a table without having

purchased anything. When the manager enquired about their intentions they claimed they were waiting for a friend to arrive to join them. Instead of allowing these men to remain in the store, the manager called the police and the men were arrested but were not

charged with anything. The actions of the manager demonstrate implicit racism. The manager assumed the worst when the two men remained in the store without purchasing anything, likely discriminating against the two men based on the colour of their

skin rather than their actions. Starbucks has since apologised and is now offering training in implicit bias to prevent similar incidents occurring again in their stores.

Apply your understanding

- 1 Describe** how the manager's actions at Starbucks could be used to illustrate the impact of implicit racism in everyday situations. (2 marks)
- 2 Identify** a strategy businesses can take to prevent incidents of implicit racism from occurring in their establishments. (1 mark)
- 3 Explain** how understanding implicit racism could help individuals reflect on their own behaviours and attitudes towards people of different racial or ethnic backgrounds. (2 marks)

Changing attitudes and decreasing prejudice

Smith and colleagues (2002) suggested that the best way to be open to cultural diversity and to decrease prejudice is to increase contact with other cultures, be aware of different cultures and keep an open mind. Working together to better understand and communicate with those who come from other cultures is vital to educating individuals, increasing trust and decreasing the mystery of unfamiliar cultures.

In order to form new relationships, it can be useful to find commonalities between two cultures. Having said this, understanding the differences between the cultures can mean avoiding misunderstandings or frustrations that can build up due to lapses in communication between individuals. In Lesson 18.3, other factors that can decrease prejudice will be discussed to demonstrate ways in which individuals can act in order to overcome prejudices.

Check your learning 18.2



Check your learning 18.2: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** the two types of racism, using examples. (4 marks)
- 2 Explain** how cultural diversity can be a source of conflict, using an example. (2 marks)

Analytical processes

- 3 Distinguish** between racism and prejudice. (1 mark)
- 4 Compare** implicit racism and xenophobia. (2 marks)

- 5 Contrast** ethnocentrism with explicit racism. (1 mark)

Knowledge utilisation

- 6 Discuss** the positive and negative aspects of cultural diversity. (2 marks)
- 7 Investigate** the cognitive processes behind the formation of stereotypes and their impact on people's attitudes and behaviours towards different cultural groups. **Explain** how stereotypes can lead to prejudice and discrimination. (4 marks)

Lesson 18.3

Reducing prejudice

Key ideas

- The contact hypothesis outlines how prejudice can be minimised. It includes increasing the contact between groups of individuals, which in turn will increase understanding between the two groups of people.
- Prejudice can be decreased by increasing intergroup contact and ensuring sustained contact, setting mutual goals that require cooperation from both groups and depend on them working together and working at an equal power level.
- Cognitive approaches can also be used to minimise prejudice by using strategies to change the way people think rather than changing social interactions.
- Cao and colleagues' 2015 study is an example of the contact hypothesis achieving its goal of decreasing prejudice in a real-life setting.
- Matsumoto (2007) used emotional displays that are universal for all cultures to show that reading others' emotional cues may be a useful way to understand people from other cultures and to decrease potential prejudice.



Learning intentions
and success criteria

The contact hypothesis

The first step to reducing prejudice is to be open-minded and aware of the different factors that can decrease prejudice. Factors such as sustained intergroup contact, superordinate goals, mutual interdependence and equality of status are all ways to decrease prejudice and resultant discrimination, including racism. These factors allow differing cultures to increase their exposure to one another and therefore understand the basis of their respective cultures in more depth.

Allport (1954) postulated the contact hypothesis, which states that increasing the interaction between groups that are in conflict can reduce prejudice. By spending more time together, individuals from different groups get to know each other, and stereotypes and misconceptions can be broken down. The factors mentioned not only suggest an increase in contact between groups that may be in conflict, but also key ways in which to improve cooperation and working towards similar goals in order to decrease prejudice.

Intergroup contact

Increasing contact with those we deem to be different from ourselves can reduce prejudice because it can increase the sharing of ideas between the two groups or two individuals, which in turn can increase the individuals' awareness of shared ideals, values and goals. By increasing **intergroup contact** and finding similarities between the two groups, the frustration or fear that one may feel about an unfamiliar culture may be reduced.

Long-term contact can be more effective than many shorter bursts of contact in combating stereotyping. This increased duration of contact between those who hold the stereotype and those who have been stereotyped is called **sustained contact**. This can be achieved, for example, by having individuals from different cultures working together on a project or sharing a goal over a longer period of time.

intergroup contact

contact or exposure to a particular group of people

sustained contact

long-term interaction between individuals of different cultural backgrounds



FIGURE 1 Sustained contact with people you have stereotyped can decrease prejudice.

This extended contact will allow individuals who hold a particular stereotype to get to know the other individual better, and potentially dispel the held stereotype about the person or group of people. Long-term contact can increase the chance of individuals finding out more about each other and, therefore, is able to decrease prejudice more effectively.

Reducing prejudice through intergroup contact

Cao, a researcher from the Queensland Brain Institute, reviewed research that suggests that when an individual observes someone in pain, there is activation in the sensory

and emotion areas of the brain. Interestingly, earlier research suggested that observing someone in pain who is the same race as you results in higher activation of the brain areas compared with observing someone from another race. Given these findings, Cao aimed to investigate if newly arrived immigrants to Australia would display this same racial bias when observing an individual in pain. Cao also wanted to see if this bias changed over time, as immigrants got to know the local people better as they spent more time in Australia.

Cao and colleagues (2015) chose 30 participants who had recently arrived from China to participate in their study at the University of Queensland. Participants were only recruited to the study if they completed their primary and secondary education in China and they had resided in Australia for fewer than 5 years.

The method utilised an fMRI to measure the brain activity of the participants while they observed videos of people from their own race or from another race receiving painful and non-painful stimuli. Additionally, rating scales and the level of contact participants had with those from different cultures from their own were recorded prior to the study commencing.

The results were similar to those of previous research. Participants' brain activity increased when they observed individuals from their own race in pain. Another interesting finding was that the activity within an area of the brain called the anterior cingulate (an area in the brain that is thought to be associated with feelings of empathy) positively correlated with the level of contact participants reported having with individuals from other races. In other words, the more contact a participant had with people from other races, the higher their feelings of empathy towards those individuals. It is also interesting to note that the closeness or quality of the personal relationship did not affect the increase in empathy; simply being in contact with other races more often increased the strength of the correlation between brain activity and observations of pain. Therefore, Cao and colleagues concluded that racial bias can be decreased by increasing levels of intergroup contact, even if the contact is not particularly meaningful. It is simply the regularity of contact that can reduce prejudice, in this case in the form of neural activity.

Real-world psychology

Changing history by increasing intercultural understanding

Rosa Parks is often referred to as the mother of the civil rights movement in the United States. What she did may seem like such a small gesture, but back in 1955, it was possibly the most extreme and brave

action anyone could have taken. During the height of the segregation of “Whites” and “Blacks” in the United States, there were separate schools for white and for black children, black people had to move

seats on a bus or stand if asked by a white person, and marrying someone from another race was illegal in some states. Conflict was common between the blacks and the whites and the measures to keep the races apart did nothing to decrease conflict. In fact, the separation of the races increased the hostility. On 1 December 1955, Rosa Parks boarded her normal bus in Montgomery, Alabama. She sat on a seat in the city bus, and when a white man asked her to surrender her seat, she refused. Four days later, after she was arrested for her action (it was law to abide by segregation rules), waves of protesters ran through the streets asking for equality for the races in the United States. After her arrest, black people, and many white people boycotted the city bus line for over a year. The media and the government took



FIGURE 2 Rosa Parks sitting in the “wrong section” of the city bus in 1955 and refusing to move for a white man when requested by the bus driver

notice after the protests, broadcasting more about individuals from African American backgrounds on national television. Martin Luther King Jr acted as the spokesperson for the bus boycott and he stressed that the protests were nonviolent. Thousands of people, both black and white, marched together in the protests with the aim of changing the racist laws of the United States and changing the perspectives of those in government so that equality could be achieved for the African American people. Rosa Parks became a leader and a spokesperson for decreasing conflict between whites and blacks, and for achieving equality between the races. She is an example of how one person can make a big difference by increasing intercultural understanding.

Apply your understanding

- 1 Describe** the role of nonviolent protests, such as the bus boycott led by Martin Luther King Jr, in changing public perceptions and laws regarding racial segregation. (1 mark)
- 2 Explain** how the segregation laws and practices in the United States during the 1950s contributed to increased hostility and conflict between racial groups. (2 marks)
- 3 Explain** how increasing intercultural understanding can decrease prejudice and conflict, using the Rosa Parks example as evidence. (2 marks)
- 4 Identify** a modern-day example of individuals or movements that have drawn inspiration from Rosa Parks and the civil rights movement to address issues of inequality and discrimination. (1 mark)

Superordinate goals

Superordinate goals are shared goals that are so big that no individual or single group could achieve success on their own. It requires cooperation from both groups of people in order to achieve the goal. These goals must be more important than lesser goals so that both groups find value in achieving the goal, which will mean that they are more likely to work together for mutual benefit.

In working together as members of a group, conflicts between the two groups may be reduced because this cooperation allows individuals to feel like they are part of the unified community rather than individual members of two separate groups. This sense of membership within a united group can mean that individuals who were initially part of

superordinate goals

shared goals whereby members within one group cannot achieve the overall result without the help of the other group

Study tip

Cross-cultural psychology builds on many ideas that were covered in Modules 11 to 17. Refer back to these modules if you need to.

mutual interdependence

when two groups must rely on each other to successfully complete a task

the out-group can now be considered as part of the in-group. Working together can also remove stereotypes, as individuals get to know personal aspects of the individuals from the other group, which can decrease prejudice (Sherif et al., 1961). In terms of cross-cultural psychology, superordinate goals are often seen in terms of world politics.

Mutual interdependence

Sherif's (1961) study highlights another factor that can reduce prejudice. **Mutual interdependence** is where people depend on another person or group to meet their goals. In other words, if all the people involved in a project or activity have a shared vision and a shared goal, then it is likely that they will cooperate in order to achieve those goals. For example, in a soccer team (Figure 3) there are people from many different races and age groups, but one thing they have in common is that they all want the premiership; they are all striving towards the same goal. In fact, they depend on each other to reach that goal. Having a mutual dependence on the members of your group can increase the ability to work well and peacefully within the group.



FIGURE 3 These soccer players have mutual interdependence on each other. They have to work together every game they play to increase their chance of winning.

Equal-status contact

equal-status contact

contact between members of two different groups on the same level and with the same amount of power

Equal-status contact suggests that social interactions need to occur where there is no power difference, and communication and actions are performed on the same level. In other words, if those who have prejudice against a particular group have more regular contact with that group, the interactions that exist must be on the same level, where one group cannot exert more power or dominance over the other.

Grack and Richman (1996) researched whether having equality in interactions between different groups would decrease previously held prejudices. Mixed-race groups were formed in the work and home environments and as long as their interactions were on the same level (i.e. student to student or colleague to colleague rather than principal and student or manager and colleague), it increased an individual's understanding of the other group and decreased prejudice.

Challenge**Emotional display**

Professor David Matsumoto works for the San Francisco University psychology department in the United States. His speciality is facial and emotional expressions and how these differ cross-culturally.

His recent research is based upon previous findings that there are differences across cultures in the perception of emotional expression. Matsumoto (2007) decided to extend upon this previous research by conducting three experiments. The aim of all three experiments was to test how well people can judge emotions from the faces of people from different cultures from their own. They were shown facial emotional expressions from Japanese and Caucasian photographs as part of the JACFEE set (Japanese and Caucasian Facial Expressions of Emotion). The participants were asked to match

each photograph with a list of emotions and predict what the person in the photograph was about to do next. In the second and third experiment, the participants were told the nationality of the people in the pictures before they were asked to assess the emotions.

The results showed that, regardless of a person's nationality, all participants were able to accurately assess basic emotions on both the Japanese and Caucasian faces. They were able to do this whether or not they were told of the photographed person's nationality first.

Justify a possible implication of this finding on improving conflicts between cultures, and **evaluate** the study, giving at least two strengths and two limitations.

Check your learning 18.3

Check your learning 18.3: Complete these questions online or in your workbook.

Retrieval and comprehension

- 1 Describe** three factors that can reduce prejudice. (3 marks)

Analytical processes

- 2 Apply** the contact hypothesis to a real-life situation where you did not really like a person in your class, or perhaps in your sporting club, but one of the factors allowed you to get to know them better and decrease your prejudice towards the new person. **Describe** how the factor changed your relationship with that person. (1 mark)
- 3 Distinguish** between superordinate goals and mutual interdependence. (1 mark)
- 4 Compare** intergroup contact and equality of status. (2 marks)
- 5 Analyse** the following case study and **explain** why this solution may have decreased conflict between the colleagues. (2 marks)

Mary and Steven work together in a big law firm in Australia. Mary was born in Australia while Steven is originally from Egypt. They were tasked to work on a project together, but within two days, Mary had asked to be transferred because Steven kept trying to take over and would not listen to her perspective. The manager decided to invite the pair out for dinner with their families. Although Mary and Steven thought this was strange, they obliged and went out to share a meal together. Within a week of this informal gathering, the pair worked much better together.

Knowledge utilisation

- 6 Evaluate** the 2015 study by Cao and colleagues, and suggest a possible improvement to their research method. (3 marks)
- 7 Assess** the significance of Matsumoto's 2007 study in understanding culture, cultural diversity and racism. (3 marks)

Review: Cultural diversity

Summary

- 18.1**
- Immigration is the movement of people from their original homeland to a new country or place where they do not possess citizenship.
 - Acculturation is a process where an immigrant embraces the laws and customs of their new country, while retaining their own cultural ideals at the same time.
 - The psychological challenges of immigration and acculturation include culture shock, assimilation and marginalisation.
 - Culture shock can lead to a lack of integration by immigrants because massive differences between cultures can overwhelm individuals.
 - Assimilation is the adaptation of a new immigrant taking on all the aspects of the host culture and giving up their own.
 - Marginalisation occurs when individuals or groups are treated as unimportant, leading to exclusion from social, economic and cultural activities. This can result in significant psychological challenges, identity struggles, discrimination and economic hardship, particularly for immigrants.
- 18.2**
- Cultural diversity is the range of cultural norms or cultural traditions that exist within a society. It can be a very beneficial aspect of a society, but it can also lead to conflict, especially if the ideas and values of the cultures are very different.
 - Cultural diversity can contribute to the formation of stereotypes and prejudice. There are several theories about how and why prejudice is formed.
 - People can express prejudice in several ways: xenophobia, racism and ethnocentrism. This behaviour can increase hostility and lead to conflicts.
 - Racism is negative actions geared towards those from a different group based on their race. Implicit racism includes unconscious or covert actions, whereas explicit racism is outward or overt racist action.
 - Dunn (2004) investigated racism in Australia and also how it can be decreased by increasing exposure to people from other cultures. His research established that the quality of the interactions doesn't matter; as long as there is increased contact, this will serve to decrease prejudice.
- 18.3**
- The contact hypothesis outlines how prejudice can be minimised. It includes increasing the contact between groups of individuals, which in turn will increase understanding between the two groups of people.
 - Prejudice can be decreased by increasing intergroup contact and ensuring sustained contact, setting mutual goals that require cooperation from both groups and depend on them working together and working at an equal power level.
 - Cognitive approaches can also be used to minimise prejudice by using strategies to change the way people think rather than changing social interactions.
 - Cao and colleagues' 2015 study is an example of the contact hypothesis achieving its goal of decreasing prejudice in a real-life setting.
 - Matsumoto (2007) used emotional displays that are universal for all cultures to show that reading others' emotional cues may be a useful way to understand people from other cultures and to decrease potential prejudice.

Review questions 18.4A Multiple choice



Review questions: Complete these questions online or in your workbook.

(1 mark each)

- 1 How would you describe superordinate goals?
 - A They are used to decrease prejudice between groups.
 - B They need a powerful leader to motivate both groups to achieve their goals.
 - C They will only be able to decrease prejudice if the groups already know each other.
 - D They are shared goals that cannot be achieved without cooperation from both of the groups.
- 2 Which is an example of explicit racism?
 - A Assuming someone with darker coloured skin may not be able to speak English
 - B Seeing a Chinese name on a job application and putting that application in the rejection pile
 - C Discriminating when choosing sports teams by excluding people who are from an Indian background
 - D Someone saying a racial slur under their breath as they pass an individual from a different nationality
- 3 Yingji and Peter work for the same place and have worked for the same amount of time doing the same job. Yingji earns \$10,000 less per year than Peter. Which concept does this example represent?

| | |
|--------------|------------------|
| A Judgment | B Prejudice |
| C Stereotype | D Discrimination |
- 4 How can multiculturalism reduce racism?
 - A By increasing exposure to different cultures
 - B By giving equal power and status to different cultural groups
 - C By increasing power to one cultural group and not the other
 - D By recognising that some groups are better than others within the society
- 5 What is the difference between assimilation and acculturation?
 - A Culture shock is only relevant to assimilation and not acculturation.
 - B One is concerned with immigration and the other is only relevant to migration.
 - C Acculturation involves a person losing their cultural ideals to a larger culture, whereas assimilation does not.
 - D Assimilation involves completely integrating into a culture and losing original cultural ideals in order to live in the framework of the host culture, whereas acculturation does not.
- 6 Jimmy and Saveen came into conflict at school due to prejudice that had formed between the two of them because their cultural values are very different. The teacher decided to create a superordinate goal for the pair and assigned Jimmy as the leader and Saveen as the worker. Is this likely to decrease the current prejudice between the pair?
 - A Yes, because superordinate goals always decrease prejudice.
 - B No, because there is no equality in the role assignments for the goal.
 - C No, because superordinate goals only require one person to achieve the set goal.
 - D Yes, because Jimmy will be able to lead, and as a leader he must get to know Saveen better, which will decrease prejudice.
- 7 When Kelly doesn't get the job she applied for, she blames her lack of success on the "immigrants that are taking over my country" for her lack of job opportunity. What is this an example of? Select all that apply.
 - A Racism
 - B Scapegoating
 - C Intergroup conflict
 - D Cognitive approaches
- 8 Which of the following may increase culture shock for an immigrant?
 - A Not speaking the language of the host country
 - B Being reunited with their family in the new destination
 - C Choosing to move to a new country for better job opportunities
 - D Feeling excited and optimistic about starting a new life abroad
- 9 Which idea can Rosa Parks can be identified with?
 - A Feminism
 - B Intergroup contact
 - C Increasing exposure
 - D The mother of the civil rights movement

- 10 Why can cultural diversity cause conflict?
- A Increase in job opportunities for all
 - B Lack of understanding due to language differences
 - C People celebrating different cultural festivals
 - D A variety of cuisines becoming available in local restaurants
- 11 What is cross-cultural research?
- A Research that deeply investigates one culture from the inside out
 - B Research that investigates more than one culture and what makes them cross
 - C Research that investigates more than one culture and compares them based on their similarities and differences
 - D Research that investigates the food aspects of a culture to better understand how this forms part of daily practice
- 12 Which scenario would be most useful in decreasing prejudice, based on the contact hypothesis?
- A Asking individuals from different cultures to work together in a group once
 - B Asking individuals from different cultures to work together on a long-term project
 - C Asking one individual to lead another individual from a different culture as they work together
 - D Asking individuals from different cultures to work in the same environment but on different goals
- 13 Which of these is an example of the biological perspective for the formation of stereotypes?
- A Someone creates schemas about a group of people based on the behaviour of one person within this group.
 - B Being exposed to the social environment where the individuals come from aids in the development of a stereotype.
 - C Stereotyping against those who are unknown is an evolutionary advantage because it helps to protect those from the same race as you.
 - D Time with another person from another race can increase the chances of stereotyping.
- 14 Which of the following can decrease prejudice?
- A Scapegoating
 - B Intergroup contact
 - C Forming stereotypes
 - D Separation and isolation

Review questions 18.4B Short response



Review questions: Complete these questions online or in your workbook.

Retrieval and comprehension

- 15 **Identify** the difference between prejudice, stereotypes and discrimination. (3 marks)
- 16 **Define** “implicit racism” and “explicit racism”, and **identify** one difference between the two terms. (3 marks)
- 17 **Describe** how a jigsaw activity in a school classroom can be used as an example of a superordinate goal. (1 mark)
- 18 **Identify** factors that can contribute to the formation of prejudice. (2 marks)

Analytical processes

- 19 **Explain** how immigration can lead to marginalisation, using an example. (2 marks)
- 20 Interview a member of your community from a different ethnic background from your own who was born overseas (this could be a student or a neighbour or teacher). **Identify** any challenges they faced when they first moved to Australia. (3 marks)

Knowledge utilisation

- 21 **Discuss** the following question: “Can members of a minority group be racist?” Justify your answer. (3 marks)
- 22 **Investigate** racism in Australia today and identify three government-initiated policies that aim to decrease discrimination and prejudice. (3 marks)
- 23 **Discuss**, using evidence, the impact of offshore detention centres on the psychological adjustment of immigrants coming into Australia for humanitarian reasons. (4 marks)
- 24 **Evaluate** the study of Cao and colleagues (2015) and suggest one possible extension to their research. (3 marks)
- 25 **Evaluate** the study of Dunn (2004) and suggest a possible implication of this research on reducing prejudice in Australia. (3 marks)
- 26 **Investigate** the following claim: “Racism is inevitable in this day and age.” **Devise** a possible research question that could be used to investigate this claim. (1 mark)

Data drill

Using data to predict social acceptance

A study by Sánchez-Holgado and colleagues (2022) aimed to investigate whether online hate speech against migrants and refugees could serve as a predictor of social acceptance towards groups in different provinces within Spain.

Method

The researchers used the intergroup contact theory as their theoretical framework. They analysed 97,710 tweets about migrants and refugees and compared this data with secondary data from public Spanish institutions regarding the acceptance of immigration and the foreign population.

Results

The correlation between the proportion of foreign population in Spain and the attitude towards immigration was found to be $r = -0.067$, $p > 0.05$ (Figure 1).

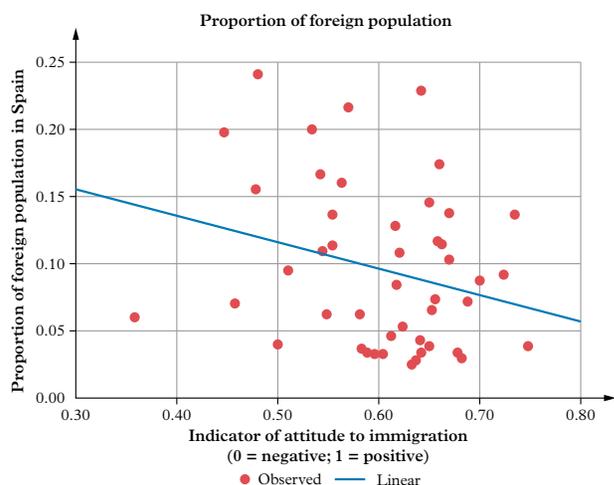


FIGURE 1 Correlation between the proportion of foreign population in Spain and the attitude towards immigration

The correlation between immigrant population and presence of hate speech variables was found to be $r = -0.035$, $p > 0.05$ (Figure 2).

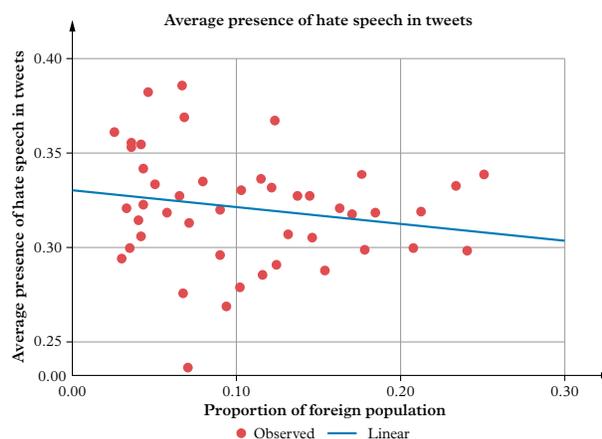


FIGURE 2 Correlation between immigrant population and presence of hate speech

Apply understanding

- 1 **Identify** the study design used. (1 mark)
- 2 **Determine** the number of tweets that were analysed in this study. (1 mark)

Analyse data

- 3 **Identify** the strength and direction of the correlation between the proportion of foreign population in Spain and the attitude towards immigration, using evidence to support your response. (3 marks)
- 4 **Identify** the strength and direction of the correlation between immigrant population and presence of hate speech variables. (3 marks)

Interpret evidence

- 5 **Interpret** the correlation between the proportion of foreign population in Spain and the attitude towards immigration, with reference to the p -value. (2 marks)
- 6 **Infer** if there is a significant relationship between immigrant population and the presence of hate speech variables. (2 marks)



Module 18 checklist: Cultural diversity

Topic 4 review

Multiple choice

(1 mark each)

- 1 What is acculturation?
 - A Adopting the host culture entirely
 - B Rejecting both the original and host cultures
 - C Completely abandoning one's own culture
 - D Living in a new country while maintaining one's own cultural ideals
- 2 Which term refers to the belief that one's own culture is superior to others?
 - A Assimilation
 - B Acculturation
 - C Ethnocentrism
 - D Cultural relativism
- 3 Equality of status between groups in intergroup contact means that
 - A one group is superior to the other.
 - B one group controls decision-making.
 - C groups should have equal power and influence.
 - D groups must have the same financial resources.
- 4 The process of adjusting to a new culture while maintaining one's original culture is known as
 - A integration.
 - B assimilation.
 - C culture shock.
 - D marginalisation.
- 5 Increased exposure to diverse cultures can
 - A reinforce stereotypes.
 - B limit social interactions.
 - C heighten cultural barriers.
 - D decrease overall prejudice.
- 6 Which factor is essential for the integration and fulfilment of needs within a community?
 - A Shared goals
 - B Social isolation
 - C Financial resources
 - D Emotional suppression
- 7 What effect does implicit racism have on society?
 - A It promotes inclusivity.
 - B It eliminates cultural biases.
 - C It leads to subtle discrimination.
 - D It fosters understanding among groups.
- 8 Sustained contact between groups is effective because it
 - A allows stereotypes to deepen.
 - B reinforces cultural differences.
 - C isolates one group from the other.
 - D promotes understanding and reduces prejudice.
- 9 Marginalisation can lead to
 - A increased social capital.
 - B stronger community ties.
 - C full participation in society.
 - D economic and social exclusion.
- 10 Which of the following is an example of a superordinate goal?
 - A Two teams competing in a soccer match
 - B Individuals working alone on their personal goals
 - C Groups working independently on separate projects
 - D Two groups working together to build a community garden
- 11 What do cultural dimensions measure?
 - A The core values in a group
 - B The physical size of a culture
 - C The economic status of a culture
 - D The language proficiency of a culture
- 12 Cultural norms can include
 - A daily behaviour.
 - B food preparation.
 - C both food preparation and daily behaviour.
 - D neither food preparation nor daily behaviour.

- 13 What does multiculturalism celebrate?
- A Political stability
 - B Cultural diversity
 - C Cultural uniformity
 - D Economic equality
- 14 In the psychological context, culture encompasses
- A biological traits.
 - B only rituals and customs.
 - C only language and religion.
 - D values, beliefs and behaviours.
- 15 What is a potential negative outcome of pluralism?
- A Enhanced cultural identity
 - B Strengthened community ties
 - C Marginalisation of minority cultures
 - D Encouragement of diverse practices

Short response

- 16 **Describe** how individualist cultures typically view personal achievement. (1 mark)
- 17 **Identify** an example of a cultural norm. (1 mark)
- 18 **Explain** “culture shock” using an example. (2 marks)
- 19 **Identify** two benefits of living in a multicultural society. (2 marks)
- 20 **Describe** how mutual interdependence can lead to reduced prejudice, using an example. (2 marks)
- 21 **Identify** a strategy to combat implicit racism in individuals. (1 mark)
- 22 **Describe** how a shared emotional connection can increase group cohesion. (1 mark)
- 23 **Explain** why it is important to study diverse cultural perspectives in psychology. (2 marks)
- 24 **Describe** how cultural diversity can be a source of conflict, with reference to prejudice expressed as explicit racism. (4 marks)
- 25 **Describe** the role of equity of status in intergroup interactions, using an example. (2 marks)
- 26 **Explain** how a shared emotional connection can impact the success of a community. (2 marks)
- 27 **Distinguish** between multiculturalism and pluralism, providing an example of each. (3 marks)
- 28 **Explain** the difference between individualistic and collectivist cultures, using examples. (3 marks)
- 29 **Explain** how differences in cultural values can influence behaviour (2 marks)
- 30 **Explain** how cultural diversity can lead to both opportunities and challenges, using examples. (3 marks)

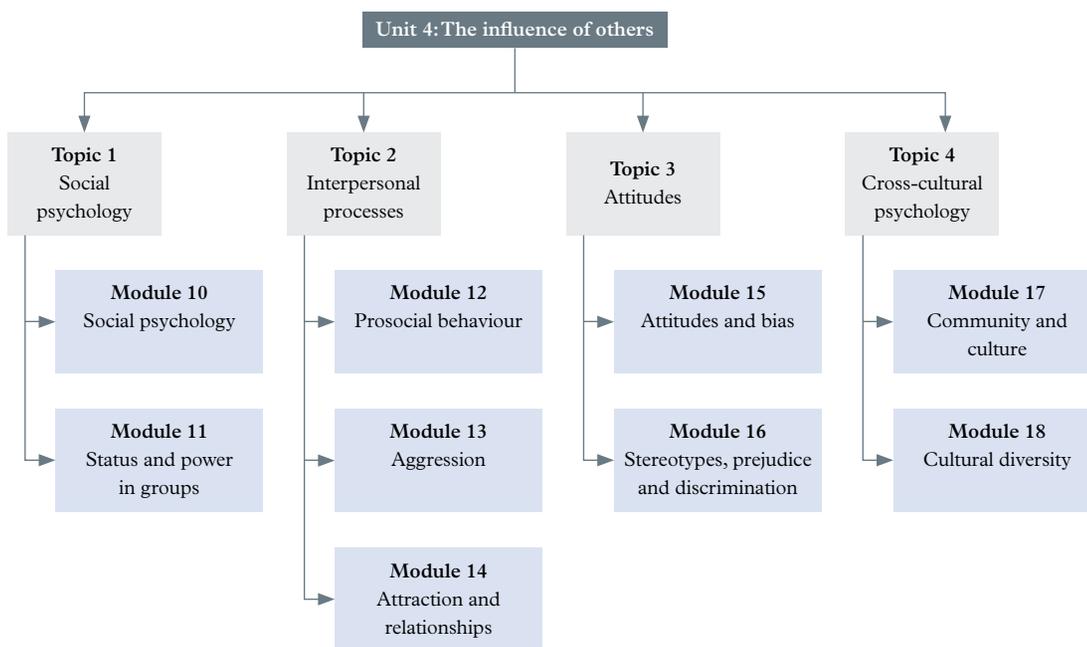
TOTAL MARKS
/46 marks

Review

This unit review is designed to help you revise your understanding of key concepts for all the content covered in Unit 4, learn some expert tips for answering exam questions, and practise your skills answering a range of exam-style questions.

PART A: Revisit and revise

Part A of the Unit review asks you to reflect on your learning and identify areas in which you need more work. The chart shows all the topics in Unit 4 and where you can find information about them in your *Psychology for Queensland Units 3 & 4 Second edition* resource.



PART B: Exam essentials

Now that you've completed your revision for Unit 4, it's time to learn and practise some of the skills you'll need to answer exam questions like a pro! To help you, our expert authors have created the following advice and tips to help you maximise your results on the end-of-year examination.

Exam tip 1: Use key words and syllabus vocabulary.

Using key words and syllabus vocabulary in your exam answers can help you demonstrate a clear understanding of the material and ensure you address the specific requirements of the question. During your revision, make sure to familiarise yourself with key terms from the syllabus so you can use them correctly when answering questions in your exam. Correct use of key terms can show the examiner that you are familiar with the core concepts and can apply them accurately.

See it in action

Read the practice exam question and see how the tip has made a difference between a complete and an incomplete response.

Question 1 (4 marks)

Sarah sees a classmate, James, trip over a bag and fall in the hallway. Sarah laughs and assumes James is clumsy. However, James explains later that he tripped because someone pushed the bag into his path. **Describe** how attributions are used to explain behaviour using examples.

Complete response

Describes situational attributions [1 mark] Provides an example of a situational attribution from the question [1 mark]

Situational attributions explain behaviour based on external factors or circumstances. For example, James explains that he tripped because someone pushed the bag into his path, which is an external factor affecting his behaviour. Dispositional attributions explain behaviour based on internal characteristics or traits. For example, Sarah assumes James is clumsy, attributing his fall to his personal trait of clumsiness.

Describes dispositional attributions [1 mark] Provides an example of a dispositional attribution from the question [1 mark]

Incomplete response

Has used the wrong term as the following description describes situational attributions [0 marks]

Dispositional attributions explain behaviour based on external factors or circumstances. Situational attributions explain behaviour based on internal characteristics or traits.

Has not provided any examples in the answer [0 marks] Has used the wrong term as the following description describes dispositional attributions [0 marks]

Think like an assessor

To maximise your marks on an exam, it can help to think like a QCAA assessor. Consider how many marks each question is worth and what information the assessor is looking for.

A student has given the following response in a practice exam. Imagine you are a QCAA assessor and use the marking guide to mark the response.

Question 2 (2 marks)

Describe a strategy to reduce prejudice using an example, with reference to mutual interdependence.

Mutual interdependence involves creating situations where groups rely on each other to achieve a common goal. This fosters cooperation and reduces prejudice by highlighting the strengths and contributions of each group.

Marking guide

| | |
|------------|---|
| Question 2 | <ul style="list-style-type: none"> • Describes mutual interdependence (1 mark) • Provides a relevant example (1 mark) |
|------------|---|

Fix the response

Consider where you did and did not award marks in the response. How could the response be improved? Write your own response to the same question to receive full marks from a QCAA assessor.

Exam tip 2: Attempt every part of the question.

When faced with a question you don't fully know the answer to, it's important to still attempt to answer it, especially if part of the answer asks for an example. You might earn marks for the example even if your explanation is incomplete.

See it in action

Read the practice exam question and see how the tip has made a difference between a response that has scored full marks and a response where marks have been lost.

Question 3 (2 marks)

Explain how shared emotional connection leads to a sense of community, using an example.

Complete response

Shared emotional connections, such as common experiences or shared values, help build a sense of community by fostering feelings of belonging and mutual support. For instance, a group of neighbours who come together to celebrate local festivals and support each other during difficult times develops a strong sense of community through their shared emotional connections.

Explains how shared emotional connection leads to a sense of community [1 mark]

Provides a relevant example [1 mark]

Incomplete response

Explanation is very brief and does not fully describe how shared emotional connections lead to a sense of community. It should mention aspects like fostering feelings of belonging and mutual support. [0 marks]

Shared emotional connections help build a sense of community. For instance, a group of neighbours who regularly come together to celebrate local festivals and support each other during difficult times. These shared emotional experiences create a network of trust and solidarity, making each member feel valued and connected to the group.

Provides a relevant example [1 mark]

Think like an assessor

To maximise your marks on an exam, it can help to think like a QCAA assessor. Consider how many marks each question is worth and what information the assessor is looking for.

A student has given the following response in a practice exam. Imagine you are a QCAA assessor and use the marking guide to mark the response.

Question 4 (4 marks)

Describe self-serving and confirmation biases. Provide an example of each. (4 marks)

Self-serving bias involves attributing successes to internal factors (like personal abilities or efforts) and failures to external factors (such as luck or others' actions). It helps maintain self-esteem and a positive self-image. For example, a student who scores well on an exam might credit their intelligence and hard work, but if they score poorly, they might blame the exam's difficulty or the teacher's grading. Confirmation bias is the tendency to seek out, interpret and remember information that confirms one's existing beliefs.

Marking guide

Question 4

- Describes self-serving bias (1 mark)
- Provides a relevant example of self-serving bias (1 mark)
- Describes confirmation bias (1 mark)
- Provides a relevant example of confirmation bias (1 mark)

Fix the response

Consider where you did and did not award marks in the response. How could the response be improved? Write your own response to the same question to receive full marks from a QCAA assessor.

Exam tip 3: Practice answering cross-topic questions.

In Paper 2 of the Psychology exam, the more challenging questions often require you to integrate knowledge from different topics. Practising cross-topic questions can help you develop the ability to synthesise information and apply it in a comprehensive manner. Regularly practise answering questions that require you to draw on multiple areas of the syllabus. This will help you become more comfortable with integrating concepts and improve your ability to tackle complex questions.

See it in action

Read the practice exam question and see how the tip has made a difference between a response that has scored full marks and a response where marks have been lost.

Question 5 (2 marks)

Explain how social learning theory can be used to understand the development of prosocial behaviour in children.

Complete response

Explains social learning theory [1 mark]

Social learning theory posits that children learn behaviours through observation and imitation of others, particularly role models such as parents, teachers and peers. Children observe prosocial behaviours, such as sharing and helping, and imitate these actions, especially when they see these behaviours being rewarded or praised.

Applies social learning theory to prosocial behaviour [1 mark]

Incomplete response

Explains social learning theory [1 mark]

Social learning theory posits that children learn behaviours through observation and imitation of others, particularly role models such as parents, teachers and peers.

Does not explain how social learning theory can be used to understand the development of prosocial behaviour [0 marks]

Think like an assessor

To maximise your marks on an exam, it can help to think like a QCAA assessor. Consider how many marks each question is worth and what information the assessor is looking for.

A student has given the following response in a practice exam. Imagine you are a QCAA assessor and use the marking guide to mark the response.

Question 6 (2 marks)

Describe how cognitive dissonance can be used to explain the findings from Milgram's (1963) research on obedience.

In Milgram's (1963) research on obedience, participants experienced dissonance between their actions (administering shocks) and their belief that harming others is wrong. To reduce this discomfort, they justified their actions by deferring responsibility to the authority figure, thus continuing to obey despite their moral objections.

Marking guide**Question 6**

- Explains cognitive dissonance theory (1 mark)
- Provides evidence from Milgram's study that demonstrates cognitive dissonance (1 mark)

Fix the response

Consider where you did and did not award marks in the above response. How could the response be improved? Write your own response to the same question to receive full marks from a QCAA assessor.

Practice makes perfect

Now that you know all these tips, it's time for you to move on to Part C: Exam practice, to put them into practice.

PART C: Exam practice

Now it's time to put the tips and advice you've learned into practice while you complete these exam-style questions! You will complete two papers as part of your external examination: Paper 1 tests you on multiple choice and short response questions, and Paper 2 tests you on more complex, multi-part short-response questions. The questions here, in Part C, give you practice at these types of questions.

Multiple choice

(1 mark each)

- In a social psychology experiment, a psychology student decides to drop a pile of books and papers in the middle of the school's cafeteria. They conducted two trials: one during a quiet time when few people were present, and then again during a busy lunchtime when many people were present. The student observed that during the busy lunchtime nobody came to her aid, whereas during the quiet condition someone quickly assisted her. This is an example of
 - altruism.
 - competence.
 - social norms.
 - the bystander effect.
- An attitude is best defined as
 - a positive or negative evaluation we make about others that changes over time.
 - a positive or negative evaluation we make about others that is a result of genetics.
 - a judgment we make on other people, objects, events or ideas that changes over time.
 - an evaluation of a person, object, event or idea that is learnt and relatively consistent over time.
- Which of the following did Solomon Asch's experiments on conformity (1951) demonstrate?
 - Conformity decreased as the group size increased.
 - Individuals are more likely to conform when in groups of people they know.
 - Individuals were more likely to conform when one or more confederates gave the correct answers.
 - Individuals were more likely to conform when confederates were unanimous in their incorrect responses.

- 4 Georgia moved to the Gold Coast to attend university. Georgia is living on campus. Many people living on campus have also left behind their friends and family. This shared emotional connection is helping Georgia
- A assimilate.
 - B fulfil her needs.
 - C develop membership.
 - D feel a sense of community.
- 5 Which of the following best describes the difference between primary and secondary socialisation?
- A Primary socialisation occurs only through peers, while secondary socialisation involves authority figures.
 - B Primary socialisation is influenced by media and schooling, while secondary socialisation is shaped only by family.
 - C Secondary socialisation focuses on building basic language skills, while primary socialisation focuses on social norms.
 - D Primary socialisation occurs during childhood, while secondary socialisation happens later in life through institutions.
- 6 Liam agrees to donate money to a charity because his coworkers are doing it, but he doesn't believe in the cause himself. What type of group influence is Liam demonstrating?
- A Obedience
 - B Compliance
 - C Identification
 - D Internalisation
- 7 How is internalisation distinct from compliance and identification?
- A It occurs only in family settings and during childhood.
 - B It involves a lasting change in both public and private beliefs.
 - C It is driven by the desire to gain rewards and avoid punishment.
 - D It involves a temporary change in behaviour that disappears after group pressure ends.
- 8 Which of the following statements about the relationship between status and social behaviour is correct?
- A Roles have less impact on behaviour than status in group settings.
 - B Power is unrelated to status and has no influence on group dynamics.
 - C Individuals with high status always demonstrate more prosocial behaviour.
 - D High-status individuals tend to have more influence on group decisions and behaviour.
- 9 The social responsibility norm influences prosocial behaviour by
- A promoting prosocial behaviour only when empathy is involved.
 - B encouraging people to help only those they believe will reciprocate.
 - C encouraging individuals to help those in need, regardless of self-benefit.
 - D encouraging individuals to act in ways that increase personal competence.
- 10 Competence as a factor in prosocial behaviour means
- A helping others only when they are highly skilled.
 - B helping others to feel better about one's own skills.
 - C helping others only when they explicitly ask for help.
 - D being able to effectively help someone in a given situation.
- 11 A group of students decides to follow one member's plan for a project without critically evaluating it. They avoid disagreements to maintain group harmony. What social or cognitive factor is influencing the group's behaviour?
- A Groupthink
 - B Social influence
 - C Audience inhibition
 - D Diffusion of responsibility

- 12 After playing a violent video game for several hours, Sam reacts aggressively to a minor disagreement with a sibling. According to the GAM, this aggression is caused by
- A social influence from family members.
 - B diffusion of responsibility during the game.
 - C the development of long-term aggressive personality traits.
 - D the activation of aggressive thoughts, emotions and arousal.
- 13 After repeatedly watching advertisements that use aggressive and competitive themes, Mark begins to view aggression as an acceptable way to resolve conflicts. How has media influenced Mark's behaviour?
- A By increasing audience inhibition
 - B By diffusing personal responsibility
 - C Through sustained intergroup contact
 - D By normalising aggression and influencing cognitive schemas
- 14 Explicit attitudes differ from implicit attitudes because they
- A are more unconscious and difficult to identify.
 - B are always accurate reflections of unconscious biases.
 - C are consciously held beliefs that can be verbally expressed.
 - D influence behaviour only when group pressures are present.
- 15 A student identifies strongly with their sports team. They feel proud when the team wins and compare their team's success to other teams' failures. Which stage of social identity theory is this?
- A Group attribution
 - B Social comparison
 - C Social identification
 - D Social categorisation
- 16 Maria sees a classmate trip and assumes they are clumsy, without considering the slippery floor. What type of error is Maria demonstrating?
- A Self-serving bias
 - B Group attribution
 - C Social comparison
 - D Fundamental attribution error
- 17 Confirmation bias occurs when people
- A form stereotypes to simplify complex social environments.
 - B compare their group positively to other groups to boost self-esteem.
 - C attribute successes to internal factors and failures to external causes.
 - D seek evidence that aligns with their pre-existing beliefs while ignoring contradictory information.
- 18 An economic downturn causes a community to blame an immigrant group for job losses, even though there is no evidence supporting this claim. What type of prejudice formation is this?
- A Scapegoating
 - B Group prejudice
 - C Direct experience
 - D Prejudiced personality
- 19 Individualist cultures tend to emphasise
- A group harmony and collective goals.
 - B cultural assimilation and marginalisation.
 - C shared beliefs and values across all members.
 - D independence, personal achievement and individual goals.
- 20 Marginalisation occurs when immigrants
- A experience prejudice in the form of implicit racism.
 - B maintain their own culture while rejecting the dominant culture.
 - C fully adopt the dominant culture while abandoning their own traditions.
 - D experience exclusion and fail to identify with either their own or the dominant culture.
- Short response**
- 21 **Compare** the social learning theory and the biological theory of gender role formation. (2 marks)
- 22 At a recycling station, signs show "90% of people in this community recycle". John decides to start recycling too. **Identify** the type of norm influencing John and explain how it influences behaviour. (2 marks)
- 23 **Describe** cost-benefit analysis with reference to how it can influence someone's decision to help others. (2 marks)

- 24 Maria opens up about her childhood struggles to her friend, who, in turn, shares their own experiences. This deepens their emotional bond. **Identify** the factor of attraction illustrated here with reference to how it promotes closeness. (2 marks)
- 25 A recently separated couple begins to tell friends and family their own versions of why the relationship ended. They each emphasise how they've grown from the experience. **Identify** the two phases of relationship dissolution being described and **explain** how they relate to Rollie and Duck's model. (4 marks)
- 26 **Define** "stereotypes" using an example and **describe** one advantage and one disadvantage of using stereotypes. (4 marks)
- 27 **Explain** the role a dominant culture plays in distinguishing pluralism from multiculturalism. (1 mark)
- 28 A diverse workplace organises team-building activities where all members have equal roles and rely on each other to succeed. **Identify** the strategy being used to reduce prejudice and **describe** how it promotes harmony. (2 marks)
- 29 **Describe** the structure of attitudes using the tri-component model. (3 marks)
- 30 **Discriminate** between prejudice and discrimination, using an example. (2 marks)
- 31 This question refers to the investigation on compliance by Asch (1955).
- Describe** the effect of status, roles and power on the behaviour of participants in Asch's study. (3 marks)
 - Describe** an example of how social norms might have played a role in the conformity of participants in the investigation. (1 mark)
 - Predict** how cultural differences could have influenced the rates of conformity, with reference to the investigation. (2 marks)
- 32 This question refers to the investigation on obedience by Milgram (1963).
- Describe** obedience using an example from the investigation. (2 marks)
 - Explain** participants' feelings during and after the experiment, using the cognitive dissonance theory. (2 marks)
 - Compare** the type of obedience demonstrated in Milgram's study with the findings of Haney and colleagues' (1973) research on roles and status. (2 marks)
- 33 This question refers to the investigation by Haney and colleagues (1973).
- Explain** how the findings of the study demonstrated the concept of deindividuation. (2 marks)
 - Explain** the results of the investigation, using the GAM. (2 marks)
 - Describe** an ethical principle that was not taken into consideration in the investigation. (1 mark)
- 34 This question refers to the investigation of bystander intervention by Latané and Darley (1969).
- Identify** two factors that influence whether individuals help in emergency situations, with reference to the investigation. (4 marks)
 - Compare** the findings of this investigation with Asch's (1955) study. (2 marks)
 - Describe** how personal characteristics could have influenced prosocial behaviour in the investigation. (2 marks)
- 35 This question refers to the investigation into attraction by Buss and colleagues (1990).
- Describe** biological and cultural explanations of attraction, with reference to the investigation. (2 marks)
 - Describe** a social origin of attraction using an example from the investigation. (2 marks)
 - Explain** the results of the investigation, using a theory of gender role formation. (2 marks)

36 A modification of Experiment 2 from Bargh and colleagues' (1996) study examined the effect of stereotype priming on behaviour. In this experiment, participants were primed with an elderly stereotype and their walking speed was measured.

Participants: 40 participants (20 in the control group, 20 in the primed group)

| Participant | Experimental group | Control group |
|-------------|--------------------|---------------|
| 1 | 14.5 | 12.5 |
| 2 | 14.8 | 11.8 |
| 3 | 15.2 | 13.2 |
| 4 | 14.1 | 12.1 |
| 5 | 14.9 | 11.9 |
| 6 | 15.3 | 12.3 |
| 7 | 14.7 | 12.0 |
| 8 | 15.0 | 11.7 |
| 9 | 14.6 | 12.4 |
| 10 | 15.1 | 12.2 |

- Describe** implicit attitudes with reference to the investigation. (2 marks)
- Calculate** the mean of the experimental and control groups. (2 marks)
- An unpaired t -test was used to determine if there was a significant difference between the experimental and control groups. The p -value was 0.087. **Draw a conclusion** about the effect of stereotype priming on behaviour. (2 marks)

MODULE

19

Practical manual

Introduction

Part of studying Psychology is researching existing literature, as well as conducting your own experiments to investigate phenomena. This module provides examples of how you can approach experiments, as well as things to look out for when conducting research.

In Module 1, Psychology toolkit, ethical considerations are discussed (Lesson 1.5). As psychological research typically involves people and animals, it is important that you read through the ethical requirements and ensure that they are met before conducting an experiment. No psychological research can be conducted without informed consent.

Consult with your teacher before participating in or completing any practicals in this manual.

Unit 3 Practicals



Lesson 6.5 Evaluating the validity of depth of processing

Lesson 8.2 Context dependency of memory

Unit 4 Practicals



Lesson 16.2 The effect of stereotype priming on behaviour



Glossary

A

ablation

the surgical removal of body tissue

absolute threshold

the minimum level of energy required for a stimulus outside our body to be detected by our internal senses

accessibility

successful retrieval of information from long-term memory

accommodation

the process by which the ciliary muscles of the eye change the curvature of the lens to focus an image on the retina

acculturation gap

the difference that can arise between the level of assimilation of migrants compared to their children

acculturation

the process where people from one culture encounter another culture, and start adjusting the cultural and social values, beliefs, ideas and behavioural patterns of their culture of origin to those of a different culture

acetylcholine

a neurotransmitter in the brain, spinal cord and peripheral nervous system involved in muscle contractions, learning and memory, and REM sleep

action potential

a momentary change in the electrical potential of a cell, which allows a nerve cell to transmit a signal or impulse towards another nerve cell

actor-observer bias

the tendency to explain our own actions by external factors, and explain the actions of others by internal factors

affective component of the tri-component model

how an individual feels about an attitude object

ageism

prejudice and discrimination on the basis of age (typically youth or elderly)

agent

a person or group that facilitates the process of socialisation; could be parents, family, peers, school or the media

aggression

intentional behaviour aimed at causing harm to another person who wants to avoid that harm

altruism

a prosocial behaviour that involves selflessness or helping others, even if there is nothing to be gained personally or if there is some personal cost

Alzheimer's disease

a condition that progressively destroys neurons in the brain, causing memory loss

amplitude

maximum displacement of a wave from equilibrium (resting position)

amygdala

an almond-shaped structure, located in the medial temporal lobe of the brain, that is central to emotion, aggression and implicit learning; it is vital in initiating and processing emotional responses and in forming emotional memories

anterograde amnesia

the inability to create new memories, usually following a traumatic injury

antisocial behaviour

behaviour that is harmful to others and, ultimately, to the community (e.g. prejudice, aggression)

articulatory loop

a component of the phonological loop that rehearses auditory information

assimilation

adapting or fitting into the majority culture

association

a learnt connection between two (or more) objects or events – especially significant in classical conditioning

association cortex

specialised region of the brain where multiple streams of sensory data are integrated

attitude

a learnt, stable and relatively enduring evaluation of a person, object, event or idea that can affect an individual's behaviour

attraction

the ability to evoke interest and attention

attractiveness halo effect

the theory that people who are physically attractive are assumed to have additional positive qualities

attribution

inference about the causes of events or behaviours to understand social experiences

attribution theory

the theory that humans need to understand why people behave in certain ways, and there are two ways to explain behaviour: dispositional attributions and situational attributions

audience inhibition

the reluctance of bystanders to help due to the perceived negative appraisals of others (or due to feelings of self-consciousness)

auditory nerve

a bundle of axons that transmits auditory information from the cochlea to the other regions in the brain

authoritarian

a style of leadership where the leader actively makes all decisions and has control over the group

authority

the power to order individuals to behave in a certain manner

autonomic nervous system

consisting of the parasympathetic and sympathetic branches; responsible for the communication between the body's non-skeletal (visceral) and involuntary striated (heart) muscles and the internal organs and the glands that carry out bodily functions

availability

successful storage of information into long-term memory

aversion therapy

a form of treatment using classical conditioning to cause an undesired behaviour to create an unwanted response, thereby reducing the incidence of the behaviour

axon terminal

located at the end of the axon; it transmits messages to the next neuron by releasing neurotransmitters from terminal buttons

axon

the part of a neuron along which the electrochemical nerve impulse is transmitted

B

basal ganglia

a set of structures involved in the control of movement, gathering and channelling information from different areas of the brain

behavioural component of the tri-component model

how a person behaves towards the attitude object

behaviourism

a learning theory that focuses on observable behaviours and the way they are influenced by the environment

belief

the conviction or acceptance that certain things are true or real

bias

an opinion or belief held about a thing, idea, group or individual

binocular depth cue

using information from both eyes to estimate depth

biological theory of gender role formation

a theory that an individual's gender is predetermined by their biological sex: their genitals and reproductive organs

biosocial theory

a biological theory that states that gender roles are developed as a result of interaction between biological sex and socialisation

bottom-up processing

perceptions are built from incoming sensory data, constructing a whole stimulus by combining its individual parts

box and whisker plot

graph showing the distribution of data that shows the median, quartiles and outliers

Broca's area

part of the left frontal lobe; the speech production centre of the brain

bystander effect

a bystander is more likely to help others in an emergency when there is no one else around, than when there are other bystanders present

bystander intervention

the act of a person voluntarily helping someone else

C**camouflage**

exploitation of the figure-ground principle whereby the contour of the figure blends with the background, making it more difficult to see

capacity

a characteristic of memory that refers to the amount of information that can be held in a memory store

case study

in-depth examination of a person, group, organisation or event using various methods

cell body (soma)

the largest part, of the neuron, containing the nucleus; it controls metabolism and maintenance of the neuron

central executive

directs our attention and coordinates the actions of the other components

central limit theorem

given a sufficiently large sample size, the sampling distribution of the sample mean will approximate a normal distribution, regardless of the shape of the population distribution

central nervous system (CNS)

comprises the brain and the spinal cord; controls the body by processing and responding to sensory input from the peripheral nervous system

cerebellum

the area of the brain responsible for coordinating and remembering smooth, well-sequenced movements

cerebral cortex

the multilayered outer surface of the cerebrum responsible for receiving information from the environment, controlling our responses, and allowing complex voluntary movements and higher order thinking processes; consists of the neocortex and allocortex

cerebrum

the part of the brain most responsible for voluntary movement and complex thought processes such as perception, imagination, judgment and decision-making

chunking

a coding strategy that increases the capacity of short-term memory

classical conditioning

an animal or other organism can passively learn to show a naturally occurring reflex action, such as salivation, in response to any stimulus; learning through association; also known as Pavlovian conditioning

closure

a Gestalt principle that refers to the brain's tendency to perceive incomplete images as a whole

cognitive component of the tri-component model

how a person thinks about the attitude object

cognitive development

the development of mental processes and abilities throughout the lifespan

cognitive dissonance

mental discomfort that occurs because of dissonance (inconsistency between two or more cognitions)

cognitive dissonance theory

the theory that emphasises a person will feel uncomfortable and try to maintain an internal consistency and agreement between their beliefs and behaviours by altering beliefs to match behaviours

cognitive origins of attraction

the theory that our perception and interpretation of a potential mate is what attracts us

cognitive psychology

the study of internal mental processes such as thinking, problem-solving, language, attention, memory and decision-making

collectivist culture

priority of society's goals as a whole are emphasised above personal goals

colour constancy

the ability to perceive colours as relatively constant even under varying lighting conditions

column graph

graph typically used for experimental designs where the height of the vertical bar corresponds to the mean and each column represents a condition of the independent variable

communication

verbal and non-verbal expression between individuals

community

a group of people with common characteristics

competence

an individual's ability to respond effectively to a situation or to perform a task successfully

compliance

a change in people's attitudes publicly, but not privately, so that they are more likeable in their group

conclusion

an evidence-based decision about the hypothesis and/or research question

concurrent validity

the extent to which a test correlates with a benchmark test or measure taken at the same time

conditioned response (CR)

an automatic learnt response that occurs when a conditioned stimulus is presented, after being repeatedly paired with an unconditioned stimulus (classical conditioning)

conditioned stimulus (CS)

a previously neutral stimulus that, after being repeatedly paired with an unconditioned stimulus, elicits a conditioned response (classical conditioning)

cone

a photoreceptor providing clear vision in colour; works in bright light

confidence interval

range of values, derived from sample statistics, that is likely to contain the value of an unknown population parameter

confidence level

a percentage that reflects the proportion of times the confidence interval is likely to contain the true population parameter (e.g. mean)

confirmation bias

tendency to search for, recall and interpret information to suit pre-existing beliefs

conformity

adjusting our attitudes, beliefs and behaviours to align with group norms

consolidation

the process in which the brain forms a permanent representation of memory

content validity

whether a test comprehensively accounts for all the relevant aspects of the construct it aims to assess

context-dependent cue

a cue to assist retrieval from long-term memory, connected to the external environment in which learning took place

continuity

a Gestalt principle that refers to the brain's tendency to perceive elements that appear to sit on a straight or curved line as a continuous path

continuous data

data that can take on any value within a range

controlled process

a transient process under the control of a person that influences memory capacity and/or duration

convergence

a binocular cue for depth perception; the automatic turning of the eyes inwards as we watch an object approaching

corpus callosum

the thick band of about 200 million nerve fibres connecting the right and left hemispheres of the brain

cost-benefit analysis model

a model of behaviour that suggests that when bystanders are confronted with emergencies, they weigh up the pros and cons of providing help compared to those of not helping

cued recall

recall assisted by cues, not involving the original items to be retrieved

cultural dimension

used to group cultures into categories based on values and overall beliefs

cultural diversity

the many cultural, racial and ethnic groups in a society

cultural norms

shared rules set by a specific group to guide behaviour

cultural perspective

psychological investigation that considers the culture from which an individual came in order to explain behaviour

culture

a collection of ideals, values, belongings and ethics that belong to a group of people and are passed on from generation to generation

culture shock

feeling overwhelmed by the differences of the culture of a new country that has a very different set of ideals or values from your country of origin

D**deindividuation**

a sense of anonymity and loss of individuality that comes from being in a situation where individuals can't be identified personally; individuals are more likely to commit antisocial acts

democratic

a style of leadership where the leader negotiates decisions with the group

dendrite

a branch-like segment of a neuron that receives signals from other neurons or sensory receptors via the synapses and delivers these to the cell body

depth perception

the ability to accurately judge three-dimensional space and distance, using cues in the environment

descriptive norm

a typical behaviour, attitude or actions that people engage in within a specific context or situation

diffusion of responsibility

the idea that bystanders are less likely to take responsibility for helping in the presence of others

discrete data

data that can only take specific values within a range

discrimination

prejudice expressed through positive or negative behaviour directed towards a social group and its members

discriminative stimulus

in operant conditioning, Skinner's term for the precondition that indicates that behaviour will be reinforced

displacement

new information taking the place of existing information in short-term memory

dispositional attribution

the assumption that the cause of the behaviour is due to internal or personal factors

distal cause

long-term biological or environmental factor that has a role in shaping an individual's personality

DNA

genetic information that is inherited from your parents

dominant culture

the set of cultural norms, values and practices that are most widely accepted and influential

dopamine

a neurotransmitter involved in thoughts, feelings, motivation and behaviour

duration

a characteristic of memory that refers to the length of time information can be maintained in a memory store

E**echoic memory**

a sensory register for the fleeting storage of auditory information, lasting about 3 to 4 seconds and helping the brain piece together sounds to make them meaningful

effective punishment

punishment administered in such a way that it reduces the likelihood of the behaviour recurring

effort justification

a special case of cognitive dissonance where the inconsistency experienced makes the person go to considerable effort to justify the achievement of a relatively modest goal

elaborative rehearsal

a process by which we give meaning to information and link it to other information in our semantic network

electrochemical signal

an electrical or chemical signal used for cell communication

empathy

the capacity to understand and respond to the distress and emotions of others, which often leads to prosocial behaviour

encoding failure

failure to securely store a memory trace

encoding specificity principle

the idea that associations encoded at the time we learnt new information make the most effective retrieval cues

encoding

the process of transforming information into a form that can be used and stored

epinephrine

a neurotransmitter and hormone involved in stress responses

episodic buffer

a theoretical component of working memory that integrates information from components of working memory and long-term memory, to create a unified, time-sequenced representation of events

episodic memory

explicit long-term memory of episodes or experiences in your life

equal-status contact

contact between members of two different groups on the same level and with the same amount of power

equity

equal investment in the relationship from both parties

error bar

graphical representation of the variability of uncertainty in data, usually either the standard deviation, standard error or confidence interval

ethnocentrism

valuing one's own ethnicity or culture more than others, and acting with prejudice towards other groups or people

evolutionary advantage view

the theory that suggests that symmetry in facial characteristics is attractive is because symmetry suggests good health

excitatory synapse

a synapse that causes the target neuron to become excited, and more likely to fire and propagate an action potential

explicit attitude

an attitude that an individual is open about and that is aligned with their behaviour

explicit memory

a type of long-term memory that can be consciously recalled, including personal experiences (episodic) and facts (semantic)

explicit racism

negative actions towards members of a particular cultural group that are overt, such as a racial slur

external reliability

consistency of a measure or test across different occasions or different observers

external validity

the extent to which the findings of a study can be generalised

extinction

the reduction and elimination of the conditioned response after repeated exposure to the conditioned stimulus is no longer paired with the unconditioned stimulus

extrapolate

to extend or project known information to estimate unknown values or outcomes beyond the original observation range, based on the trends and patterns identified in the data

F**face validity**

a subjective judgment on the extent to which a psychological instrument appears to measure what it is supposed to measure

feature detector

a specialised neuron found in the optic nerve and primary visual cortex that individually responds to visual elements of an image

fight-flight-freeze response

a physiological response to stress that causes an organism to react in a combative manner (fight), remove itself from the situation (flight) or not react at all (freeze)

figure-ground organisation

a Gestalt principle of perceptual organisation wherein images are organised into the central object of attention (figure) and a background (ground)

forgetting

inability to retrieve information from memory

free recall

recalling as much information as possible in any order, without cues

frequency table

table that displays the number of occurrences of each category of a variable

frequency theory

a theory that says pitch perception is determined through the timing of neural firing rates, which are synchronised with the cochlea's basilar membrane

frontal lobe

the largest lobe of the brain; has several functions, including initiating movement of the body, language, planning, judgment, problem-solving, aspects of personality and emotions; extremely well developed in higher order mammals

fundamental attribution error

when people place too much emphasis on dispositional attribution, and too little emphasis on situational attribution when trying to explain behaviour

G**GABA (gamma-amino butyric acid)**

an inhibitory neurotransmitter; imbalance of GABA is implicated in severe anxiety disorders; also involved in arousal and sleep

gender

a socially and culturally constructed idea of what male and female are; this can include, but is not limited to, personality traits, social behaviours and physical appearance

gender constancy

where a child realises that sex is a fixed state that will not change; they also realise that if someone's appearance or behaviour changes, this does not make them a member of the opposite sex, achieved at the age of 5

gender identity

where a child recognises and labels themselves as a boy or a girl, achieved around 2 to 3 years of age

gender schema

a mental representation of what it is to be male or what it is to be female, typically based on stereotypes

gender schema theory

a theory of gender role formation that people build over time that provides information about how a male or female should behave

gender script

gender roles and behaviours that children come to consider as normal, based on their observations of everyday life

gender stability

where a child realises that their sex will not change over time, achieved around 3 to 4 years of age

gene

a portion of your DNA that codes for a particular characteristic

general aggression model (GAM)

a framework that explains how personal traits, situational factors and internal processes interact to influence aggressive behaviour

generalisation

a judgment about the extent to which the research findings can be applied outside the study

Geschwind's territory

area of the brain that provides a connection between Broca's area and Wernicke's area; helps to process the multiple properties of words, and classify and label things, which is a prerequisite for developing concepts and thinking abstractly

Gestalt principles of visual perception

used to organise and interpret perceptual stimuli; includes figure-ground organisation, closure, similarity and proximity

glutamate

an excitatory neurotransmitter in the brain involved in memory and learning

group

two or more people who interact over a period of time, have influence on each other and share a common goal

groupthink

the tendency of a group to make decisions based on maintaining group cohesion rather than by critically analysing the realities of the situation

H**height in the visual field**

a monocular depth cue that shows depth by portraying objects further away as being closer to the horizon

hippocampus

a finger-sized curve structure that lies in the medial temporal lobes; responsible for consolidation of explicit memories and transfers these to other parts of the brain for storage as long-term memory; provides context for emotional meaning by recalling previous experiences

histogram

visual representation of a frequency table in the form of a column graph

homeostasis

a self-regulating process by which the body maintains a stable internal balance while adjusting to a changing environment

homogeneity of variance

the assumption that different samples or groups have similar variances in their respective distributions

HPA axis

a major neuroendocrine system that includes the hypothalamus, pituitary gland and adrenal gland; these structures interact through a feedback system to regulate a number of functions such as a person's digestion, immune system, mood, emotions and responses to stress

hypothalamus

a structure in the forebrain that plays a major role in homeostasis, and controlling emotion and motivated behaviours such as eating, drinking and sexual activity

iconic memory

a sensory register for the fleeting storage of visual information; it lasts about 0.3 seconds and explains why we can see a moving picture from a series of still photos

identification

a change in people's attitude and behaviour because they are influenced by someone and relate to the content of the attitude

immigration

the act of moving to a new country to find a new home

implicit attitude

involuntary, uncontrolled or unconscious attitude that an individual is often unaware they hold, even though it may influence their behaviour

implicit memory

a type of long-term memory that operates without conscious awareness, including procedural skills, priming and conditioned responses

implicit racism

negative actions towards members of a different cultural group that are covert and often unconscious

individualist culture

the importance of oneself achieving goals is prioritised over the needs of society

influence

convincing individuals to do something that you want them to do

informational influence

a type of social influence where we look to others for guidance in uncertain situations, believing that they have more accurate information

in-group

a group of people with a shared interest, identity or beliefs; the group with which an individual identifies

inhibitory synapse

a synapse that causes the target neuron to become inhibited, and less likely to fire and propagate an action potential

injunctive norm

a social rule or expectation about how people should behave in a given situation

intergroup contact

contact or exposure to a particular group of people

interleaving

a study method that involves mixing different topics or types of problems within a single study session to improve learning and problem-solving

internal consistency

internal reliability calculated across items within a test instrument

internal reliability

the extent to which a study or instrument is consistent within itself

internal validity

the extent to which the observed changes in a study can be attributed to the manipulation of the independent variable and not other factors

internalisation

a change in people's attitude and behaviour because they have taken on a new attitude into their belief system

interposition

a monocular depth cue in which objects further from the observer are partially obscured by those in the foreground

interpretation

giving meaning to stimulus in the brain based on our past experiences, motives, values and context

inter-rater reliability

the extent to which different observers or raters agree in their assessments

intersex

an individual who is born with both male and female, or ambiguous, genitals and reproductive organs

interval data

numerical data where the intervals between numbers are equal, but there is no true zero point

J**justify**

to provide sound reasons or evidence in support of a decision

L**laissez-faire**

a style of leadership where the leader does not actively make any decisions, and lets the group control themselves

learning

a relatively permanent change in behaviour or knowledge in response to experience

levels of processing (LOP) model of memory

a model of memory that suggests a deeper level of processing during encoding results in better retrieval from long-term memory

light

the visible part of the electromagnetic spectrum

limbic system

a group of structures in the brain consisting of the amygdala, hypothalamus and midbrain; involved in memory, emotion, behaviour and motivation

limitation

assumption, feature or constraint from an investigation that limits a researcher's ability to confidently answer the research question, generalise findings or extrapolate to a claim

line graph

a pictorial representation of data linking two variables, where one is plotted on the y-axis and the other on the x-axis

line of best fit

a straight line drawn through a scatterplot of data points that best expresses the relationship between those points

linear perspective

a monocular depth cue in which parallel lines appear to converge as they retreat into the distance

localisation of function of the brain

specific parts of the brain are responsible for different functions

long-term memory (LTM)

a durable memory system that stores a lot of encoded information relatively permanently

loudness

the intensity or volume of sound, determined by the amplitude of the wave

M**maintenance rehearsal**

a strategy for keeping information in short-term memory or for moving it into long-term memory by repeating the information

Mann-Whitney U test

non-parametric test of statistical significance used to compare differences between two independent groups with either ordinal data or continuous data that does not have a normal distribution

marginalisation

when a person, group or idea is treated as unimportant or pushed to the edges of society

mean

the average of all the scores, calculated by adding up all the scores and dividing that total by the number of scores

median

the middle number (or mean of the two middle numbers) of a number series listed in numerical order

membership

inclusion in a group or society of people and a sense of belonging

membrane potential

the difference in electrical charge inside and outside the neuron

memory trace

physical representation of memory in the brain

mental representation

a cognitive process where information is stored in memory for later retrieval and use

mere exposure effect

a psychological phenomenon that predicts individuals who spend more time with someone and become more familiar with them will prefer them over other people with whom they have not spent as much time

method of loci

a mnemonic that focuses on visualisations to strengthen memory

mnemonic

a strategy or method that can be used to improve or strengthen memory

mode

the most commonly occurring score in the dataset

model

someone we respect or look up to (e.g. a parent, teacher, friend or loved one)

modelling

the process of the model demonstrating a behaviour that is being observed

monocular depth cue

using information from one eye to estimate depth

monosynaptic spinal reflex arc

a reflex arc made up of only two neurons (one sensory and one motor) synapsing in the spinal cord

mood

an emotional state that can affect our perceptions, thoughts and behaviours

motor neuron

neuron that communicates messages from the CNS to the particular muscles that an organism intends to move at any particular moment or glands to support bodily functions; also known as efferent

multiculturalism

individuals from multiple cultural groups coexist without any single group being dominant

multi-store model of memory

a model that describes the structure (sensory memory, short-term memory and long-term memory) and controlled processes of memory

music enculturation

the process through which individuals acquire the skills, preferences and understanding of music specific to their cultural environment

mutual interdependence

when two groups must rely on each other to successfully complete a task

myelin

a white, fatty, waxy substance that coats some axons and insulates them, protecting them from electrical interference from other neurons; this increases the efficiency of transmission of nerve impulses

myelin sheath

an insulating fatty coating that helps facilitate the transmission of information (electrical impulse) to other neurons

N**natural selection**

mechanism for evolution that can predict the likelihood of survival based on an organism's phenotype

negative correlation

two variables change in opposite directions; as one increases, the other decreases

negative punishment (response cost)

a form of punishment that occurs when something desirable is removed to decrease the chance of the behaviour occurring again (e.g. removing a mobile phone if misused)

negative reinforcement

the removal, reduction or prevention of an unpleasant stimulus in response to a behaviour, increasing the likelihood that a behaviour will be repeated

negative vicarious reinforcement

an individual witnesses another being punished for a behaviour so discontinues that behaviour themselves

negatively skewed

the tail of the distribution heads towards zero

neocortex

the largest part of the cerebral cortex, located on the outermost regions of the cerebrum; responsible for higher-order brain functions such as memory, sensory perception and spatial reasoning

neuron

nerve cells, responsible for communication within the body

neurotransmitter

chemical released from a neuron following an action potential that helps communication across nerve synapses

neutral stimulus (NS)

a stimulus that causes no response (classical conditioning)

nominal data

data is organised into qualitative categories that cannot be quantified or ranked

norepinephrine

a neurotransmitter and hormone involved in regulating stress responses, alertness, arousal, emotional regulation and attention

normal distribution

a symmetrical, bell-shaped distribution of data where most observations are clustered around the mean and decrease with distance from the centre

normality

the assumption that a dataset is approximately normally distributed, following the classic bell-shaped curve

normative influence

a type of social influence that leads us to conform in order to be liked and accepted by others

O**obedience**

following direct orders or commands from an authority figure

objective data

data that is measured according to an identifiable external criterion

observational learning

where a person learns by watching the behaviour demonstrated by another

occipital lobe

the cerebral cortex at the rear of the brain; the location of the primary visual cortex and association areas involved with integration of visual stimuli

operant conditioning

a type of learning in which behaviour becomes controlled by its consequences

optic nerve

a bundle of ganglion axons that transmits visual information from the retina to the brain

ordinal data

data that has a definite sequence, but the gap between one level and the next is not constant

organisation

grouping sensory information received in the brain to make sense of it

out-group

people or groups that exist outside of someone else's group; the group with which an individual does not identify

outlier

extreme score that can be objectively calculated as an observation greater than three standard deviations above or below the mean

P**parameter**

numerical value that describes aspects of a population

parasympathetic nervous system

a branch of the autonomic nervous system responsible for maintaining day-to-day functioning of the body, such as digestion, heart rate, breathing and some glandular functions; reverses changes in bodily function caused by the sympathetic nervous system

parietal lobe

the location of the primary somatosensory cortex in the brain; enables a person to perceive their own body and where things are located in their immediate environment

Parkinson's disease

a progressive neurological condition, known to affect the ability to control movement

passive aggression

involves indirect actions that cause harm, like ignoring someone or not inviting them to an event

Pearson correlation coefficient

a measure of the strength of the linear relationship between two continuous variables

peer review process

where experts in a field evaluate the quality and accuracy of a research paper, study or scholarly work before it is published

percentile

measure that indicates the value below which a given percentage of observations in a group fall

perception

the brain's process of making meaning of raw sensory stimuli

perceptual bias view

a theory that states that symmetrical faces are more attractive because the visual centres of the brain find symmetrical information easier to process

perceptual constancies

the tendency to maintain a stable perception of a stimulus, although the properties of the image on the retina may change

perceptual set

a predisposition to interpret stimuli in a particular way, according to expectations influenced by past experience, context, emotion and motivation

peripheral nervous system (PNS)

comprises all the nerves and ganglia outside the brain and spinal cord that communicate information to and from the central nervous system

phenotype

the physical representation of what your gene codes for (e.g. brown hair, blue eyes)

pheromone

a chemical substance released by the body that can affect other people

phonological loop

a storage system for auditory information in working memory comprising the phonological store and articulatory loop

phonological store

a component of the phonological loop that holds auditory information

photoreceptor

a specialised cell located in the retina that detects and transduces light energy

physical aggression

involves actions like hitting, kicking, or damaging someone's property

physical attractiveness

attributes that can be seen on the exterior of a person that draw people to that person

pictorial depth cue

a monocular depth cue used by artists to create a three-dimensional perception of something that exists on a two-dimensional surface

pie chart

a circular graph divided into sections that are proportional to the data they represent

pitch

the perceived highness or lowness of a sound is determined by the frequency of the wave

place theory

a theory that says pitch perception is determined by where on the cochlea's basilar membrane a sound wave causes vibrations

pluralism

the coexistence of multiple cultural groups within a society that has a dominant culture

polysynaptic reflex arc

a reflex arc made up of multiple neurons, with one or more interneurons in the spinal cord connecting the sensory and motor neurons

positive correlation

two variables change in the same direction; as one increases (or decreases), so does the other

positive punishment

a form of punishment that occurs when something undesirable is added to decrease the chance of the behaviour occurring again (e.g. being given extra chores at home for arriving home after curfew)

positive reinforcement

a consequence that strengthens a response by providing a pleasant or satisfying outcome, increasing the likelihood that a behaviour will be repeated

positive vicarious reinforcement

an individual witnesses another being rewarded for a behaviour and decides to act in the same way

positively skewed

the tail of the distribution heads away from zero

postsynaptic neuron

a neuron that receives information from another neuron

power

a person has power if they can influence the thoughts or behaviour of others

precision

the extent to which repeated observations or measurements yield similar results

predictive validity

how well a test score or measure predicts outcomes or behaviours in the future

prefrontal cortex (PFC)

part of the cerebral cortex that connects brain regions that are involved in the processing and production of emotion; plays a crucial role in executive control and higher cognitive functions such as decision-making

prejudice

an unfavourable or negative attitude towards members of a group, based solely on their membership of that group

presynaptic neuron

a neuron that transmits information to another neuron

primary auditory cortex

located in the upper part of the temporal lobe; receives sound from the ears

primary data

data collected firsthand

primary motor cortex

located at the rear of each frontal lobe; responsible for movement of the skeletal muscles of the body

primary sensory cortex

specialised region of the brain where raw sensory data is processed

primary socialisation

the process of learning the beliefs, customs and appropriate behaviours of a group during the early stages of life, typically from parents and close family members

primary somatosensory cortex

located at the front of each parietal lobe; processes sensations such as touch, pressure, temperature and pain

primary visual cortex

located at the back of the occipital lobe; processes information from the eyes

priming

when prior, often unconscious, exposure to stimuli influences a person's recall or performance on later tasks

proactive interference

when previously learnt material inhibits our ability to encode and store new material

procedural memory

implicit long-term memory of how to perform actions

prosocial behaviour

helping behaviour that benefits other people and society in general

proximity

the individual parts are close together

psychology

the systematic study of the mind (mental processes) and behaviour

punisher

a stimulus that decreases the likelihood of a particular response recurring

p-value decimal value indicating the probability that observed results occurred by chance under the assumption that the null hypothesis is true

Q**qualitative data**

descriptions of the characteristics of what is being studied

quantitative data

measurements (numerical information) about the variables being studied

R**race**

the grouping of people based on common descent

racism

negative emotions or actions towards someone based on their race

range

the difference between the highest score and the lowest score in the dataset

ratio data

measurements that represent quantities in terms of equal intervals and an absolute zero

raw data

original, unprocessed information

recall

retrieval of stored information using few or no cues

reception

stimulus energy is received by the sense organ

receptive field

the specific area of sensory space (such as a region of the retina for vision) that a sensory receptor or neuron responds to

reciprocity

how much each person in a relationship is giving to the relationship

reciprocity principle

the social expectation that you will respond in kind to someone who has helped you or done you a favour

recognition

a process of retrieval that requires identification of a correct response from a set of alternatives

reflex

automatic, involuntary response to sensory information (stimulus)

reflex arc

the path taken by the nerve impulses in a reflex

reinforcer

a stimulus or event that increases the likelihood of a response

relational aggression

aims to harm someone's social relationships, like spreading lies or excluding them

relationship

a connection between two or more people

relationship dissolution

the ending of a relationship initiated by at least one partner in the relationship

relative size

a monocular depth cue based on our tendency to perceive the object producing the largest retinal image as being the nearest, and the object producing the smallest retinal image as being the farthest away

relearning

reacquiring knowledge that was previously learnt but forgotten

reliability

the degree to which an experiment, test or any measuring procedure yields the same results on repeated trials

reproductive fitness

a measure of how likely a person is to pass their characteristics on to the next generation

resilience

the ability to cope with a difficult situation using mental strategies

retinal disparity

the binocular depth cue that arises as the brain compares the two slightly different images obtained because of the distance between the two eyes

retrieval cue

a mental reminder or prompt that activates our neural network to assist with recollection later on

retrieval failure theory

the inability to retrieve material due to an absence of the right cues or a failure to use them

retrieval

the process of retrieving stored information for use

retroactive interference

when newly acquired material inhibits our ability to retrieve previously learnt material

retrograde amnesia

the inability to recall events, facts or experiences of the past

rod

a photoreceptor providing peripheral vision in black and white; works in dim light

Rollie and Duck's phase model

of relationship dissolution a model addressing the stages of a breakup including five phases: intrapsychic, dyadic, social, grave-dressing and resurrection

S**scapegoating**

blaming a person or group for a negative action, event or result

scatterplot diagram

that shows the values of the two variables for each participant in the sample by representing the intersection of those two values with a dot on a graph

schema

an organised mental framework about a person, place or thing

secondary data

data collected from second-hand sources

secondary socialisation

the process of learning the beliefs, customs and appropriate behaviours of a group via teachers, extended family, friends and the media

selection

the process of selecting important and filtering out unimportant information to focus on relevant stimuli

selective attention

the process of focusing on particular stimuli while ignoring others

self-disclosure

the act of sharing personal thoughts, feelings and experiences that are not immediately obvious with others

self-report

participants' written or verbal responses to questions, statements or instructions about themselves

self-serving bias

a tendency to view ourselves more favourably than we view others in the same position

semantic memory

explicit long-term memory for facts or general knowledge

semantic network

a form of knowledge representation whereby information is stored in a hierarchical pattern, grouped by meaning and linked to related information

sensation

detection of energy by specialised receptors in sense organs

sensory memory

a storage system that holds incoming sensory information for a very short time

sensory neuron

neuron that carries sensory information from the body and the outside world into the CNS; also known as afferent

serial recall

recalling information in the order in which it was presented

serotonin

a neurotransmitter in the brain involved in the regulation of mood, sleep, eating, arousal and pain

sex

determined by the biological chromosome make-up expressed through an individual's reproductive organs, genitals and other physical characteristics

shape constancy

the constant perception of an object's known shape despite the changing perspective from which it is observed

short-term memory (STM)

a temporary memory system that holds a limited amount of information (5–9 pieces) for a short duration (12–20 seconds)

similarity

a characteristic that is alike between those in the relationship

similarity-attraction hypothesis

people who are similar to each other are more likely to find each other attractive and start a relationship, compared to those who are less similar

situational attribution

the assumption that the cause of the behaviour is due to environmental or external factors

size constancy

the constant perception of an object's size, even though the size of the image on the retina alters as the object moves nearer to or further from us

social categorisation

the tendency of people to classify similar objects and people in order to identify and understand them

social comparison

comparing our in-group with other groups to affirm our identity

social desirability

bias the tendency to answer questions in a way that one believes will be viewed favourably by others

social exchange

meaningful interactions with others

social identification

a process where people modify their behaviour, attitudes and beliefs to match the group that they belong to

social identity

a person's sense of self based on the groups they belong to

social identity theory

a theory that suggests that groups are part of our identity and self-esteem, through three processes: social categorisation, social identification and social comparison

social influence

the likelihood that bystanders will be more likely to help based on the reaction of others

social influence theory

a theory that suggests that an individual's thoughts, feelings and behaviours are shaped by the presence or actions of others; encompasses various forms of influence including compliance, identification and internalisation

social learning theory

describes the way in which people acquire certain behaviours by watching and learning from role models; the initial focus of observational learning

social loafing

an individual puts in less effort when in a group than they do individually

social norm

an unwritten rule about how to behave in a particular social group or culture

social origins of attraction

the theory that repeated exposure to a potential partner through regular interactions will influence attraction

social penetration theory

an explanation of how relationships develop through gradual increases in self-disclosure

social psychology

the study of how people's thoughts, feelings, beliefs and goals are constructed within a social context by other people, whether actual or imagined

social responsibility norm

the expectation that members of a society will provide help to people who are dependent or in need, without the expectation of favours being returned

socialisation

the process of how people learn the beliefs, customs and appropriate behaviours of a society or group

somatic nervous system

the branch of the PNS that transmits sensory information to the CNS and carries motor commands from the CNS to the skeletal muscles

spacing

a study method that involves spreading out study sessions over time to improve long-term memory

spinal cord

a bundle of nerve fibres that carries sensory and motor signals between the peripheral nervous system and the brain

spontaneous recovery

the reappearance of an extinguished response after a rest period despite the absence of a consequence

standard deviation

a statistical measure of the average deviation of scores from the mean, calculated as the square root of variance

standard error

numerical value that quantifies the variability of the sample mean estimate with respect to the true population mean

state-dependent cue

a cue to assist retrieval from long-term memory, connected to the internal environment (mood state or physical condition) in which learning took place

statistic

numerical value that describes aspects of a sample

status

the position of an individual within a group

stereotype

a set of generalised and simplified beliefs about a group of people or a person based on their membership of a group

stimulus discrimination

in classical conditioning, when an organism responds to the conditioned stimulus but not to any stimulus that is similar to the conditioned stimulus

stimulus discrimination

in operant conditioning, when a behaviour stops being applied to similar situations and only to the discriminative stimulus

stimulus generalisation

in classical conditioning, when an organism responds to any stimulus that is similar to the conditioned stimulus

stimulus generalisation

in operant conditioning, when a behaviour is displayed because of a discriminative stimulus that is similar to the original

stimulus

physical energy from the environment

storage

maintaining encoded information

subculture

small alternative culture or norms that exist within a larger community

subjective data

information about the variables being studied based on opinion, with no external criterion by which they are measured

superordinate goals

shared goals whereby members within one group cannot achieve the overall result without the help of the other group

sustained contact

long-term interaction between individuals of different cultural backgrounds

symmetry

a balanced arrangement of parts around a central axis

sympathetic nervous system

branch of the autonomic nervous system that changes the activity levels of internal organs, muscles and glands to prepare for increased activity during times of high physical or emotional arousal

synapse

the junction between two neurons through which the two neurons communicate

synaptic transmission

the process of neurons sending information to each other via neurotransmitters

T**temporal lobe**

the part of the forebrain beneath the temporal plate of the skull, at the side of the head above the ears; contains Wernicke's area and the primary auditory cortex

test-retest reliability

the stability of test scores or measurements over time with repeated administrations

texture gradient

a monocular depth cue in which texture in the foreground is seen in finer detail than texture further away

thalamus

a structure in the brain located between the cerebral cortex and the midbrain, just above the brain stem; responsible for relaying motor and sensory signals to the cerebral cortex

three-phase model (ABC of operant conditioning)

the assumption that the antecedent makes the conditions right for the behaviour to follow and be encouraged or discouraged by its consequences

timbre

the unique quality or character of a sound that allows us to distinguish between different sources of sound

tip-of-the-tongue phenomenon (TOT)

the feeling of knowing the answer even if we cannot remember it in the moment

top-down processing

perceptions of stimuli are influenced by our prior knowledge, expectations and context

trace decay

rapid fading of information from short-term memory

transduction

receptor cells convert stimulus energy into electrochemical nerve impulses

transmission

nerve impulses are sent to the central nervous system

tri-component model of attitudes

the theory that an attitude consists of cognitive, affective and behavioural components

t-test

comparison of means in data that reveals how significant the differences are

type I error

when a true null hypothesis is incorrectly rejected, also known as a "false positive"

type II error

when a false null hypothesis is not rejected, also known as a "false negative"

U**uncertainty**

ambiguity that exists in data or findings

unconditioned response (UCR)

a response that occurs naturally in response to the unconditioned stimulus (classical conditioning)

unconditioned stimulus (UCS)

a stimulus that causes an unconditioned response (classical conditioning)

V

validity

the extent to which a study or instrument accurately measures what it intends to measure

value

a principle or standard of behaviour considered important in a society

variance

a statistical measure of the spread of data, calculated as the average of the squared differences from the mean

verbal aggression

uses words to harm, such as yelling or spreading rumours

vicarious conditioning

a type of learning that occurs through observing the behaviours and consequences experienced by others

vicarious learning

witnessing a type of behaviour in another and establishing whether this is acceptable or not based on the observation; involves watching others and learning from the consequences of their actions, whether they are rewarded or punished

vicarious punishment

when a child observes another person's behaviour being punished

vicarious reinforcement

a theory that individuals are more likely to engage in a behaviour or activity if they witness another individual being rewarded for that activity or behaviour

vicarious reward

when a child observes another person's behaviour being rewarded

visual acuity

the clarity or sharpness of vision

visual illusion

perceptual phenomenon where the brain misinterprets visual stimuli, leading to an image that differs from objective reality

visuospatial sketchpad

the storage system for visual information in working memory

voluntary behaviour

an action that is controlled by the person or animal performing it

voluntary movement

the intentional execution of an action involving cognitive processes

W

wavelength

the distance from peak to peak or trough to trough

Wernicke's area

part of the left temporal lobe, responsible for language reception and interpretation and for creation of grammatically correct speech

Wilcoxon signed-rank test

non-parametric test used to compare two matched samples, or repeated measurements with either ordinal data or continuous data that does not have a normal distribution

working memory

temporary storage and manipulation of information to perform complex tasks

X

xenophobia

fear of, or strong animosity towards, people of different races or cultural backgrounds

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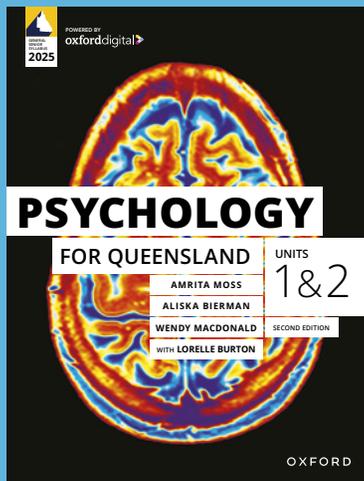
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