OXFORD

PSYCHOLOGY

FOR VCE

UNITS 1 & 2

STUDENT WORKBOOK

ALISKA BIERMAN

PSYCHOLOGY

FOR VCE

UNITS 1 & 2

STUDENT WORKBOOK

ALISKA BIERMAN

OXFORD
UNIVERSITY PRESS

OXFORD
UNIVERSITY PRESS

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship
and education by publishing worldwide. Oxford is a registered trademark
of Oxford University Press in the UK and in certain other countries.

Published in Australia by
Oxford University Press
Level 8, 737 Bourke Street, Docklands, Victoria 3008, Australia

First published 2024
First Edition

ISBN 978 0 1903 3802 2

Edited by Natasha Broadstock
Typeset by Q2A Media Services Pvt. Ltd., Noida, India
Proofread by Casey McGrath
Printed in China by Golden Cup Printing Co Ltd

Oxford University Press Australia & New Zealand is committed to sourcing paper responsibly.

Disclaimer
Links to third party websites are provided by Oxford in good faith and for information only. Oxford disclaims any responsibility for the materials contained in any third party website referenced in this work.

Acknowledgement of Country
Oxford University Press acknowledges the Traditional Owners of the many lands on which we create and share our learning resources. We acknowledge the Traditional Owners as the original storytellers, teachers and students of this land we call Australia. We pay our respects to Elders, past and present, for the ways in which they have enabled the teachings of their rich cultures and knowledge systems to be shared for millennia.

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.

CONTENTS

MEET THE AUTHOR AND REVIEWER

Author: Aliska Bierman

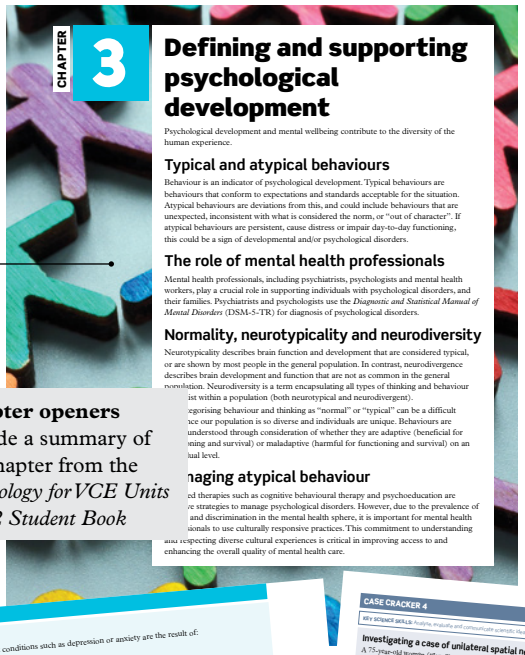
Aliska holds a Bachelor of Engineering (Aerospace Avionics) with Honours, a Graduate Diploma of Education (Secondary) and a Graduate Diploma of Psychology. She has been teaching senior physics and psychology at Brisbane State High School for five years, and she leads the design of teaching and learning programs for psychology. Aliska is an accomplished science author, writing for Education Perfect and Oxford University Press for both the Queensland and Victorian curricula. Her involvement as a QCAA marker and writer, along with her role as a digital pedagogy leader at her school, highlights her dedication to educational excellence and innovation.

Reviewer: Salvina Noonan

Salvina Noonan has been teaching VCE Psychology at various schools for 15 years. Since 2018, she has been employed by the VCAA as a VCE Psychology assessor. With a passion for education and a strong background in psychology, Salvina is a regular presenter at an annual conference focused on the teaching of VCE Psychology. She has completed a Bachelor of Science, a Bachelor of Education, and a Master of Education specialising in Student Wellbeing. Salvina has held several positions of leadership within schools, including Year 12 Coordinator and Assistant Head of Department, Science.

Using *Psychology for VCE Units 1 & 2 Student Workbook*

The first of a two-volume series, *Psychology for VCE Units 1 & 2 Student Workbook* offers complete support for Units 1 & 2 teachers and their students, providing unparalleled depth and comprehensive syllabus coverage.


CHAPTER 3

Defining and supporting psychological development

Psychological development and mental wellbeing contribute to the diversity of the human experience.

Typical and atypical behaviours

Behaviour is an indicator of psychological development. Typical behaviours are behaviours that conform to expectations and standards acceptable for the situation. Atypical behaviours are deviations from this, and could include behaviours that are unexpected, inconsistent with what is considered the norm, or "out of character". If atypical behaviours are persistent, cause distress or impair day-to-day functioning, this could be a sign of developmental and/or psychological disorders.

The role of mental health professionals

Mental health professionals, including psychiatrists, psychologists and mental health workers, play a crucial role in supporting individuals with psychological disorders, and their families. Psychiatrists and psychologists use the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR) for diagnosis of psychological disorders.

Normality, neurotypicality and neurodiversity

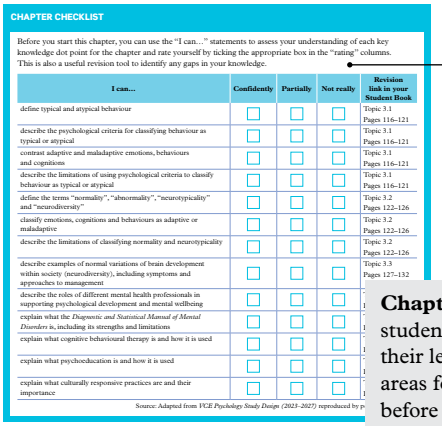
Neurotypicality describes brain function and development that are considered typical, or are shown by most people in the general population. In contrast, neurodivergence describes brain development and function that are not as common in the general population. Neurodiversity is a term encapsulating all types of thinking and behaviour ist within a population (both neurotypical and neurodivergent).

egorising behaviour and thinking as "normal" or "typical" can be a difficult ce our population is so diverse and individuals are unique. Behaviours are understood through consideration of whether they are adaptive (beneficial for ning and survival) or maladaptive (harmful for functioning and survival) on an ual level.

aging atypical behaviour

ed therapies such as cognitive behavioural therapy and psychoeducation are e strategies to manage psychological disorders. However, due to the prevalence of and discrimination in the mental health sphere, it is important for mental health ionals to use culturally responsive practices. This commitment to understanding and respecting diverse cultural experiences is critical in improving access to and enhancing the overall quality of mental health care.

Chapter openers provide a summary of the chapter from the *Psychology for VCE Units 1 & 2 Student Book*

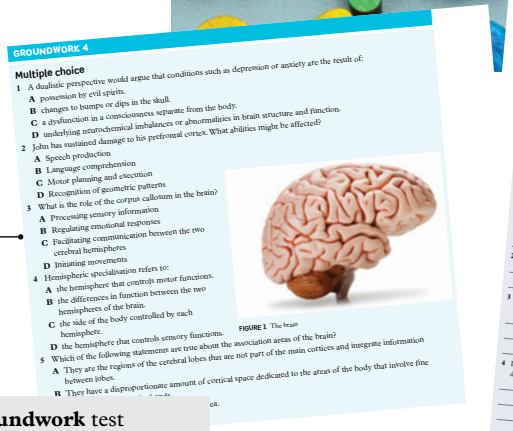

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
define typical and atypical behaviour	☐	☐	☐	Topic 3.1 Pages 116–121
describe the psychological criteria for classifying behaviour as typical or atypical	☐	☐	☐	Topic 3.1 Pages 116–121
contrast adaptive and maladaptive emotions, behaviours and cognitions	☐	☐	☐	Topic 3.1 Pages 116–121
describe the limitations of using psychological criteria to classify behaviour as typical or atypical	☐	☐	☐	Topic 3.1 Pages 116–121
define the terms "normality", "abnormality", "neurotypicality" and "neurodiversity"	☐	☐	☐	Topic 3.2 Pages 122–126
classify emotions, cognitions and behaviours as adaptive or maladaptive	☐	☐	☐	Topic 3.2 Pages 122–126
describe the limitations of classifying normality and neurotypicality	☐	☐	☐	Topic 3.2 Pages 122–126
describe examples of normal variations of brain development within society (neurodiversity), including symptoms and approaches to management	☐	☐	☐	Topic 3.3 Pages 127–132
describe the roles of different mental health professionals in supporting psychological development and mental wellbeing	☐	☐	☐	
explain what the *Diagnostic and Statistical Manual of Mental Disorders* is, including its strengths and limitations	☐	☐	☐	
explain what cognitive behavioural therapy is and how it is used	☐	☐	☐	
explain what psychoeducation is and how it is used	☐	☐	☐	
explain what culturally responsive practices are and their importance	☐	☐	☐	

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by p

Chapter checklists ask students to reflect on their learning and identify areas for improvement before they progress


GROUNDWORK 4

Multiple choice

1 A dualistic perspective would argue that conditions such as depression or anxiety are the result of:
A possession by evil spirits.
B changes to bumps or dips in the skull.
C a dysfunction in a consciousness separate from the body.
D underlying neurochemical imbalances or abnormalities in brain structure and function.

2 John has sustained damage to his prefrontal cortex. What abilities might be affected?
A Speech production
B Language comprehension
C Motor planning and execution
D Recognition of geometric patterns

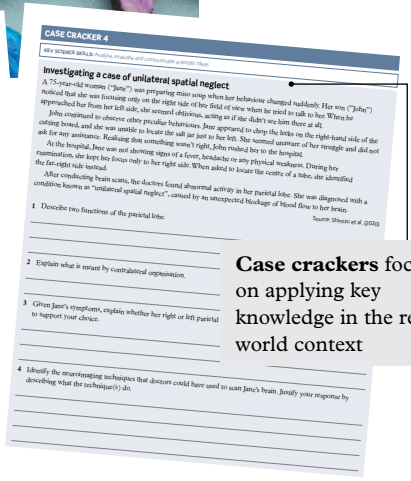
3 What is the role of the corpus callosum in the brain?
A Processing sensory information
B Regulating emotional responses
C Facilitating communication between the two cerebral hemispheres
D Initiating movements

4 Hemispheric specialisation refers to:
A the hemisphere that controls motor functions.
B the differences in function between the two hemispheres of the brain.
C the side of the body controlled by each hemisphere.
D the hemisphere that controls sensory functions.

5 Which of the following statements are true about the association areas of the brain?
A They are the regions of the cerebral lobes that are not part of the main cortices and integrate information between lobes.
B They have a disproportionate amount of cortical space dedicated to the areas of the body that involve fine

FIGURE 1 The brain

Groundwork test students on key knowledge before they attempt the activities in the chapter


CASE CRACKER 4

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Investigating a case of unilateral spatial neglect

A 75-year-old woman ("Jane") was preparing miso soup when her behaviour changed suddenly. Her son ("John") noticed that she was focusing only on the right side of her field of view when he tried to talk to her. When he approached her from her left side, she seemed oblivious, acting as if she didn't see him there at all.

John continued to observe other peculiar behaviours. Jane appeared to drop the leeks on the right-hand side of the cutting board, and she was unable to locate the salt jar just to her left. She seemed unaware of her struggle and did not ask for any assistance. Realising that something wasn't right, John rushed her to the hospital.

At the hospital, Jane was not showing signs of a fever, headache or any physical weakness. During her examination, she kept her focus only to her right side. When asked to locate the centre of a lobe, she identified the far-right side instead.

After conducting brain scans, the doctors found abnormal activity in her parietal lobe. She was diagnosed with a condition known as "unilateral spatial neglect", caused by an unexpected blockage of blood flow to her brain.

Source: Shinoto et al. (2020)

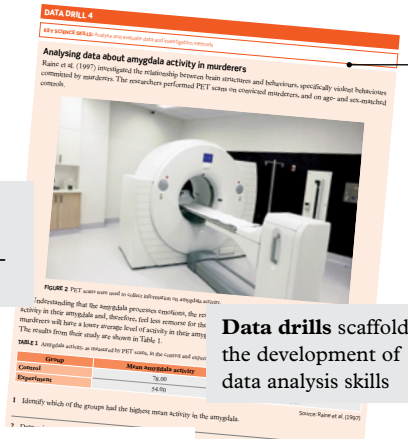
1 Describe two functions of the parietal lobe.

2 Explain what is meant by contralateral organisation.

3 Given Jane's symptoms, explain whether her right or left parietal to support your choice.

4 Identify the neuroimaging techniques that doctors could have used to scan Jane's brain. Justify your response by describing what the technique(s) do.

Case crackers focus on applying key knowledge in the real-world context


DATA DRILL 4

KEY SCIENCE SKILLS: Analyse and evaluate data and investigate methods

Analysing data about amygdala activity in murderers

Raine et al. (1997) investigated the relationship between brain structures and behaviours, specifically violent behaviours committed by murderers. The researchers performed PET scans on convicted murderers and on age- and sex-matched controls.

FIGURE 2 PET scans were used to collect information on amygdala activity.

Understanding that the amygdala processes emotions, the re activity in their amygdala and, therefore, feel less remorse for the murderers will have a lower average level of activity in their amyg The results from their study are shown in Table 1.

TABLE 1 Amygdala activity, as measured by PET scans, in the control and exper

Group	Mean amygdala activity
Control	7.08
Experiment	54.00

Source: Raine et al. (1997)

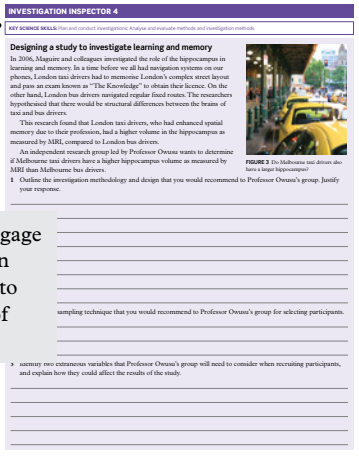
1 Identify which of the groups had the highest mean activity in the amygdala.

nce to the data in Table 1.

to reference the data as supporting evidence in your response. Hint: SD for standard deviation and equestrig it to the value for

E OF THE BRAIN IN MENTAL PROCESSES AND BEHAVIOUR 45

Data drills scaffold the development of data analysis skills


INVESTIGATION INSPECTOR 4

KEY SCIENCE SKILLS: Plan and conduct investigations; Analyse and evaluate methods and investigation methods

Designing a study to investigate learning and memory

In 2006, Maguire and colleagues investigated the role of the hippocampus in learning and memory. In a time before we all had navigation systems on our phones, London taxi drivers had to memorise London's complex street layout and pass an exam known as "The Knowledge" to obtain their licence. On the other hand, London bus drivers navigated regular fixed routes. The researchers hypothesised that there would be structural differences between the brains of taxi and bus drivers.

This research found that London taxi drivers, who had enhanced spatial memory due to their profession, had a higher volume in the hippocampus as measured by MRI, compared to London bus drivers.

An independent research group led by Professor Owusu wants to determine if Melbourne taxi drivers have a higher hippocampus volume as measured by MRI than Melbourne bus drivers.

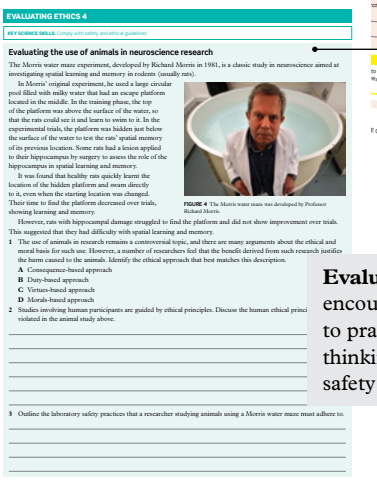
FIGURE 3 Do Melbourne taxi drivers also have a larger hippocampus?

1 Outline the investigation methodology and design that you would recommend to Professor Owusu's group. Justify your response.

sampling technique that you would recommend to Professor Owusu's group for selecting participants.

3 Identify two extraneous variables that Professor Owusu's group will need to consider when recruiting participants, and explain how they could affect the results of the study.

Investigation inspectors engage students with the investigation methodologies and ask them to consider important features of experiment design


EVALUATING ETHICS 4

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Evaluating the use of animals in neuroscience research

The Morris water maze experiment, developed by Richard Morris in 1981, is a classic study in neuroscience aimed at investigating spatial learning and memory in rodents (usually rats).

In Morris' original experiment, he used a large circular pool filled with milky water that had an escape platform located in the middle. In the training phase, the top of the platform was above the surface of the water, so that the rats could see it and learn to swim to it. In the experimental trials, the platform was hidden just below the surface of the water to test the rats' spatial memory of its previous location. Some rats had a lesion applied to their hippocampus by surgery to assess the role of the hippocampus in spatial learning and memory.

It was found that healthy rats quickly learnt the location of the hidden platform and swam directly to it, even when the starting location was changed. Their time to find the platform decreased over trials, showing learning and memory.

However, rats with hippocampal damage struggled to find the platform and did not show improvement over trials. This suggested that they had difficulty with spatial learning and memory.

FIGURE 4 The Morris water maze was developed by Professor Richard Morris.

1 The use of animals in research remains a controversial topic, and there are many arguments about the ethical and moral basis for such use. However, a number of researchers feel that the benefit derived from such research justifies the harm caused to the animals. Identify the ethical approach that best matches this description.
A Consequence-based approach
B Duty-based approach
C Virtues-based approach
D Morals-based approach

2 Studies involving human participants are guided by ethical principles. Discuss the human ethical princi violated in the animal study above.

3 Outline the laboratory safety practices that a researcher studying animals using a Morris water maze must adhere to.

Evaluating ethics encourage students to practise ethical thinking and examine safety concerns

Research reviews asks students to practise analysing, evaluating and communicating scientific ideas

Practice exam questions for Unit 1, Unit 2 and Units 1 & 2 prepare students for exam success, including multiple-choice and short answer questions

Psychology toolkit and Investigation chapters provide additional guidance for building key science skills and give students the opportunity to practise their skills

Investigations from the *Psychology for VCE Units 1 & 2 Student Book* included

Answers and sample responses to all questions appear at the back of the book

Key science skills map

Use this map to see which activities you should complete to practise your key science skills.

- CC = Case cracker
- DD = Data drill
- II = Investigation inspector
- EE = Evaluating ethics
- RR = Research review

Key science skill	VCE Psychology Units 1–4	1	2	3	4	5	6	7	8	9	10	11
Develop aims and questions, formulate hypotheses and make predictions	• identify, research and construct aims and questions for investigations	RR 1.1		II 3 RR 3				RR 7				II 11.1
	• identify independent, dependent and controlled variables in controlled experiments	RR 1.1		II 3 RR 3							II 10	II 11.1
	• formulate hypotheses to focus investigations	RR 1.1										II 11.1
	• predict possible outcomes of investigations	RR 1.1										II 11.1
Plan and conduct investigations	• determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation	II 1. 2		II 3	II 4	II 5					II 10	II 11.1
	• design and conduct investigations; select and use methods appropriate to the investigation, including consideration of sampling technique (random and stratified) and size to achieve representativeness, and consideration of equipment and procedures, taking into account potential sources of errors and uncertainty; determine the type and amount of qualitative and/ or quantitative data to be generated or collated	II 1.2	II 2	II 3	II 4	II 5		II 7			II 10	II 11.1

Key science skill	VCE Psychology Units 1–4	1	2	3	4	5	6	7	8	9	10	11
	• work independently and collaboratively as appropriate and within identified research constraints, adapting or extending processes as required and recording such modifications							II 7	II 8			II 11.1 DD 11.2
Comply with safety and ethical guidelines	• demonstrate ethical conduct and apply ethical guidelines when undertaking and reporting investigations	EE 1.3	EE 2	EE 3	EE 4	II 5 EE 5	DD 6.2	EE 7	EE 8		EE 10	
	• demonstrate safe laboratory practices when planning and conducting investigations by using risk assessments that are informed by safety data sheets (SDS), and accounting for risks				EE 4					EE 9		
	• apply relevant occupational health and safety guidelines while undertaking practical investigations					EE 5				EE 9		
Generate, collate and record data	• systematically generate and record primary data, and collate secondary data, appropriate to the investigation	DD 1.4					DD 6.2					
	• record and summarise both qualitative and quantitative data, including use of a logbook as an authentication of generated or collated data	DD 1.4		DD 3			DD 6.2				DD 10	
	• organise and present data in useful and meaningful ways, including tables, bar charts and line graphs					DD 5		DD 7	DD 8		DD 10	
Analyse and evaluate data and investigation methods	• process quantitative data using appropriate mathematical relationships and units, including calculations of percentages, percentage change and measures of central tendencies (mean, median, mode), and demonstrate an understanding of standard deviation as a measure of variability				DD 4	DD 5						

Key science skill	VCE Psychology Units 1–4	1	2	3	4	5	6	7	8	9	10	11
	• identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained	DD 1.5	DD 2	DD 3	II 4		RR 6.3		II 8	II 9 DD 9		II 11.1 DD 11.2
	• identify outliers and contradictory or incomplete data	DD 1.5										DD 11.2
	• repeat experiments to ensure findings are robust								II 8			
	• evaluate investigation methods and possible sources of error or uncertainty, and suggest improvements to increase validity and to reduce uncertainty	DD 1.5		DD 3				II 7	II 8	II 9 DD 9	RR 10	II 11.1 DD 11.2
Construct evidence-based arguments and draw conclusions	• distinguish between opinion, anecdote and evidence, and scientific and non-scientific ideas				RR 4		II 6.1	RR 7				
	• evaluate data to determine the degree to which the evidence supports the aim of the investigation, and make recommendations, as appropriate, for modifying or extending the investigation	CC 1.6			RR 4							
	• evaluate data to determine the degree to which the evidence supports or refutes the initial prediction or hypothesis	CC 1.6								DD 9		
	• use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with evidence base and relevant to the question under investigation	CC 1.6									DD 10	
	• identify, describe and explain the limitations of conclusions, including identification of further evidence required	CC 1.6							II 8	DD 9		II 11.1
	• discuss the implications of research findings and proposals, including appropriateness and application of data to different cultural groups and cultural biases in data and conclusions	CC 1.6							RR 8	DD 9	RR 10	

Key science skill	VCE Psychology Units 1–4	1	2	3	4	5	6	7	8	9	10	11
Analyse, evaluate and communciate scientific ideas	• use appropriate psychological terminology, representations and conventions, including standard abbreviations, graphing conventions and units of measurement	RR 1.7	CC 2	CC 3	CC 4	CC 5 RR 5		CC 7	CC 8	CC 9	CC 10	
	• discuss relevant psychological information, ideas, concepts, theories and models and the connections between them		CC 2 DD 2	CC 3	CC 4	CC 5 RR 5		CC 7 RR 7	CC 8	CC 9	CC 10	
	• analyse and explain how models and theories are used to organise and understand observed phenomena and concepts related to psychology, identifying limitations of selected models/theories		CC 2		CC 4					CC 9		
	• critically evaluate and interpret a range of scientific and media texts (including journal articles, mass media communications, opinions, policy documents and reports in the public domain), processes, claims and conclusions related to psychology by considering the quality of available evidence		RR 2		RR 4	RR 5		RR 7		RR 9		
	• analyse and evaluate psychological issues using relevant ethical concepts and guidelines, including the influence of social, economic, legal and political factors relevant to the selected issue		EE 2									
	• use clear, coherent and concise expression to communicate to specific audiences and for specific purposes in appropriate scientific genres, including scientific reports and posters	RR 1.7				RR 5				RR 9		
	• acknowledge sources of information and assistance, and use standard scientific reference conventions					RR 5		RR 7		RR 9		RR 11.3

CHAPTER 1

Psychology toolkit

In VCE Psychology, you will build on a range of skills that you have been practising in Years 7 to 10 Science. These include: developing aims and questions, formulating hypotheses and making predictions; planning and conducting investigations; complying with safety and ethical guidelines; generating, collating and recording data; analysing and evaluating data and investigation methods; constructing evidence-based arguments and drawing conclusions; and analysing, evaluating and communicating scientific ideas.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
outline the structure of the VCE Psychology course, including the areas of study, their outcomes and assessments	☐	☐	☐	Topic 1.1 Pages 4–8
recognise the importance of key science skills	☐	☐	☐	Topic 1.1 Pages 4–8
describe the process of the scientific method	☐	☐	☐	Topic 1.2 Pages 9–13
identify independent, dependent, controlled, extraneous and confounding variables	☐	☐	☐	Topic 1.3 Pages 14–24
construct aims, research questions and hypotheses	☐	☐	☐	Topic 1.3 Pages 14–24
contrast the types of ethical approaches	☐	☐	☐	Topic 1.4 Pages 25–29
describe the ethical concepts	☐	☐	☐	Topic 1.4 Pages 25–29
describe the ethical guidelines	☐	☐	☐	Topic 1.4 Pages 25–29
recognise the importance of laboratory safety	☐	☐	☐	Topic 1.4 Pages 25–29
conduct a risk assessment, including locating safety data sheets for specific chemicals or substances	☐	☐	☐	Topic 1.4 Pages 25–29
describe the scientific investigation methodology relevant to VCE Psychology	☐	☐	☐	Topic 1.5 Pages 30–34
contrast the methods for participant selection, including random and stratified sampling	☐	☐	☐	Topic 1.5 Pages 30–34
contrast the investigation designs, including participant allocation, within-subjects design, between-subjects design and mixed design	☐	☐	☐	Topic 1.5 Pages 30–34
contrast qualitative and quantitative data; discrete and continuous data	☐	☐	☐	Topic 1.5 Pages 30–34
describe different ways in which data can be collected, including observations, interviews, questionnaires and yarning circles	☐	☐	☐	Topic 1.5 Pages 30–34
recognise the types of information that are recorded in a logbook	☐	☐	☐	Topic 1.5 Pages 30–34

I can…	Confidently	Partially	Not really	Revision link in your Student Book
present data in appropriate ways, such as in a table or graph	☐	☐	☐	Topic 1.6 Pages 35–42
process and analyse data quantitatively, including the calculation of percentages, percentage change, measures of central tendency and variability	☐	☐	☐	Topic 1.6 Pages 35–42
analyse data and methods qualitatively, including accuracy and precision, repeatability, reproducibility and validity	☐	☐	☐	Topic 1.7 Pages 43–46
identify errors, sources of uncertainty and outliers	☐	☐	☐	Topic 1.7 Pages 43–46
distinguish between evidence, anecdote, opinion, scientific ideas and non-scientific ideas	☐	☐	☐	Topic 1.8 Pages 47–51
construct evidence-based arguments and draw conclusions	☐	☐	☐	Topic 1.8 Pages 47–51
identify the limitations and implications of research findings	☐	☐	☐	Topic 1.8 Pages 47–51
recognise the different types of scientific information, including ideas, concepts, models and theories	☐	☐	☐	Topic 1.9 Pages 52–55
outline the strengths and weaknesses of the different sources of scientific information	☐	☐	☐	Topic 1.9 Pages 52–55
describe the factors affecting psychological issues	☐	☐	☐	Topic 1.9 Pages 52–55
identify the features of effective scientific communication	☐	☐	☐	Topic 1.10 Pages 56–58
list some ways to communicate scientific findings	☐	☐	☐	Topic 1.10 Pages 56–58
understand how to engage with Aboriginal and Torres Strait Islander peoples' knowledges, cultures and histories in VCE Psychology	☐	☐	☐	Topic 1.11 Pages 59–65
recognise some key strategies to maximise exam success	☐	☐	☐	Topic 1.12 Pages 66–69
understand what questions are asking based on the command terms used	☐	☐	☐	Topic 1.12 Pages 66–69

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

1.1 Develop aims and questions, formulate hypotheses and make predictions

Like all scientific research, psychological research follows a structured approach, and a few parameters must be clearly defined. The **aim** of a study provides a broad goal of what the research hopes to accomplish. After you have collected information about existing research and scientific knowledge, you will develop a **research question**. A research question is a more specific query that provides a roadmap for our research to help us achieve the aim. After that, you will formulate a **hypothesis**. This is a prediction about the relationship between variables that is grounded in existing literature and theory. You may also make predictions that are more detailed, including specific phenomena that could be observed based on the hypothesis. Together, these components form the backbone of a robust psychological investigation, making sure it remains focused and relevant.

Writing an aim, research question, hypothesis and prediction

An aim, research question, hypothesis and prediction for an example investigation are shown in Table 1.

TABLE 1 Sample aim, research question, hypothesis and prediction

Aim	To investigate the relationship between sleep duration and cognitive performance
Research question	How does sleep duration impact a person's cognitive performance?
Hypothesis	It is hypothesised that individuals who sleep less than 7 hours a night will perform worse on a memory test compared to those who sleep 7 hours or more.
Prediction	Participants who get 5 hours of sleep will score 20 per cent lower on the memory test compared to those who get 8 hours of sleep.

In an investigation, the variables identified in the aim, research question, hypothesis and prediction must be similar. You can see this in Table 1, where they start more broadly as constructs in the aim and can become more specific in the research question and hypothesis.

Remember that a variable is anything that can vary (change). If the variable is manipulated by the researcher, it is called the independent variable (IV). The variable that is expected to change because of the IV is called the dependent variable (DV). The DV is measured by the researcher each time the IV is changed to determine if there is a cause-and-effect relationship.

You can use the general formula shown in Figure 1 to help you construct your hypothesis.

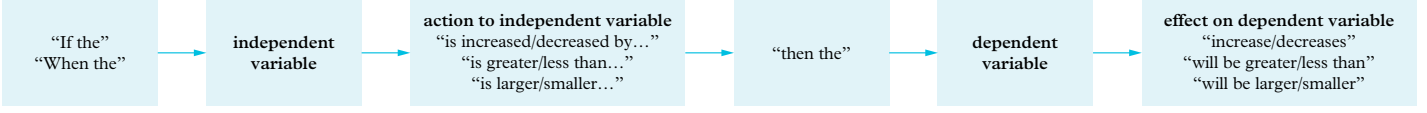


FIGURE 1 Constructing a hypothesis using suggested phrases

RESEARCH REVIEW 1.1

KEY SCIENCE SKILLS: Develop aims and questions, formulate hypotheses and make predictions

Defining parameters for research on sleep deprivation

Research has shown that sleep plays a crucial role in cognitive functioning. Lack of sleep can significantly affect cognitive abilities, such as concentration, decision-making and memory. Adolescents, due to their unique sleep patterns and social and academic pressures, are particularly vulnerable to sleep deprivation. For instance, research suggests that when adolescents do not get enough sleep, they may struggle with memory recall and learning new information (Carskadon, 2011).

FIGURE 2 Sleep deprivation can significantly impact cognitive abilities.

Choose a specific aspect of the relationship between sleep deprivation and cognitive performance in adolescents you might like to investigate. Create a research question and aim, and identify the independent and dependent variables of your research. Use this information to construct a hypothesis that predicts the outcome of the investigation.

Research question	
Aim	
Independent variable	
Dependent variable	
Hypothesis	

1.2 Plan and conduct investigations

When you conduct your own investigation, such as the student-designed investigation from Unit 2 Area of Study 3, you will need to choose a methodology and design that best suits your research question. Methodologies include: case studies; classification and identification; controlled experiment; correlational study; fieldwork; literature review; modelling; product, process or system development; and simulation. In this section, we'll focus on controlled experiments.

Designing a controlled experiment

A controlled experiment is designed to test the effect of one variable (the **independent variable**) on another variable (the **dependent variable**). All other **extraneous variables** (non-IV variables that could influence the DV) are controlled. This ensures that any changes observed in the DV are due to changes in the IV and not other variables.

Participants are grouped into either experimental groups or a control group. Allocation into groups should be random to prevent any bias. However, this could introduce participant variables (differing characteristics of participants), which can become extraneous variables to control for. This can be done through carefully considering the experimental design, as summarised in Table 1.

TABLE 1 Summary of within-subjects, between-subjects and mixed designs

Design	Within-subjects	Between-subjects	Mixed
Description	Involves testing each participant under all conditions of the investigation	Randomly allocates participants into different groups, with each group experiencing only one condition of the investigation	Combines elements of within-subjects and between-subjects designs; used when there are multiple IVs that could affect the DV
Strengths	Eliminates participant variables as confounds since the same individuals are used across all conditions	Can be more time-efficient; minimises the risk of order effects (where a different result is observed due to the sequence in which experimental conditions are performed)	Can reduce variability; enhances efficiency by testing multiple hypotheses with the same set of participants
Limitations	Could introduce order effects (e.g. practice effects, fatigue, boredom)	Requires a larger number of participants; can introduce confounding variables such as participant variables	Can be more time-consuming and expensive
Overcoming limitations	Have half perform the experimental condition first, then the control condition; have the other half perform the conditions in reverse order; consider increasing the time interval between measurements	Match participants based on key characteristics relevant to the investigation (e.g. adoption and twin studies)	–

Selecting an appropriate design helps to minimise confounding variables (variables that have not or cannot be controlled for, and that affect the DV) and improve efficiency.

INVESTIGATION INSPECTOR 1.2

KEY SCIENCE SKILLS: Plan and conduct investigations

Selecting an experimental design to assess effects on productivity

Imagine you are designing an experiment to test the effects of two IVs – time of day and type of task – on productivity.

FIGURE 1 There are many ways in which you could study productivity.

1 Identify which design (within-subjects, between-subjects or mixed) would be most appropriate. Justify your choice and describe how you could group the participants.

2 Discuss how you would choose between a within-subjects and between-subjects design for an experiment.

1.3 Comply with safety and ethical guidelines

In your VCE Psychology studies, you will encounter ethical concepts and ethical guidelines (see Topic 1.4 in your Student Book). Ethics, in general, refers to the standards that guide individuals to make judgments, and conduct themselves in ways that are appropriate ("right") and avoid behaviours that are inappropriate ("wrong"). Ethical conduct involves adhering to **ethical guidelines** to ensure the wellbeing and rights of the participants in your study. This includes maintaining confidentiality, allowing voluntary participation, and granting withdrawal rights at any stage. Informed consent is vital, and use of deception in research must be carefully considered and managed. After your study, participants must be debriefed to explain the purpose, results and conclusions of the investigation, and any misconceptions should be corrected. During the debriefing stage, counselling services should also be offered to participants. Additionally, you should consider any potential psychological or physical harm, and how this can be minimised in the study.

Considering ethical dilemmas

An ethical dilemma is a situation in which a person faces conflicting ethical principles that make it challenging to choose a clear course of action. For example, there is a clear conflict between using deception in research and gaining informed consent from participants. In such situations, adhering to one ethical principle might result in the violation of another. The complexity of ethical dilemmas often means that there isn't a single "right" answer, and solutions may vary based on individual perspectives, cultural norms or situational specifics.

When exploring ethical dilemmas, a number of **ethical concepts** should also be considered:

- integrity – honestly communicating research results
- justice – fairly assessing claims, means and actions
- beneficence – having the intention to do well
- non-maleficence – avoiding harm and making sure benefits outweigh risks
- respect – empowering living beings to make their own decisions where possible.

To ensure the wellbeing of participants, researchers must submit detailed plans of their investigations to the Human Research Ethics Committee (HREC) of their university or other research institution (such as a hospital or medical research body). The committee reviews the proposal and weighs up the potential harm against societal benefit before signing off on an investigation.

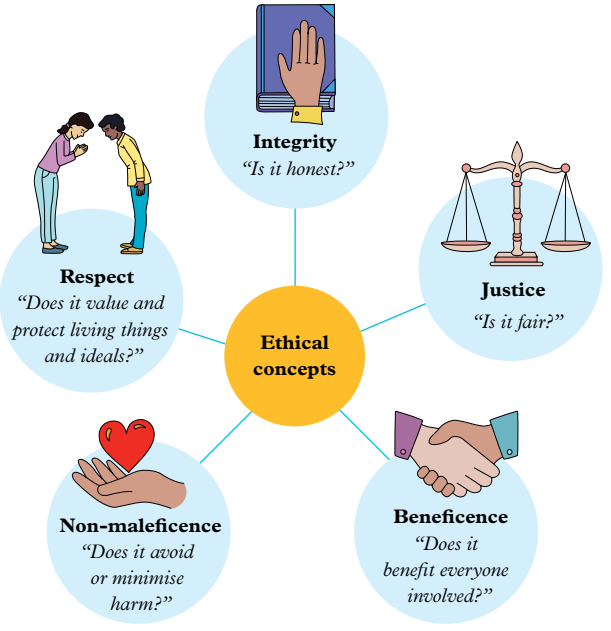


FIGURE 1 A summary of questions you can ask to assess how ethical concepts apply to your research.

EVALUATING ETHICS 1.3

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Recognising ethical issues in studies on anxiety disorders

Researchers are conducting a study on the effects of a new therapy on individuals with anxiety disorders. The therapy has shown exciting results in previous studies, and has the potential to provide significant benefits to those suffering from anxiety. However, to test its effectiveness, participants will be randomly assigned to either the treatment group or a control group, where they will receive a placebo (a sugar pill with no active ingredient). The study will involve weekly therapy sessions for a period of six months, and participants will be monitored for changes in their anxiety levels.

FIGURE 2 The researchers plan on using a placebo in their investigation.

1 Describe the ethical dilemma associated with using a placebo to "treat" patients with a clinical disorder.

2 Identify and describe two ethical concerns raised by this particular study, with reference to one ethical concept and one ethical guideline.

Ethical concept	How is it breached?

Ethical guideline	How is it breached?

1.4 Generate, collate and record data

Data refers to factual information – typically the results of observations, measurements or responses – that is collected for research or investigations. Data forms the basis for constructing evidence-based claims and drawing conclusions.

Data can come directly from primary sources or indirectly from secondary sources, and can be either quantitative (numerical) or qualitative (descriptive). The choice of data collection methods is informed by the research question and any relevant ethical issues. Methods include observations, interviews, focus groups, yarning circles and questionnaires. Each method has its strengths and weaknesses, and your choice will depend on the type of data you seek to help you answer your research question.

Types of data

In psychological studies, **qualitative data** is useful for gathering subjective (personal) information about a person's thoughts, motivations, feelings and other behaviours. Meanwhile, **quantitative data** is measurable, numerical information about the variables being studied, e.g. a heart rate measured in beats per minute. Quantitative data is generally objective (without personal opinion or bias) and allows for statistical analyses to be performed.

In some cases, we can assign numerical values to qualitative data. A Likert scale is a type of survey tool used to measure people's attitudes, opinions or perceptions by offering a range of response options from one extreme to another, typically from "strongly agree" to "strongly disagree". These qualitative responses can be assigned numerical values, which allow researchers to apply descriptive statistics to analyse the data.

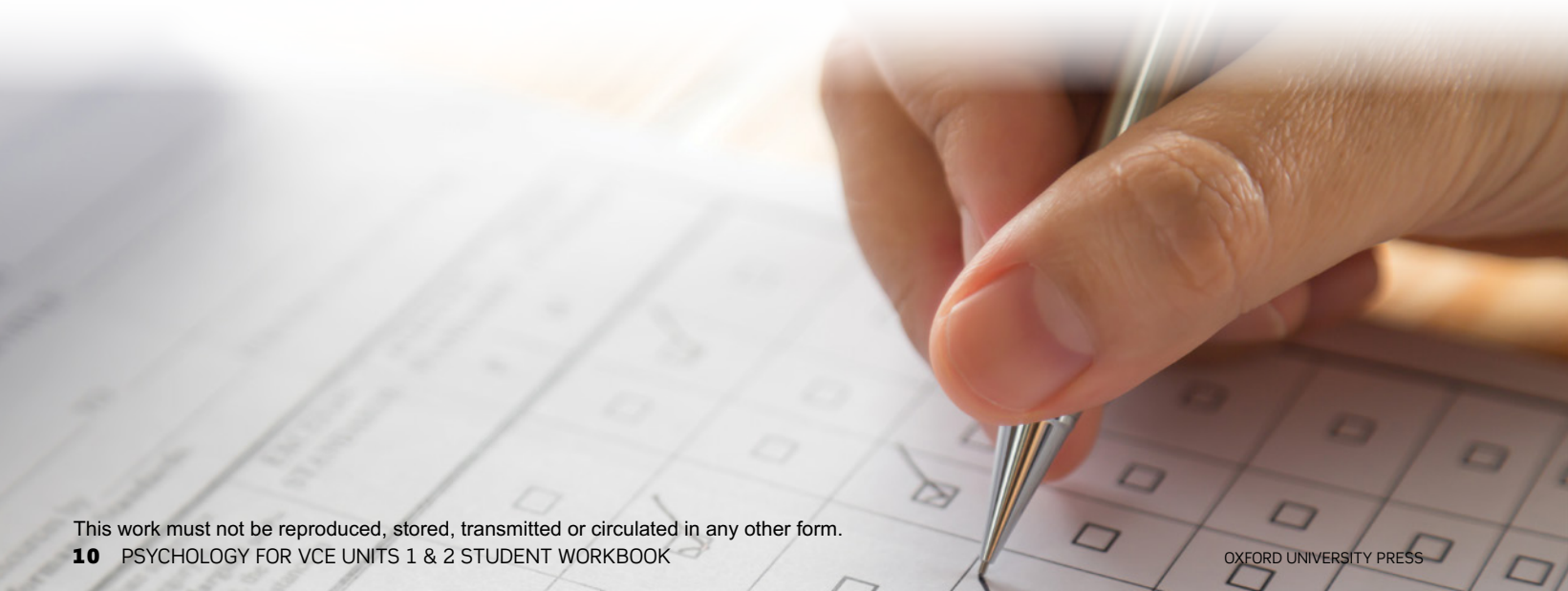
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	← Qualitative data
1	2	3	4	5	← Quantitative data

FIGURE 1 A Likert scale can be used to collect both qualitative and quantitative data.

Data may also be either discrete or continuous. **Discrete data** consists of separate, distinct values, usually obtained by counting – e.g. the number of pets in a household or number of students in a class. On the other hand, **continuous data** can take on an infinite number of values within a given range, and is usually obtained by measuring. Examples of continuous data include height, weight, temperature or time.

Understanding the different types of data you can generate is important, as it helps you select the most suitable methods to help you to answer your research question.

FIGURE 2 Surveys are a very common method of data collection in psychological studies.



DATA DRILL 1.4

KEY SCIENCE SKILLS: Generate, collate and record data

Assessing the type of data generated about student stress during exams

Dr Chi wants to investigate student stress levels during exam periods. They design a questionnaire and distribute it among a group of university students, asking them to rate their stress levels during their most recent exam period on a 5-point Likert scale, where 1 = "little or no stress" and 5 = "high stress".

FIGURE 3 Dr Chi wants to study stress levels in students during exam periods.

1 The data collected is _____ data.

A primary
B secondary
C continuous
D precise

2 Identify whether the data collected is qualitative, quantitative or both. Justify your response.

3 Fill in the table to contrast subjective and objective data, with reference to Dr Chi's investigation.

Type of data	Definition	Example from Dr Chi's investigation
Subjective		
Objective		

4 Explain whether the numerical value assigned to participants' stress levels represents discrete or continuous data.

1.5 Analyse and evaluate data and investigation methods

The raw data obtained from a psychological investigation needs to be valid in order to maximise the quality of data. Any errors, outliers or uncertainty in the data or results should be identified and discussed as part of the evaluation.

Validity refers to the degree to which a study or measurement measures what it intends to. Within the study, this is referred to as internal validity. The broader applicability or "generalisability" of the results to individuals and settings beyond the study is called external validity. **Accuracy** refers to the closeness of a measured value or result to the "true" or accepted value. Typically, there is a positive association between accuracy and validity.

Precision refers to the degree of consistency or agreement between repeated measurements or observations of the same quantity or within a single study.

Ideally, scientific instruments and methodologies should be both valid and precise. High precision typically indicates reliable results; however, a measurement can be valid without being precise, and vice versa.

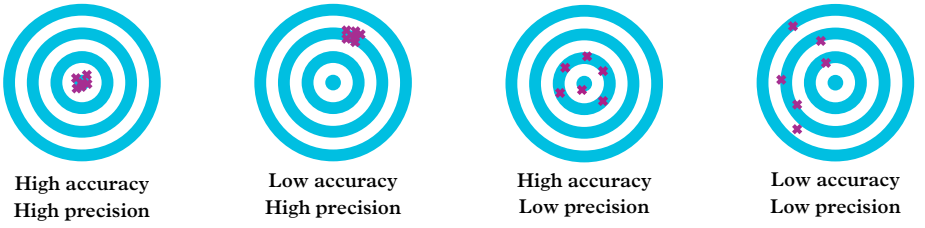


FIGURE 1 Accuracy and precision are different concepts

Uncertainty refers to the ambiguity that exists due to the natural subjectivity of the concepts being measured, especially in the field of psychology. It highlights the challenge in obtaining exact values for variables such as emotions, attitudes and personality traits that cannot be directly observed. Uncertainty can be identified by looking for contradictory or incomplete data, and evaluating potential alternative explanations for the results, or considering factors that might influence their interpretation.

Error refers to the difference between the measured value and the true value of what is being measured. Types of error include personal errors, mistakes, miscalculations and observer errors made during the investigation. Error also includes measurement errors, and random or systematic errors. Random errors reduce precision and can impact reliability, while systematic errors reduce accuracy and can impact validity. Outliers are extreme scores that can be caused by anomalies, personal error such as data entry errors, or measurement errors.

By understanding the limitations of your data and methods, and assessing the quality of your data, you can be confident that the conclusions you draw from them are robust and appropriate for your data set.

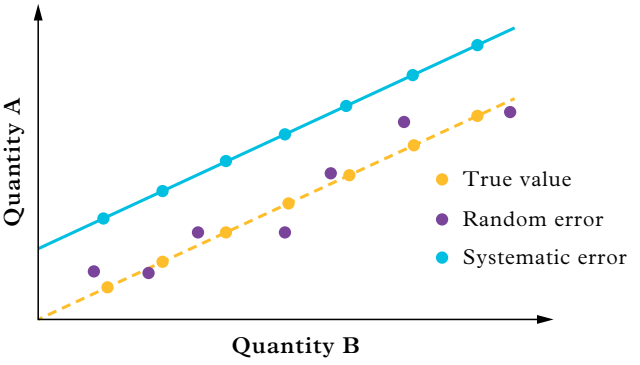


FIGURE 2 How random and systematic errors affect results

Study tip

Personal errors should not be included in your final report because this is a sign of "bad science". Instead, you should record these in your logbook with a reflection or description of how you corrected the mistake.

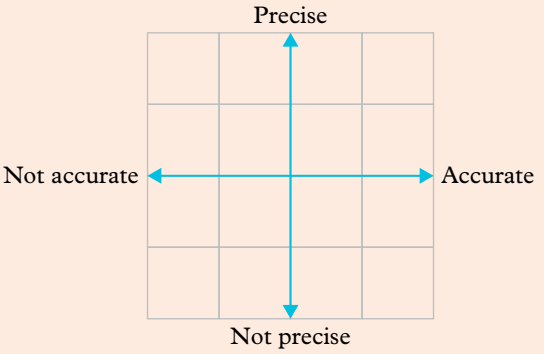
DATA DRILL 1.5

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Evaluating data using the correct terminology

1 Suppose you conduct a series of measurements and obtain the following results: 10.3 cm, 10.2 cm, 10.4 cm, 10.3 cm, 10.1 cm. However, the actual measurement should be 8.7 cm.

a Show, by drawing a cross on the grid, where the data sits on the following matrix.



b Justify your response to part **a**.

2 In a study of stress levels in university students, you use a questionnaire that consistently measures students' coffee consumption. Repeated use of the questionnaire provides similar results. Describe the validity of this questionnaire.

3 In an experiment, you are timing a one-minute task with a stopwatch. However, every time you use the stopwatch, it records times that are consistently 5 seconds too short. Identify whether this is a random or systematic error, and explain how it impacts the experiment's results.

4 You are studying individuals' perceptions of happiness, and find that responses to a survey question vary widely because of the subjective nature of the concept.

a Explain whether this situation demonstrates error or uncertainty.

b Explain how you could address errors or reduce uncertainty in the investigation.

5 The following data set is obtained for a memory test:

65, 70, 72, 71, 90

Circle any outliers and predict how they could impact the interpretation of your data.

1.6 Construct evidence-based arguments and draw conclusions

The point of investigations in psychology is to gather evidence that enables you to meet the aim and/or answer the research questions. This involves:

- analysing the collected data to identify relevant trends, patterns or relationships between the variables
- evaluating the suitability of the evidence to achieve the aim of the investigation and answer the research question. Your evaluation should consider the reliability and validity of the source of information
- using valid data as evidence to build scientific arguments, draw conclusions and make inferences.

Evaluating sources of research

It is important to seek out credible sources when you conduct research. Credible sources are those that are current, relevant to your investigation, come from authoritative sources, and have accurate data. Information is reliable and valid if you can find multiple credible sources – such as those published within the scientific community – with the same key ideas and supporting evidence.

Sources of information such as opinions (personal views), anecdotes (stories) and non-scientific ideas have low credibility and may not be suitable to the aim of the investigation. On the other hand, evidence (empirical data) and scientific ideas (based on research) have higher credibility as the data has higher validity. Once you determine that the sources are reliable, they can be used as evidence in your scientific arguments.

Study tip

Your teacher may provide you with clearer criteria for evaluating sources, including the definition for what constitutes "contemporary" or "recent". See Chapter 1 Psychology toolkit in your Student Book for more help on identifying sources of information, and Chapter 6 Research investigation for help evaluating the credibility of sources and information.

Constructing scientific arguments

To construct a clear scientific argument, you could use a structural framework that may be familiar to you from English, such as PEEL (also known as TEEL or PEEEL). This is shown in Table 1. Using PEEL, each paragraph should contain only one point, topic or argument.

TABLE 1 PEEL can be used to construct scientific arguments.

P – Point	Identify the point of the paragraph. This could also be a topic (T in TEEL) or the position you are taking in your scientific argument.
E – Explanation/evidence	Summarise the information source and include data as supporting evidence.
E – Evaluation	Use logical and critical thinking to evaluate the evidence. Identify and describe **limitations** that lower the **reliability** or **validity** of the investigation, and that may impact your ability to answer the research question. Identify whether further evidence is needed, or suggest improvements to strengthen your findings.
Repeat EE, if applicable	If you are writing a scientific argument, you might have several pieces of evidence to explain and evaluate. In this case, repeat EE for each piece of evidence.
L – Link	Link the findings back to your overall investigation by writing a summary statement. The summary statement can be in the form of a tentative conclusion, implications or linking to ideas in the next paragraph.

Study tip

You could apply the PEEL structure to all sections in your scientific report, including the introduction and discussion.

Constructing a conclusion

The conclusion summarises the overall investigation. Table 2 provides a list of suggestions of what to include for each type of conclusion.

TABLE 2 Checklist for what to include in your conclusion

Research investigation (secondary data)	Student-designed experiment (primary data)
☐ a **concluding statement** that summarises the findings of the investigation and answers the research question	☐ a **concluding statement** that summarises the findings of the investigation
☐ a summary of the **findings**, including the similarities and differences between the studies analysed	☐ a statement of whether the results support or refute the **hypothesis**
☐ a summary of the main **limitations** that have the most significant effects on your ability to answer the research question	☐ a summary of the **results**
☐ a **judgment** about the overall success of the investigation, considering the limitations	☐ a summary of the main **limitations** that reduce the validity of the findings
☐ an explanation of the **implications** of the study (e.g. who will benefit and how)	☐ a **judgment** about the overall success of the investigation, considering the limitations
	☐ an explanation of the **implications** of the study (e.g. who will benefit and how)

CASE CRACKER 1.6

KEY SCIENCE SKILLS: Construct evidence-based arguments and draw conclusions

Building scientific arguments about the effects of sleep deprivation on academic performance

A psychology student, Ivo, wanted to investigate the following research question: "What is the effect of sleep duration on academic performance in high school students?"

They hypothesised that high school students who were sleep deprived – defined as having less than 8 hours of sleep per night – would have lower semester grades than those who were not sleep deprived.

Ivo recruited 200 participants from their high school. They placed participants into Group A if they slept for, on average, 8 to 10 hours per night. Participants who slept for, on average, 4 to 7 hours per night, were placed in Group B. Their average semester 1 grades were recorded, with Group A students achieving an average grade of 85 (standard deviation of 5) and Group B students achieving an average grade of 70 (standard deviation of 10). Their grades were significantly different.

During semester 2, Ivo asked all Group A and Group B participants to achieve an average of 8 to 10 hours of sleep per night. At the end of the semester, both groups recorded similar average grades.

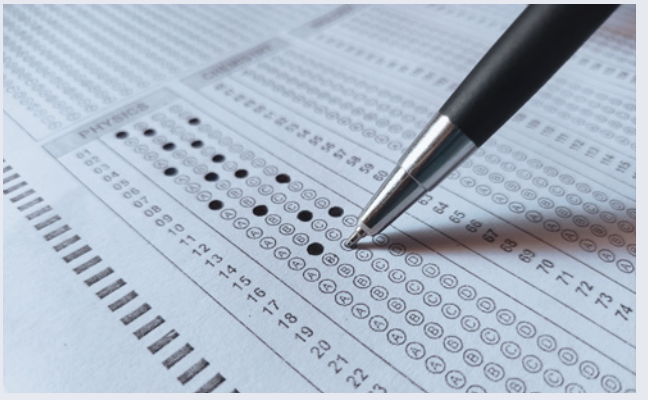


FIGURE 1 Semester results were compared to assess the effects of sleep deprivation.

1 Evaluate whether the evidence is suitable to answer the research question.

2 Identify potential confounding variables that would lower the validity of the results.

3 Construct an evidence-based conclusion about the results of the study.

FIGURE 2 How does sleep deprivation affect academic performance?

1.7 Analyse, evaluate and communicate scientific ideas

Topic 1.10 in your Student Book provides an overview of actions you can take to effectively communicate your scientific findings. Consider the additional points below:

1 Use language appropriate for your target audience.
   - Assume that your target audience is at the same level as your peers or above. You do not need to define or explain content that they are likely to know. However, if you have had to look up a definition or explanation for something, such as a new concept, then it is a good idea to include this in your assessment.
   - Make sure any acronyms you use are written out in full the first time you use them. For example: "Acute brain injury (ABI) affects a person's functioning. An example cause of ABI is a traffic accident."

2 Be concise and only include essential information.
   - Ask yourself whether what you are writing is both relevant and necessary to the overall aim or research question of your investigation.
   - Your writing will be clearer and more concise by using direct, short sentences. An example is shown in Table 1.

TABLE 1 Compare the original writing with its more concise version.

Original version (32 words)	Concise version (16 words)
An experiment was conducted by Craik and experimental psychologist and neuroscientist Endel Tulving in 1975, which assessed if and how the levels of processing affected how well information was retained by participants.	An experiment by Craik and Tulving (1975) assessed how the levels of processing affected memory recall.

Using appropriate terminology, representations and conventions

As well as general guidelines for effective communication, it is important to use the correct terminology, representations and conventions in your writing.

Psychological terminology refers to the subject-specific terms that you will learn with new content (e.g. "medial", "hemispheric specialisation", and so on), as well as general scientific terminology. This includes correctly using terms such as "precision", "accuracy" and "validity".

Representations and conventions may vary from school to school; therefore, you should check with your teacher about what is appropriate. In psychology, researchers follow the guidelines set by the American Psychological Association (APA). The APA style guide is currently in its 7th edition and includes rules about everything from how to format tables and graphs, to referencing conventions for different types of sources. You can find free summaries of the style guide online.

FIGURE 1 Good scientific communication is clear; concise; uses the correct terminology, representations and conventions; and is targeted to the audience.

RESEARCH REVIEW 1.7

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Communicating scientific findings and psychological concepts

1 Rewrite the following information more concisely.

During a comprehensive investigation, a team of psychology scholars determined that frequent usage of social media platforms, specifically for periods exceeding five hours daily, is associated with significantly diminished levels of self-esteem among the adolescent population.

FIGURE 2 What is the effect of social media usage on adolescent self-esteem?

2 Complete the table by describing the ethical principle of "beneficence" to three different audiences: a teacher, a peer and a five-year-old.

Target audience	Description of "beneficence"
A teacher	
A peer	
A five-year-old	

3 Look up the APA style guide, 7th edition.

a Highlight or circle any elements in Figure 3 that do not adhere to the APA style guide, 7th edition.

Table 1

Effect of Distance on the Volume of Different Pitched Sounds.

Distance	Volume (dB) at...			
	100 Hz	250 Hz	500 Hz	1000 Hz
1 m	75	69	65	53
2 m	64	58	50	47
3 m	58	51	39	32
4 m	49	42	30	27
5 m	41	35	22	20

Note: Data collected by author on the 30th of August 2023.

FIGURE 3 A table of results from an investigation exploring the effect of distance on volume of different pitched sounds

b Redraw the table, correctly adhering to the APA style guide, 7th edition.

FIGURE 4 You must reference all your sources.

UNIT 1

How are behaviour and mental processes shaped?

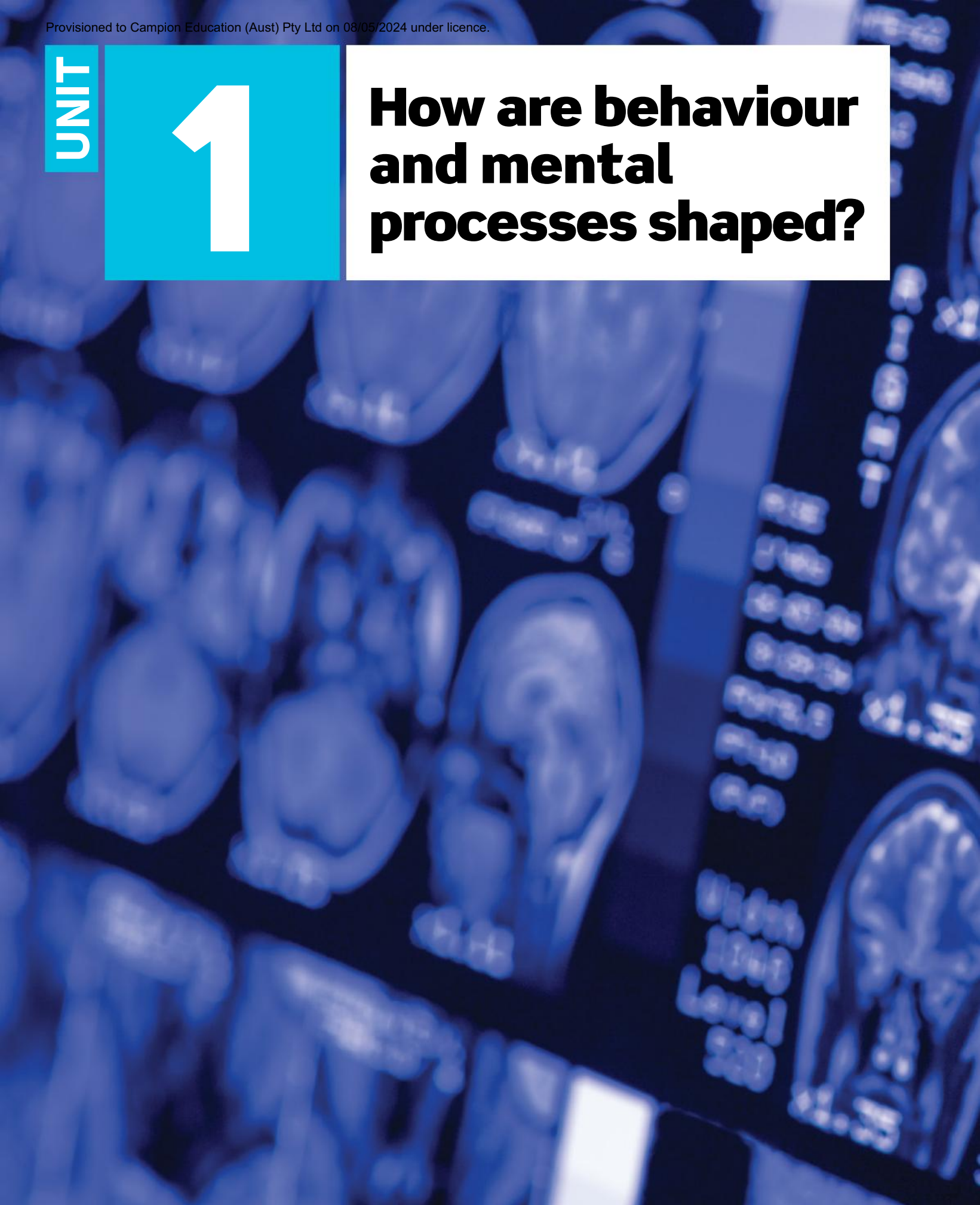


FIGURE 1 In Unit 1 you will look at the role of the brain in mental processes and behaviour.

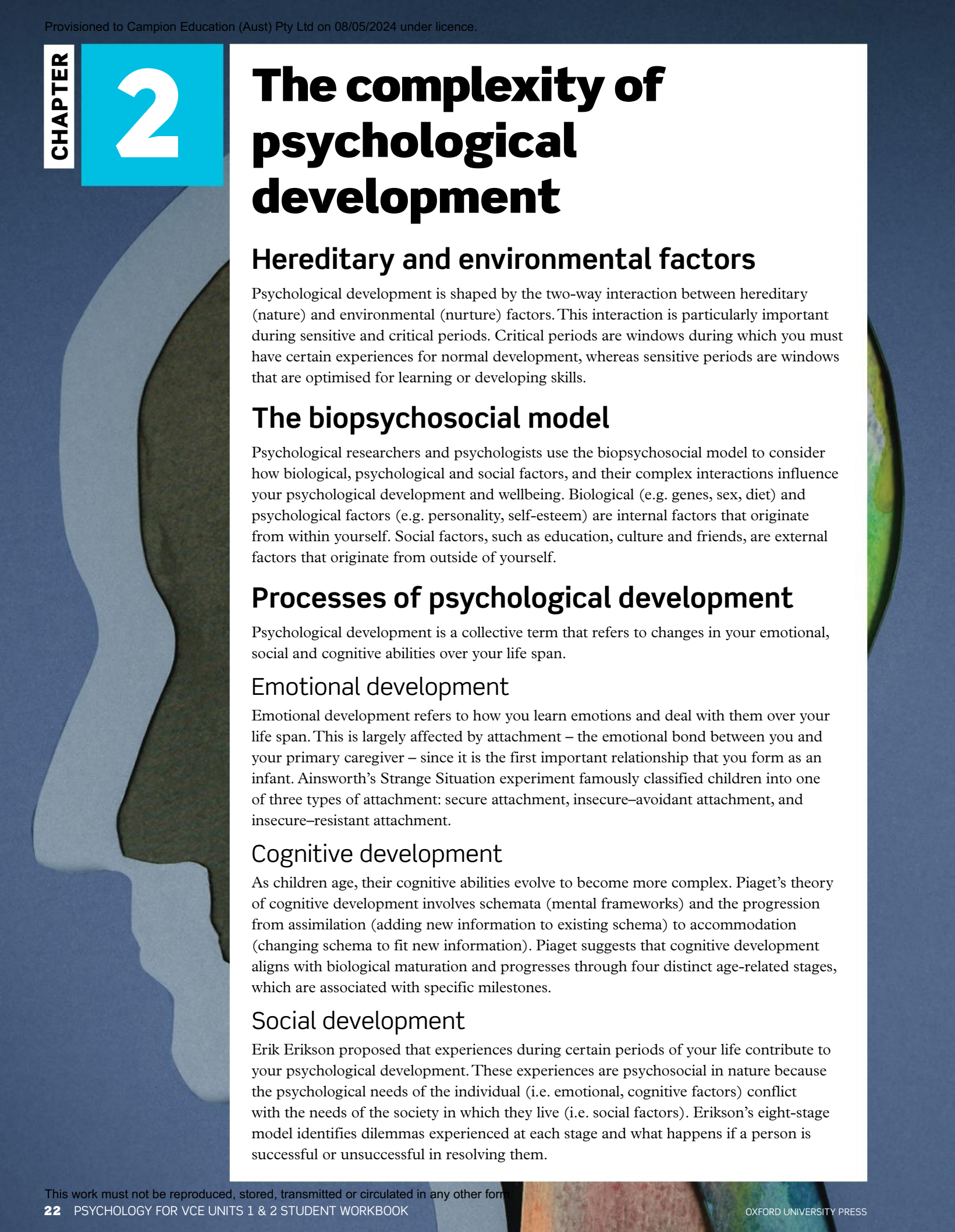
WORD WIZARD

Draw a line to match each term with the correct definition.

A BIOPSYCHOSOCIAL MODEL	1 the largest part of the forebrain and where most of the important brain functions happen, such as higher cognitive functions like thinking, planning, learning and reasoning
B COGNITIVE DEVELOPMENT	2 a behaviour that allows a person to successfully cope in their environment
C CRITICAL PERIOD	3 injury to the brain that occurs after birth
D SENSITIVE PERIOD	4 the development of mental processes and abilities throughout the life span
E ATYPICAL BEHAVIOUR	5 the differences that can exist among the population with regard to psychological development and function
F ADAPTIVE BEHAVIOUR	6 a period of time during development when an individual is more responsive to specific experiences from their environment that can shape their development
G NEURODIVERSITY	7 a bundle of nerve fibres separating the left and right hemispheres of the brain
H PSYCHOLOGIST	8 a progressive brain condition associated with repeated head trauma and concussion
I MENTAL WELLBEING	9 the brain's ability to change in response to experience
J CORPUS CALLOSUM	10 behaviour that is unexpected or inconsistent with what would generally occur within a particular situation or circumstance
K NEUROIMAGING	11 a holistic framework used to consider and categorise all the biological, psychological and social factors that influence a person's psychological development and mental wellbeing
L CEREBRUM	12 a period of time during development when an individual is especially susceptible to specific environmental experiences that shape their development, and their development is particularly vulnerable to deprivation of this experience
M NEUROPLASTICITY	13 a mental health professional trained in thoughts, feelings and behaviours who uses psychotherapy to support the development and wellbeing of their patients; they cannot prescribe medication as part of treatment
N ACQUIRED BRAIN INJURY	14 a technique that captures a picture of the brain
O CHRONIC TRAUMATIC ENCEPHALOPATHY	15 a person's overall mental state in terms of their level of functioning, their social and emotional wellbeing, and their resilience to cope with change and uncertainty

CHAPTER 2

The complexity of psychological development



Hereditary and environmental factors

Psychological development is shaped by the two-way interaction between hereditary (nature) and environmental (nurture) factors. This interaction is particularly important during sensitive and critical periods. Critical periods are windows during which you must have certain experiences for normal development, whereas sensitive periods are windows that are optimised for learning or developing skills.

The biopsychosocial model

Psychological researchers and psychologists use the biopsychosocial model to consider how biological, psychological and social factors, and their complex interactions influence your psychological development and wellbeing. Biological (e.g. genes, sex, diet) and psychological factors (e.g. personality, self-esteem) are internal factors that originate from within yourself. Social factors, such as education, culture and friends, are external factors that originate from outside of yourself.

Processes of psychological development

Psychological development is a collective term that refers to changes in your emotional, social and cognitive abilities over your life span.

Emotional development

Emotional development refers to how you learn emotions and deal with them over your life span. This is largely affected by attachment – the emotional bond between you and your primary caregiver – since it is the first important relationship that you form as an infant. Ainsworth's Strange Situation experiment famously classified children into one of three types of attachment: secure attachment, insecure–avoidant attachment, and insecure–resistant attachment.

Cognitive development

As children age, their cognitive abilities evolve to become more complex. Piaget's theory of cognitive development involves schemata (mental frameworks) and the progression from assimilation (adding new information to existing schema) to accommodation (changing schema to fit new information). Piaget suggests that cognitive development aligns with biological maturation and progresses through four distinct age-related stages, which are associated with specific milestones.

Social development

Erik Erikson proposed that experiences during certain periods of your life contribute to your psychological development. These experiences are psychosocial in nature because the psychological needs of the individual (i.e. emotional, cognitive factors) conflict with the needs of the society in which they live (i.e. social factors). Erikson's eight-stage model identifies dilemmas experienced at each stage and what happens if a person is successful or unsuccessful in resolving them.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
distinguish between hereditary and environmental factors and provide examples of each	☐	☐	☐	Topic 2.1 Pages 78–82
explain how hereditary and environmental factors interact to affect a person's psychological development	☐	☐	☐	Topic 2.1 Pages 78–82
explain what the biopsychosocial model is	☐	☐	☐	Topic 2.2 Pages 83–87
provide examples of internal and external factors affecting psychological development and mental wellbeing	☐	☐	☐	Topic 2.2 Pages 83–87
describe how biological, psychological and social factors influence psychological development and mental wellbeing, and provide examples of each	☐	☐	☐	Topic 2.2 Pages 83–87
explain how biopsychosocial factors interact to influence psychological development and mental wellbeing	☐	☐	☐	Topic 2.2 Pages 83–87
explain Harlow's theory of attachment, with reference to the findings of his research	☐	☐	☐	Topic 2.3 Pages 88–93
outline the implications and criticisms of Harlow's research	☐	☐	☐	Topic 2.3 Pages 88–93
explain Ainsworth's theory of attachment, with reference to the findings of her research	☐	☐	☐	Topic 2.3 Pages 88–93
compare and contrast the four attachment styles	☐	☐	☐	Topic 2.3 Pages 88–93
outline the implications and criticisms of Ainsworth's research	☐	☐	☐	Topic 2.3 Pages 88–93
explain what schemata are, in terms of psychological development	☐	☐	☐	Topic 2.4 Pages 94–100
describe the processes of assimilation and accommodation, in terms of psychological development	☐	☐	☐	Topic 2.4 Pages 94–100
explain Piaget's theory of cognitive development, with reference to the four stages of cognitive development	☐	☐	☐	Topic 2.4 Pages 94–100
outline the implications and criticisms of Piaget's research	☐	☐	☐	Topic 2.4 Pages 94–100
explain Erikson's theory of psychosocial development, with reference to the eight psychosocial stages	☐	☐	☐	Topic 2.5 Pages 101–106
outline the implications and criticisms of Erikson's research	☐	☐	☐	Topic 2.5 Pages 101–106
contrast sensitive and critical periods	☐	☐	☐	Topic 2.6 Pages 107–109
describe the role of sensitive and critical periods in a person's psychological development	☐	☐	☐	Topic 2.6 Pages 107–109

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

GROUNDWORK 2

Multiple choice

1 Which of the following pair of terms best completes the following sentence?
As we age, the number of development milestones _____ as the brain's plasticity _____.

A decreases; decreases
B decreases; increases
C increases; increases
D increases; decreases

2 Changes in thinking, language, memory and problem-solving abilities throughout the life span are known as:

A social development.
B cognitive development.
C biological development.
D emotional development.

3 There are only a few critical windows during human development. These mainly occur:

A after birth with the development of motor skills.
B after birth with the development of cognitive skills.
C during development in the womb, and after birth with the development of vision.
D during development in the womb, and after birth with the development of language.

4 Sera can only focus on one aspect of a task at a time. Their mother is watching them separate their crayons by colour, before separating them by size. Which milestone is Sera yet to achieve?

A Seriation
B Centration
C Egocentrism
D Object permanence

FIGURE 1 Sera is sorting crayons.

5 Which of the following statements best represents the results of Harry Harlow's experiments with rhesus monkeys?

A Nourishment creates attachment.
B Contact comfort is not important for development.
C Feeding and contact comfort create attachment.
D Feeding and nourishment do not create attachment; contact comfort is important.

Short answer

6 Identify and describe the three types of psychological development. Provide at least one example for each type of development to support your explanation.

7 Identify five environmental factors that are likely to influence psychological development during adolescence.

8 **a** Describe the biopsychosocial model.

b Consider the following points:

- Justina's mother experiences depression and her uncle has recently been diagnosed with general anxiety disorder.
- A year ago, Justina's girlfriend broke up with her without warning. Justina now has a new girlfriend. So far, things are going well; however, she can't stop thinking about everything that went wrong with her ex-girlfriend and is convinced that the same thing will happen with her new girlfriend.
- Fortunately, Justina is quite close with her family and she has a good work–life balance.

With reference to these points, identify and describe a biological, social or psychological factor that could influence Justina's mental wellbeing.

9 Compare sensitive and critical periods.

10 Contrast assimilation and accommodation.

CASE CRACKER 2

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Investigating Layne Beachley's story

Layne Beachley is an Australian legend and seven-time world surfing champion. She is also a motivational speaker, trainer, philanthropist and mentor, and the founder of Aim for the Stars – a charity that offers financial and moral support to help girls and women experiencing adversity or financial hardship achieve their dreams. However, Layne's success did not come easily. In her autobiography, she reveals the childhood hardships, depression, injuries and chronic fatigue she had to overcome to achieve success.

Layne was raised in a supportive environment. Her father and older brother loved to surf, so it is no surprise that Layne started surfing with them at a young age. Unfortunately, tragedy struck the Beachley household early on. Layne's mother died from a surgical complication when Layne was six years old. At age nine, Layne learnt that she was adopted. This news instantly left Layne feeling isolated, alone and unworthy of love, since she felt she had been abandoned by both her biological and adoptive mother.

According to Layne, she set the lofty goal to become the best in the world at something to gain love from others. At age 16, Layne became a professional surfer, and she won her first title when she was 20. Early in her career, Layne met her biological mother and found out that she was conceived during a date rape. Despite navigating the complicated relationship, Layne's confidence grew, and she went on to be the first person to win six surfing titles back-to-back. Layne was able to overcome her fear of abandonment and is happily married.

FIGURE 2 Layne Beachley overcame difficulties and achieved success in her professional and personal life.

1 Describe two different environmental factors that contributed to Layne Beachley's development.

2 With reference to the case study, discuss the role of nature and nurture in Layne's development.

DATA DRILL 2

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods; Analyse, evaluate and communicate scientific ideas

Analysing qualitative data on perspectives about nature and nurture

Emilie is investigating genetic and environmental factors that affect psychological development. She has conducted and recorded semi-structured interviews with three developmental psychology professors from a local university.

Their responses were transcribed to identify common themes. Statements that Emilie considered to be key are summarised in Table 1.

FIGURE 3 Emilie interviewed three developmental psychology professors.

TABLE 1 Key statements identified by Emilie in her investigation

Professor	Statements relating to nature (hereditary)	Statements relating to nurture (environmental)
1	• "Genes determine speed of development in all children." • "Hormones released during puberty can decrease brain development."	• "Social groups can decrease brain development if limited vocabulary is used."
2	• "A gene on chromosome 7 may have something to do with migration of neurons." • "Kids who have depression seem to have delays in their brain development."	• "Adults who do not use words with their children are hindering their brain development." • "Children who do not read books before school will be behind by the time they start school."
3	• "Genetics accounts for at least half of the brain development experienced by children." • "Hormones do not interfere with development, but can be affected if there isn't correct development."	• "If children cannot understand complex words or sentences by Grade 1, this indicates that they are experiencing cognitive delays." • "Nurture accounts for the other half of brain development."

Refer to Table 1 to answer the following questions.

1 Identify a common theme that emerges in the "nurture" transcripts across all three professors.

2 Identify the "nature" factors that are thought to influence brain development.

3 Determine the most commonly occurring theme in the "nature" column.

INVESTIGATION INSPECTOR 2

KEY SCIENCE SKILLS: Plan and conduct investigations

Exploring sampling methods to investigate mental wellbeing

In psychological research, the group of participants (humans) or subjects (animals) that take part in a research study are called the "sample". Psychologists use different sampling methods, including random sampling and stratified sampling.

Consider the following scenario: Leon is recruiting participants for a study about the effect of employment status on mental wellbeing in university students.

1 Explain the importance of obtaining a representative sample, including the impact on validity.

2 Describe how Leon could use each of the following sampling techniques to choose participants for their student experiment. Identify a limitation for each technique.

a random sampling

b stratified sampling

FIGURE 4 What is the effect of employment status on mental wellbeing?

EVALUATING ETHICS 2

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines; Analyse, evaluate and communicate scientific ideas

Investigating participant rights in attachment studies

In 1958, Harry Harlow demonstrated the importance of attachment during infancy on psychological development through his research on rhesus monkeys. Harlow found that comfort and contact were more likely to lead to attachment between an infant and caregiver than provision of sustenance, and that infants who did not form attachments developed atypically and had difficulties socialising with others. Similarly, Mary Ainsworth found that the style of parenting provided by the caregiver impacted the child's emotional behaviour and how they interacted with their caregiver and strangers.

FIGURE 5 Harlow studied attachment in rhesus monkeys.

1 Discuss the ethical guidelines that were violated in Ainsworth's Strange Situation experiment.

2 Animal research plays an important role in investigations involving psychological phenomena. The care and use of animals in research is governed by the National Health and Medical Research Council's (NHMRC) *Australian code for the care and use of animals for scientific purposes* (8th ed., 2013). With reference to ethics, describe how animal studies are similar to studies with children.

RESEARCH REVIEW 2

KEY SCIENCE SKILLS: Construct evidence-based arguments and draw conclusions

Evaluating the credibility of the Bogotá twins study

The "nature vs. nurture" debate is central in psychology. For nearly all behaviours studied, there is one key question that researchers keep in mind: to what extent are human behaviours caused by genetics or by the environment?

Twin studies can be used to establish support for the nature vs. nurture debate. One example is the "Bogotá twins", where two sets of identical twin brothers were mixed up soon after birth. One of each set was mistakenly taken home by each family. It was not until twenty years later that the mistake was revealed.

Information on the Bogotá twins was published by an Australian news outlet in 2015.

FIGURE 6 The two sets of Bogotá twins

Source: Dominus (2015)

Evaluate the credibility of this source by answering the following questions.

1 Name the organisation that published this source.

2 Identify which source of information best describes information on the Bogotá twins (mass media communication, journal article, opinion, policy document or report in the public domain). Justify your answer.

3 Identify two strengths and two weaknesses of this source.

4 A student is writing a literature review on twins and is considering using this source in their paper. Explain whether you believe this type of source is appropriate for use in a literature review.

CHAPTER 3

Defining and supporting psychological development

Psychological development and mental wellbeing contribute to the diversity of the human experience.

Typical and atypical behaviours

Behaviour is an indicator of psychological development. Typical behaviours are behaviours that conform to expectations and standards acceptable for the situation. Atypical behaviours are deviations from this, and could include behaviours that are unexpected, inconsistent with what is considered the norm, or "out of character". If atypical behaviours are persistent, cause distress or impair day-to-day functioning, this could be a sign of developmental and/or psychological disorders.

The role of mental health professionals

Mental health professionals, including psychiatrists, psychologists and mental health workers, play a crucial role in supporting individuals with psychological disorders, and their families. Psychiatrists and psychologists use the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5-TR) for diagnosis of psychological disorders.

Normality, neurotypicality and neurodiversity

Neurotypicality describes brain function and development that are considered typical, or are shown by most people in the general population. In contrast, neurodivergence describes brain development and function that are not as common in the general population. Neurodiversity is a term encapsulating all types of thinking and behaviour that exist within a population (both neurotypical and neurodivergent).

Categorising behaviour and thinking as "normal" or "typical" can be a difficult task since our population is so diverse and individuals are unique. Behaviours are better understood through consideration of whether they are adaptive (beneficial for functioning and survival) or maladaptive (harmful for functioning and survival) on an individual level.

Managing atypical behaviour

Targeted therapies such as cognitive behavioural therapy and psychoeducation are effective strategies to manage psychological disorders. However, due to the prevalence of stigma and discrimination in the mental health sphere, it is important for mental health professionals to use culturally responsive practices. This commitment to understanding and respecting diverse cultural experiences is critical in improving access to and enhancing the overall quality of mental health care.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
define typical and atypical behaviour	☐	☐	☐	Topic 3.1 Pages 116–121
describe the psychological criteria for classifying behaviour as typical or atypical	☐	☐	☐	Topic 3.1 Pages 116–121
contrast adaptive and maladaptive emotions, behaviours and cognitions	☐	☐	☐	Topic 3.1 Pages 116–121
describe the limitations of using psychological criteria to classify behaviour as typical or atypical	☐	☐	☐	Topic 3.1 Pages 116–121
define the terms "normality", "abnormality", "neurotypicality" and "neurodiversity"	☐	☐	☐	Topic 3.2 Pages 122–126
classify emotions, cognitions and behaviours as adaptive or maladaptive	☐	☐	☐	Topic 3.2 Pages 122–126
describe the limitations of classifying normality and neurotypicality	☐	☐	☐	Topic 3.2 Pages 122–126
describe examples of normal variations of brain development within society (neurodiversity), including symptoms and approaches to management	☐	☐	☐	Topic 3.3 Pages 127–132
describe the roles of different mental health professionals in supporting psychological development and mental wellbeing	☐	☐	☐	Topic 3.4 Pages 133–137
explain what the *Diagnostic and Statistical Manual of Mental Disorders* is, including its strengths and limitations	☐	☐	☐	Topic 3.5 Pages 138–145
explain what cognitive behavioural therapy is and how it is used	☐	☐	☐	Topic 3.5 Pages 138–145
explain what psychoeducation is and how it is used	☐	☐	☐	Topic 3.5 Pages 138–145
explain what culturally responsive practices are and their importance	☐	☐	☐	Topic 3.5 Pages 138–145

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

GROUNDWORK 3

Multiple choice

1 Which of the following is not an approach to defining normality?
- **A** Cognitive
- **B** Situational
- **C** Statistical
- **D** Functional

2 Culturally responsive practices in mental health care are important because:
- **A** they ensure that all patients are treated fairly.
- **B** they allow mental health professionals to ignore cultural differences.
- **C** they cater to the specific needs and experiences of diverse cultural groups.
- **D** they ensure that mental health professionals work only within their own culture.

3 Raman has a fear of birds and always stays indoors to avoid them. This maladaptive behaviour interferes with his daily functioning. Which therapeutic approach would a psychologist most likely use to modify Raman's behaviour?
- **A** Psychoeducation
- **B** Pharmacotherapy
- **C** Psychosurgery
- **D** Cognitive behavioural therapy

FIGURE 1 Raman has a fear of birds.

4 Which of the following terms refers to behavioural or mental states that deviate from statistical norms?
- **A** Neurotypical
- **B** Atypical
- **C** Normal
- **D** Hypotypical

5 Which of the following is not considered a limitation of the DSM-5-TR?
- **A** It relies heavily on self-reported symptoms.
- **B** It does not specify the causes or treatments of disorders.
- **C** It allows for consistency and standardisation in diagnosis.
- **D** It can lead to over-diagnosis.

6 Which of the following professionals is qualified to prescribe medication for the treatment of mental health disorders?
- **A** Social worker
- **B** Psychologist
- **C** Psychiatrist
- **D** Mental health nurse

Short answer

Use the following information to answer questions 7 to 9.

Dana is 20 years old and completing a Bachelor of Science at Monash University. She walks around the campus in a white laboratory coat and never wears open-toed shoes in summer. She always sits outside to eat and makes sure that she wears gloves when she returns inside. She also covers her eyes with goggles whenever she's indoors.

FIGURE 2 Consider when it is appropriate to wear personal protective equipment (PPE).

7 Identify one approach to defining normality in which Dana's behaviour would be considered normal.

8 Identify one approach to defining normality in which Dana's behaviour might be considered abnormal.

9 Explain why the approaches you identified in questions 7 and 8 might classify Dana in different ways.

10 Explain what cognitive behavioural therapy is.

CASE CRACKER 3

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Exploring Hannah Gadsby's story

Hannah Gadsby is a celebrated Australian comedian who has faced various challenges throughout their life. Like many people, Hannah interpreted their struggles with social interaction and eye contact, and their regular depressive episodes as personal inadequacies. Hannah often observed and imitated social behaviour – a tactic known as "masking". This served as a coping mechanism that allowed them to meet social pressures.

Throughout their life, Hannah faced major depressive episodes every other year and debilitating anxiety the rest of the time. They also had difficulties in managing their moods and emotions, with "meltdowns" and "shutdowns" often occurring in response to stress or over-stimulation. It wasn't until their 30s that Hannah received a dual diagnosis of autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD).

Hannah reframed their struggles following their diagnoses, and began creating an environment that would reduce their distress. They started advocating for their needs, embraced their habits, and leveraged their success in show business to manage their life more effectively.

FIGURE 3 Hannah Gadsby performing "Douglas" in a live, stand-up comedy special

Hannah emphasises that society should "stop expecting people with autism to be exceptional" and that it is "a basic human right to have average abilities".

Source: Gadsby (2022)

1 Distinguish between adaptive and maladaptive behaviour, with reference to specific examples from Hannah Gadsby's story.

2 Describe the coping mechanism Hannah used before their diagnoses.

3 For a long time, Hannah experienced disbelief about their diagnoses; they believed they had been misdiagnosed. This was taken one step further when, upon sharing their ASD diagnosis, they was told by many people that they were "too fat", "too social", "too empathic" and "too female" to be autistic. Describe a common misconception about ASD and correct it.

DATA DRILL 3

KEY SCIENCE SKILLS: Generate, collate and record data; Analyse and evaluate data and investigation methods

Assessing the relationship between stress levels and depression in young people

One hundred students from a local university, aged between 18 and 22, were given a questionnaire that looked at their current stress levels and depression score. The data is plotted in Figure 4.

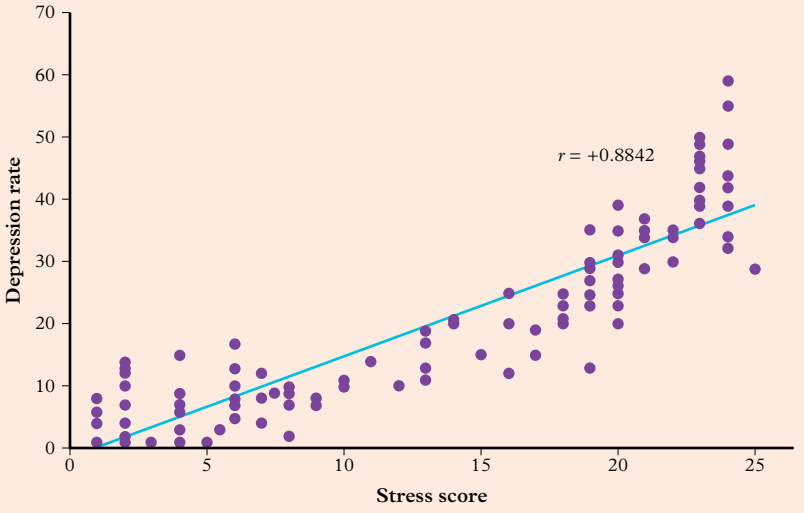


FIGURE 4 The relationship between stress scores and depression rate

1 Identify the type of graph shown in Figure 4.

2 Describe the relationship between the variables, with reference to the direction and strength of correlation.

3 Outline one potential effect on the data obtained if 10 students were surveyed instead of 100.

Study tip

The strength of a correlation can be determined by:

- visually inspecting the spread of data points around the line of best fit; the closer the data points are, the stronger the relationship
- analysing the magnitude of the correlation coefficient (*r* value); the closer the value is to +1 or −1, the stronger the relationship. $r > +0.7$ is generally considered a "strong" relationship.

The direction of a correlation can be determined by:

- visually inspecting the slope of the line of best fit; an upward slope from left to right indicates a positive relationship (as one value increases, so does the other) and a downward slope indicates a negative relationship (as one value increases, the other decreases)
- looking at the sign in front of the *r* value; a positive *r* value indicates a positive relationship (directly proportional) and a negative *r* value indicates a negative relationship (inversely proportional).

INVESTIGATION INSPECTOR 3

KEY SCIENCE SKILLS: Develop aims and questions, formulate hypotheses and make predictions; Plan and conduct investigations

Designing an investigation relating to academic performance

Sabir wants to conduct a study to examine the effects of different study environments on student test performances. They hypothesise that the lighting conditions in the study environment have an impact on how well students perform on a test.

FIGURE 5 Sabir wants to study how lighting conditions affect test performance.

1 Identify the independent variable in Sabir's investigation.

2 Identify the dependent variable in Sabir's investigation.

3 State the aim of Sabir's investigation.

4 Briefly outline a method Sabir could use to test their hypothesis.

EVALUATING ETHICS 3

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Analysing adherence to ethical guidelines in a normality study

Mrs Ainsley is teaching her class about the diagnosis and treatment of psychological disorders. She decides to survey her two psychology classes to demonstrate the statistical approach to normality. She asks each student to identify if they or a friend of theirs at the school had been diagnosed with a psychological disorder. If they had, students were asked to list the disorder(s) and state what treatment they or their friend are undergoing. All the responses were deidentified and the results were shared between the two classes.

1 Identify an ethical guideline that Mrs Ainsley upheld in her investigation and explain how she did so.

2 Identify an ethical guideline that Mrs Ainsley violated in her investigation and explain how she did so.

FIGURE 6 Evaluating ethics is a critical part of the investigation process.

RESEARCH REVIEW 3

KEY SCIENCE SKILLS: Develop aims and questions, formulate hypotheses and make predictions

Developing a complex research question

You have been provided with the following research question:

Is medication or cognitive behavioural therapy (CBT) the best treatment for psychological disorders?

FIGURE 7 Medication is an option for treating psychological disorders.

1 Identify the variables and key terms in the research question.

2 Research questions should be specific. Rewrite the research question by making the variables more specific and identifying a target population.

3 Research questions should be complex. Rewrite the research question by changing it from a closed- to an open-ended question.

4 Create a list of expanding questions that can be answered to better understand the research question.

Study tip

Topic 6.1 in your Student Book provides some ideas for sample research questions that you could investigate in Unit 1 Area of Study 3.

CHAPTER 4

The role of the brain in mental processes and behaviour

Approaches to study the brain

Monism and dualism are philosophical perspectives that provide competing explanations on the nature of consciousness and the relationship between the mind and the body. Monism proposes that the mind and body are inseparable, i.e. mental processes and consciousness are products of the physical brain. Dualism suggests that the mind is intangible and distinct from the brain, in which the immortal soul or consciousness is separate from the physical body.

Early techniques to investigate the mind–body problem include trephination, lobotomies and phrenology. Modern approaches rely on the scientific method and use empirical evidence to support theories, including case studies, autopsies, surgery, brain stimulation and mapping, and neuroimaging.

Regions of the brain

During development, the neural tube forms three distinct divisions known as the forebrain, midbrain and hindbrain. The forebrain is the largest and most developed region of the brain, consisting of the cerebrum, thalamus and hypothalamus. It is responsible for complex cognitive functions, including motor coordination, emotional regulation and personality. The midbrain, which is located between the forebrain and hindbrain, plays a role in regulating sleep–wake, arousal and alertness, and processing visual and auditory information. The hindbrain includes the cerebellum, pons and medulla oblongata. It regulates vital functions such as breathing and heart rate.

The cerebrum

The cerebrum is the largest part of the forebrain. It is divided into a left and right hemisphere, which are connected through the corpus callosum. Some processes are specialised (hemispheric specialisation) or dominant (lateralisation) in one hemisphere. Each hemisphere is responsible for processing sensory information and controlling motor movements of the opposite side of the body.

The cerebral cortex

The cerebral cortex is the thin, outermost layer of the cerebrum. It is divided into four lobes: the frontal, parietal, occipital and temporal lobes. The frontal lobe manages higher cognitive functions such as memory, emotions and problem-solving. It is subdivided into the prefrontal cortex, the premotor cortex and the primary motor cortex, which are integral to motor planning and execution. The parietal lobe is concerned with processing bodily sensations, while the occipital lobe deals with visual information. The temporal lobe processes auditory information and is also linked to language comprehension via Wernicke's area.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
describe what the procedures trephination and craniotomy are and the scientific basis behind them	☐	☐	☐	Topic 4.1 Pages 160–163
compare the arguments on each side of the brain-versus-heart debate	☐	☐	☐	Topic 4.1 Pages 160–163
compare monism and dualism	☐	☐	☐	Topic 4.1 Pages 160–163
describe what phrenology is	☐	☐	☐	Topic 4.1 Pages 160–163
explain how case studies are used to understand the role of the brain	☐	☐	☐	Topic 4.2 Pages 164–169
explain how autopsies are used to understand the role of the brain	☐	☐	☐	Topic 4.2 Pages 164–169
explain how surgical operations, such as lobotomies and split-brain surgeries, are used to understand the role of the brain	☐	☐	☐	Topic 4.2 Pages 164–169
explain how non-surgical procedures, such as electrical brain stimulation, brain mapping and neuroimaging, are used to understand the role of the brain	☐	☐	☐	Topic 4.2 Pages 164–169
describe the structure of the brain	☐	☐	☐	Topic 4.3 Pages 170–175
label the three main components of the brain: the hindbrain, midbrain and forebrain	☐	☐	☐	Topic 4.3 Pages 170–175
describe the role of the key structures within the brain in behaviour and mental processes	☐	☐	☐	Topic 4.3 Pages 170–175
describe the structure of the cerebral cortex	☐	☐	☐	Topic 4.4 Pages 176–183
describe the role of the cerebral cortex in behaviour and mental processes	☐	☐	☐	Topic 4.4 Pages 176–183
explain what hemispherical specialisation is	☐	☐	☐	Topic 4.4 Pages 176–183
deduce the location of brain damage depending on the behavioural symptoms	☐	☐	☐	Topic 4.4 Pages 176–183

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

GROUNDWORK 4

Multiple choice

1 A dualistic perspective would argue that conditions such as depression or anxiety are the result of:

A possession by evil spirits.

B changes to bumps or dips in the skull.

C a dysfunction in a consciousness separate from the body.

D underlying neurochemical imbalances or abnormalities in brain structure and function.

2 John has sustained damage to his prefrontal cortex. What abilities might be affected?

A Speech production

B Language comprehension

C Motor planning and execution

D Recognition of geometric patterns

3 What is the role of the corpus callosum in the brain?

A Processing sensory information

B Regulating emotional responses

C Facilitating communication between the two cerebral hemispheres

D Initiating movements

4 Hemispheric specialisation refers to:

A the hemisphere that controls motor functions.

B the differences in function between the two hemispheres of the brain.

C the side of the body controlled by each hemisphere.

D the hemisphere that controls sensory functions.

FIGURE 1 The brain

5 Which of the following statements are true about the association areas of the brain?

A They are the regions of the cerebral lobes that are not part of the main cortices and integrate information between lobes.

B They have a disproportionate amount of cortical space dedicated to the areas of the body that involve fine movements, such as the hands.

C They make up 75 per cent of the brain area.

D They include the primary visual cortex.

Short answer

6 Describe how case studies can be used to investigate the brain ethically.

7 Dalina had a car accident. After the crash, she was not able to speak fluently but she was able to write what she wanted to say. From this scenario, identify the area of the brain that is likely to be damaged. Justify your response.

8 Describe the function of the hypothalamus.

9 When someone is hit in or near the area where the brain meets the spinal cord, doctors are particularly concerned because this area controls automatic processes in the human body. Name this area of the brain and describe its function.

10 Distinguish between primary cortices and association areas.

CASE CRACKER 4

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Investigating a case of unilateral spatial neglect

A 75-year-old woman ("Jane") was preparing miso soup when her behaviour changed suddenly. Her son ("John") noticed that she was focusing only on the right side of her field of view when he tried to talk to her. When he approached her from her left side, she seemed oblivious, acting as if she didn't see him there at all.

John continued to observe other peculiar behaviours. Jane appeared to chop the leeks on the right-hand side of the cutting board, and she was unable to locate the salt jar just to her left. She seemed unaware of her struggle and did not ask for any assistance. Realising that something wasn't right, John rushed her to the hospital.

At the hospital, Jane was not showing signs of a fever, headache or any physical weakness. During her examination, she kept her focus only to her right side. When asked to locate the centre of a tube, she identified the far-right side instead.

After conducting brain scans, the doctors found abnormal activity in her parietal lobe. She was diagnosed with a condition known as "unilateral spatial neglect", caused by an unexpected blockage of blood flow to her brain.

Source: Shimizu et al. (2020)

1 Describe two functions of the parietal lobe.

2 Explain what is meant by contralateral organisation.

3 Given Jane's symptoms, explain whether her right or left parietal lobe was damaged. Use evidence from the scenario to support your choice.

4 Identify the neuroimaging techniques that doctors could have used to scan Jane's brain. Justify your response by describing what the technique(s) do.

DATA DRILL 4

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Analysing data about amygdala activity in murderers

Raine et al. (1997) investigated the relationship between brain structures and behaviours, specifically violent behaviours committed by murderers. The researchers performed PET scans on convicted murderers, and on age- and sex-matched controls.

FIGURE 2 PET scans were used to collect information on amygdala activity.

Understanding that the amygdala processes emotions, the researchers suggested that murderers may have less activity in their amygdala and, therefore, feel less remorse for their violent acts. Specifically, they hypothesised that murderers will have a lower average level of activity in their amygdala compared to participants in the control group. The results from their study are shown in Table 1.

TABLE 1 Amygdala activity, as measured by PET scans, in the control and experiment groups

Group	Mean amygdala activity	Standard deviation
Control	78.00	11.28
Experiment	54.00	11.15

Source: Raine et al. (1997)

1 Identify which of the groups had the highest mean activity in the amygdala.

2 Determine which group had the highest variability, with reference to the data in Table 1.

Study tip

When answering questions that require you to analyse data, it is good practice to reference the data as supporting evidence in your response. You can include this in brackets, using the abbreviation for the statistic (M for mean, SD for standard deviation) and equating it to the value. For example: "The data was precise (SD = 0.87 seconds)."

INVESTIGATION INSPECTOR 4

KEY SCIENCE SKILLS: Plan and conduct investigations; Analyse and evaluate methods and investigation methods

Designing a study to investigate learning and memory

In 2006, Maguire and colleagues investigated the role of the hippocampus in learning and memory. In a time before we all had navigation systems on our phones, London taxi drivers had to memorise London's complex street layout and pass an exam known as "The Knowledge" to obtain their licence. On the other hand, London bus drivers navigated regular fixed routes. The researchers hypothesised that there would be structural differences between the brains of taxi and bus drivers.

This research found that London taxi drivers, who had enhanced spatial memory due to their profession, had a higher volume in the hippocampus as measured by MRI, compared to London bus drivers.

An independent research group led by Professor Owusu wants to determine if Melbourne taxi drivers have a higher hippocampus volume as measured by MRI than Melbourne bus drivers.

FIGURE 3 Do Melbourne taxi drivers also have a larger hippocampus?

1 Outline the investigation methodology and design that you would recommend to Professor Owusu's group. Justify your response.

2 Describe the sampling technique that you would recommend to Professor Owusu's group for selecting participants.

3 Identify two extraneous variables that Professor Owusu's group will need to consider when recruiting participants, and explain how they could affect the results of the study.

EVALUATING ETHICS 4

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Evaluating the use of animals in neuroscience research

The Morris water maze experiment, developed by Richard Morris in 1981, is a classic study in neuroscience aimed at investigating spatial learning and memory in rodents (usually rats).

In Morris' original experiment, he used a large circular pool filled with milky water that had an escape platform located in the middle. In the training phase, the top of the platform was above the surface of the water, so that the rats could see it and learn to swim to it. In the experimental trials, the platform was hidden just below the surface of the water to test the rats' spatial memory of its previous location. Some rats had a lesion applied to their hippocampus by surgery to assess the role of the hippocampus in spatial learning and memory.

It was found that healthy rats quickly learnt the location of the hidden platform and swam directly to it, even when the starting location was changed. Their time to find the platform decreased over trials, showing learning and memory.

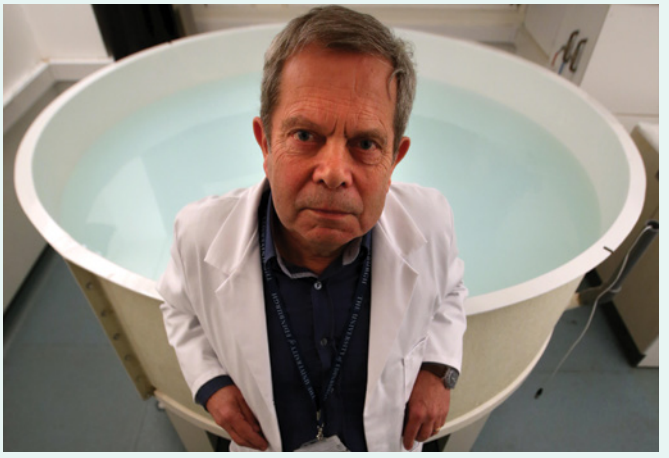


FIGURE 4 The Morris water maze was developed by Professor Richard Morris.

However, rats with hippocampal damage struggled to find the platform and did not show improvement over trials. This suggested that they had difficulty with spatial learning and memory.

1 The use of animals in research remains a controversial topic, and there are many arguments about the ethical and moral basis for such use. However, a number of researchers feel that the benefit derived from such research justifies the harm caused to the animals. Identify the ethical approach that best matches this description.

A Consequence-based approach
B Duty-based approach
C Virtues-based approach
D Morals-based approach

2 Studies involving human participants are guided by ethical principles. Discuss the human ethical principles that are violated in the animal study above.

3 Outline the laboratory safety practices that a researcher studying animals using a Morris water maze must adhere to.

RESEARCH REVIEW 4

KEY SCIENCE SKILLS: Construct evidence-based arguments and draw conclusions; Analyse, evaluate and communicate scientific ideas

Selecting suitable evidence to support claims about hemispheric specialisation

When conducting a research investigation using secondary data, it is vital to select evidence that is suitable to answer your research question. Findings from three different fictional sources are summarised below.

Source 1

"The creative abilities of famous painters have often been attributed to the right side of the brain, while mathematical skills are linked to the left side. This 'right-brained' and 'left-brained' theory is popular in many self-help books."

Source 2

"A comprehensive review of several neuroscience studies revealed that while there are differences in function between the brain's hemispheres, the categorisation of individuals as strictly 'right-brained' or 'left-brained' is an oversimplification. The brain exhibits a complex interplay between both hemispheres, and functions are not strictly isolated to one side."

Source 3

"A recent study found that individuals with artistic hobbies are more likely to use the right hemisphere of their brain during creative tasks, while those who excel in mathematics use the left hemisphere. However, the sample size was small, and the study did not consider other factors like education and background."

1 Rank the excerpts from most suitable to least suitable for answering the following research question:
"What is hemispheric specialisation, and can people be categorised as either 'right-brained' or 'left-brained'?"

2 Justify your ranking of each source.

3 Discuss the potential implications of these findings.

CHAPTER 5

Brain plasticity and brain injury

Neuroplasticity

Neuroplasticity refers to the brain's ability to undergo structural or functional changes in response to new experiences, lifestyle choices, learning, and injury or trauma. This continues throughout the life span; however, it is greatest during development and decreases with age.

Acquired brain injury

Neuroplasticity can be better understood by studying how the brain responds to injury, such as acquired brain injury (ABI). ABI refers to any damage to the brain that occurs after birth. It can be caused by oxygen deprivation, stroke, alcohol and drug use, or traumatic brain injury (TBI) due to physical impact.

Biological impacts of ABI

Biological impacts refer to disruptions to the body's physiological processes, such as movement and coordination difficulties, fatigue and sensory changes.

Psychological impacts of ABI

Psychological impacts may include changes in cognition, emotional changes and behavioural changes. Survivors of ABI are also at a higher risk of developing mental health disorders due to difficulties in adjusting to long-term life changes and potential loss of capabilities following the injury.

Social impacts of ABI

Negative social impacts may include changes in a person's relationships. A person may even become socially isolated due to communication difficulties and alterations to their behaviour caused by ABI.

Researching neurological disorders

Contemporary research and modern neuroimaging techniques are advancing the diagnosis and treatment of neurological disorders such as epilepsy, Parkinson's disease and Alzheimer's disease. Neuroimaging techniques, such as CT scans, MRIs, EEGs and PET scans, enable researchers to detect abnormalities, track disease progression and monitor treatment effectiveness.

Chronic traumatic encephalopathy

Chronic traumatic encephalopathy (CTE) is a neurodegenerative brain disease associated with repeated head traumas and concussions. CTE is only diagnosable through post-mortem examinations (autopsies); however, researchers are yet to understand the exact mechanisms leading to the disease.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
define the term "neuroplasticity"	☐	☐	☐	Topic 5.1 Pages 190–197
compare structural and functional plasticity, including the processes involved in each	☐	☐	☐	Topic 5.1 Pages 190–197
describe factors that influence brain plasticity	☐	☐	☐	Topic 5.1 Pages 190–197
explain how brain function can be maintained and/or maximised	☐	☐	☐	Topic 5.1 Pages 190–197
explain what an acquired brain injury (ABI) is, including common causes	☐	☐	☐	Topic 5.2 Pages 198–201
describe the biological impacts of ABI	☐	☐	☐	Topic 5.2 Pages 198–201
describe the psychological impacts of ABI	☐	☐	☐	Topic 5.3 Pages 202–205
describe the social impacts of ABI	☐	☐	☐	Topic 5.4 Pages 206–207
explain what neurological disorders are and list examples	☐	☐	☐	Topic 5.5 Pages 208–212
explain how contemporary research has contributed to the understanding of neurological disorders, including computerised tomography, magnetic resonance imaging, electroencephalogram and positron emission tomography	☐	☐	☐	Topic 5.5 Pages 208–212
explain what chronic traumatic encephalopathy (CTE) is, including its causes and symptoms	☐	☐	☐	Topic 5.6 Pages 213–217
describe some of the findings that have emerged from research on CTE	☐	☐	☐	Topic 5.6 Pages 213–217

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

FIGURE 1 Injury to the brain can disrupt biological, psychological and social functioning.

GROUNDWORK 5

Multiple choice

1 Experience-dependent plasticity refers to the development of neural connections in response to:
- **A** injury or trauma.
- **B** genetic predisposition.
- **C** experiences that are universal to the species.
- **D** experiences that are unique to each person.

2 Gracia has an ABI that has caused her to experience significant emotional changes. Which area of Gracia's brain is affected?
- **A** Occipital lobe
- **B** Frontal cortex
- **C** Cerebellum
- **D** Parietal lobe

3 Which of the following is a possible consequence of an ABI?
- **A** Increased memory capabilities
- **B** Improved motor skills
- **C** Sensory changes
- **D** Enhanced cognitive abilities

4 Neurological disorders typically affect which part of the body?
- **A** Heart and lungs
- **B** Kidneys and liver
- **C** Pancreas and gallbladder
- **D** Brain and spinal cord

5 What is the primary use of a PET scan?
- **A** To measure the movement and concentration of certain molecules in the brain
- **B** To examine the blood flow in the brain and brain tissue health
- **C** To detect, amplify and record the electrical activity of the brain
- **D** To identify and rule out conditions that present similar symptoms to Alzheimer's disease

6 Which of the following statements is correct?
- **A** CTE cannot be diagnosed during a patient's lifetime.
- **B** CTE cannot be diagnosed without an MRI scan.
- **C** CTE can be diagnosed based on symptoms.
- **D** CTE cannot be diagnosed without a CT scan.

7 The process that reduces or eliminates unused synaptic connections in the brain to make way for new connections is known as:
- **A** synaptic plasticity.
- **B** synaptogenesis.
- **C** synaptic pruning.
- **D** neurogenesis.

Short answer

8 Compare structural and functional plasticity.

FIGURE 2 Neuroplasticity is typically higher in children and infants than in adults.

9 Explain how the neurological disorders epilepsy, Parkinson's disease and Alzheimer's disease affect the nervous system and impact an individual's life.

10 Compare ABI to CTE.

CASE CRACKER 5

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Exploring bilingualism and "cognitive reserve"

As we age, we become at greater risk of cognitive decline. This affects different functions, including memory, attention and movement. Dementia is a broad term for the decline in cognitive ability that is severe enough to interfere with daily life. The most common cause of dementia is Alzheimer's disease.

Research has reported that bilingual individuals tend to develop dementia symptoms an average of 4.5 years later than monolingual individuals. This research includes publications by Liu and Wu in *Frontiers in Psychiatry* (2021) and Berkes and Bialystok in the *American Journal of Alzheimer's Disease & Other Dementias* (2022). Both of these studies suggest that this delay in developing dementia symptoms is not necessarily linked to bilingualism itself preventing or reducing dementia, but rather to a concept known as "cognitive reserve".

Cognitive reserve refers to the brain's ability to improvise and find alternative ways of performing a task, especially as we age. Bilingualism constantly engages the brain in juggling between two language systems, and appears to enhance cognitive reserve. It helps to build up a "reserve" of cognitive abilities that can offset the impact of age-related changes in the brain and delay the onset of dementia symptoms.

FIGURE 3 Studies have reported a relationship between bilingualism and cognitive reserve.

Bilingualism requires the brain to constantly exercise cognitive control, selecting the correct language system appropriate for a given context and suppressing the other system. In one study published in *Nature* (2004), Mechelli and colleagues demonstrated that people who are bilingual have denser grey matter and more white matter in their brains. The increase in grey matter density is attributed to neurogenesis and synaptogenesis, and the enhancement in white matter is linked to better myelination, which was speculated to result from a constant switching between languages.

1 Compare the processes of neurogenesis and synaptogenesis.

2 Explain the role of myelination in bilingualism, with reference to the study described.

3 Contrast how the processes of long-term potentiation and long-term depression are involved in learning a new language.

DATA DRILL 5

KEY SCIENCE SKILLS: Generate, collate and record data; Analyse and evaluate data and investigation methods

Calculating percentage change of reported concussions

Researchers use descriptive statistics to organise and summarise information so that they can understand what the results of their research mean and communicate the results to others. The use of descriptive statistics includes calculations such as percentage and percentage change.

1 The number of players and reports of concussions in certain contact sports were recorded across two years. This is summarised in Table 1.

TABLE 1 Reports of concussions in 2021 and 2022 among the sports of rugby, football and boxing

Sport	Number of players	Reported concussions	
		2021	2022
Rugby	5000	300	250
Football	10,000	450	500
Boxing	1500	90	75

a Calculate the percentage of rugby players with concussions in 2022.

b Calculate the percentage change in number of concussions from 2021 to 2022 among football players.

2 A study found that out of 1260 individuals with a history of repeated head trauma, 19 developed symptoms consistent with CTE. The most common symptoms included short-term memory loss, confusion, violent outbursts and emotional instability. It was also found that 80 out of the 1260 individuals had an ABI. Out of these 80, 20% reported a substantial improvement in their symptoms after undergoing a new rehabilitation therapy.

a Calculate the percentage of individuals with a history of repeated head trauma who developed symptoms consistent with CTE.

b Determine the total number of individuals with an ABI who reported substantial improvement in their symptoms following the new rehabilitation therapy.

c In the year before the new rehabilitation therapy was introduced, only ten of the individuals with an ABI reported improvement in their symptoms. Calculate the percentage change in the number of individuals reporting symptom improvement before and after the therapy program was introduced.

Study tip

A percentage is a number or ratio expressed as a ratio of 100. It can be calculated using: $\text{percentage} = \frac{\text{value}}{\text{sum of all values}} \times 100$.

Percentage change is useful to assess the difference (the increase or decrease) between two values. It can be calculated using: $\text{percentage change} = \frac{\text{new value} - \text{initial value}}{\text{initial value}} \times 100$.

INVESTIGATION INSPECTOR 5

KEY SCIENCE SKILLS: Plan and conduct investigations; Comply with safety and ethical guidelines

Selecting a research methodology to study CTE

Choosing the right scientific investigation method is essential for a successful investigation into psychological phenomena. Two of the most common methods are controlled experiment and correlational designs.

Imagine that you are a neuroscientist studying the link between CTE and the number of years spent playing contact sports.

FIGURE 4 What is the link between years spent playing contact sports and CTE?

1 Describe two limitations of using a correlational study to investigate the link between CTE and duration of engagement in contact sports.

2 Describe the practical considerations that could influence your choice of research methodology.

3 Determine which investigation methodology – correlational study or controlled experiment – would be most appropriate for this investigation. Justify your response.

Study tip

A controlled experiment involves manipulation of one variable (independent variable) and observing its effect on another variable (dependent variable), and attempts to control the influence of extraneous variables. This allows researchers to draw causal conclusions. A correlational study, on the other hand, observes the relationship between naturally occurring variables, but does not manipulate them or seek to control other potential influencing variables. This allows researchers to measure the strength and direction of the relationship, but means they cannot draw causal conclusions.

EVALUATING ETHICS 5

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Investigating ethics and safety when diagnosing neurological disorders

Contemporary research uses diagnostic techniques to understand, diagnose and inform treatments for neurological disorders. Dr Wittens is a researcher based in Ballarat who routinely uses MRI and CT scans. Both of these imaging techniques are useful for generating images of the brain.

1 Dr Wittens' patient, Catherine, has a pacemaker that prevents her from undergoing an MRI scan. This is because the MRI uses powerful magnets that can interfere with the function of a pacemaker and may result in fatality. Although an MRI scan is more sensitive (it gives more specific, detailed information) than a CT scan, Dr Wittens orders a CT scan for Catherine. Name and describe one ethical concept that Dr Wittens would have had to consider when making this decision, with reference to Catherine's situation.

2 According to the Occupational Health and Safety Regulations (2017), machinery used in the workplace must be routinely inspected, monitored and tested. Discuss the importance of routinely checking MRI and CT machines.

RESEARCH REVIEW 5

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Sourcing and summarising research about brain plasticity

Being able to summarise research that you read will make it easier for you to find support for your research question. When you summarise research, you need to consider the aim of the study, the methodology (including variables, sample size and selection), and the results, discussion and conclusion. You should also record any limitations that may affect reproducibility or validity of the results relevant to your investigation.

In this activity, consider the following research question:

How does learning a new skill, such as juggling, change the structure or function of the brain?

FIGURE 5 How does learning to juggle change brain structure and function?

1 Conduct research to find one source that can help you answer the research question. Summarise the study. (Hint: you can use the abstract to guide your summary, but it must be in your own words.)

Aim	
Method (including variables, sample size and participant selection)	
Results	
Discussion	
Conclusion	

CHAPTER 6

Response to an investigation

Chapter 6 in your Student Book further explores concepts you were introduced to in Chapter 1. Specifically, it helps you build the skills needed to form a response to an investigation into contemporary psychological research. The task assesses your ability to identify, analyse and evaluate secondary data to answer a research question you have created. The steps you will follow are summarised below:

Selecting and understanding your research question

1 Create a research question that is relevant, clear, specific, complex and phrased like a question. Clearly define any specific terms used in your investigation.
2 Break down your research question into smaller, more specific, expanding questions to guide the research.
3 Prepare a research outline to organise your thoughts and link ideas.
4 Source scientific evidence and evaluate the credibility of your sources, such as by using the CRAAP method.

Analysing and evaluating psychological research

5 Not every piece of information or data sourced will be of quality, or relevant to your investigation. Think critically about where the information (ideas or data) has come from, how it was tested, what scientific processes were involved, and what uncertainties might exist.
6 Create summaries or mind maps to help organise the information in a way that will help you answer the research question.

Communicating your response

7 Present your findings. Choose an appropriate format, use clear language, and ensure that information is presented in a logical manner. Note: Your teacher may have defined a format that you must follow.
8 Always give credit to original sources of information through in-text citations and a reference list. Doing this adds credibility to your findings, and also helps you avoid plagiarism.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
describe psychological concepts specific to the investigation, including defining key terms, and using appropriate psychological terminology, conventions and representations	☐	☐	☐	Topic 6.1 Pages 232–238
distinguish between primary and secondary data	☐	☐	☐	Topic 6.1 Pages 232–238
distinguish between opinion, anecdote and evidence, and between scientific and non-scientific ideas	☐	☐	☐	Topic 6.1 Pages 232–238
evaluate the quality of evidence, including uncertainty, validity and authority of data and sources of possible errors or bias	☐	☐	☐	Topic 6.1 Pages 232–238
organise, analyse and evaluate secondary data	☐	☐	☐	Topic 6.2 Pages 239–240
use a logbook to authenticate collated secondary data	☐	☐	☐	Topic 6.2 Pages 239–240
describe the characteristics of repeatable and reproducible psychological research and consider uncertainty	☐	☐	☐	Topic 6.2 Pages 239–240
use criteria to evaluate the validity of psychological research	☐	☐	☐	Topic 6.2 Pages 239–240
describe the characteristics of effective scientific communication	☐	☐	☐	Topic 6.3 Pages 241–244
use data representations, models and theories to organise and explain observed phenomena and psychological concepts, and their limitations	☐	☐	☐	Topic 6.3 Pages 241–244
reference and acknowledge sources of information	☐	☐	☐	Topic 6.3 Pages 241–244

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

FIGURE 1 To respond to a scientific question, you will conduct research using secondary data.

6.1 Scientific evidence

When you conduct your research investigation, you will need to collect evidence from secondary sources. You will most likely use the internet to help you find sources; however, it is important to remember that not everything published on the internet is suitable to use. Let's review the different types of information summarised in Chapter 6 of your Student Book that you might come across:

- **Evidence** refers to facts or information indicating whether a belief or proposition is true or valid. For example, in a psychological study, a correlation between two variables backed by statistical data is evidence.
- **Anecdotes** are personal stories or experiences that may be used to support a claim but lack statistical backing or scientific rigour. For example, "My friend started meditating and now feels less stressed; meditation must reduce stress."
- **Opinions** are personal beliefs or judgments that are not founded on proof or certainty. For example, some people think that the Earth is flat, despite overwhelming evidence to the contrary.
- **Scientific ideas** are concepts that are based on scientific methods and empirical evidence. For example, the theory of cognitive dissonance in psychology is based on extensive research and empirical testing.
- **Non-scientific ideas** are ideas that cannot be tested or proven scientifically. For example, many self-help books talk about the "law of attraction", which states that whatever you think about most will eventually manifest in your life.

Influence of external factors on scientific research

There are a number of external factors that you should also consider when collating secondary data:

- **sociocultural factors**: recognise that culture and society might influence psychological investigations and findings. For example, certain psychological disorders may be diagnosed more frequently in some cultures than others.
- **economic, legal and political factors**: understand that funding sources, laws and politics can influence research focus and findings.
- **ethical understanding**: always ensure that your research respects individual rights and wellbeing. Consider the implications of unethical research and how this impacts the reliability or validity of the findings.

These factors can bias your findings, so it is important to be aware of them, complete your evaluation critically, and try to use data from a diverse range of sources.

FIGURE 2 When you analyse your sources, consider the external factors that could be affecting the person's or organisation's stance on the issue.

INVESTIGATION INSPECTOR 6.1

KEY SCIENCE SKILLS: Construct evidence-based arguments and draw conclusions

Evaluating ideas about mindfulness

You overhear the following conversation between two psychology students, Anisa and Taylor. Analyse the arguments made in their conversation and classify each as: evidence, anecdote, opinion, scientific idea or non-scientific idea.

FIGURE 3 Evaluate Anisa's and Taylor's arguments about mindfulness meditation.

Statements	Answers (identify all that apply)
Anisa: "Hey Taylor, I just found this 2021 study by Smith and colleagues about a link between mindfulness meditation and reduced anxiety. Read it yet?"	
Taylor: "No, not yet, but my uncle meditates every morning and he seems pretty convinced that it helps him stay calm all day. What are your thoughts? You think meditation can help?"	
Anisa: "Well, last class, Mr. Hanes talked about some theories based on CBT. Remember? They say mindfulness techniques are useful and have really clear therapeutic effects. But personally, I think traditional therapy sessions are more effective. There was something else I came across though: did you know that some people think carrying a lucky charm can keep you calm?"	
Taylor: "Really? I always thought that things like lighting and where you put your furniture – those environmental factors – had a bigger effect on your mood than objects like lucky charms. It reminds me of that older study from 2017 by Rands and Gansemer-Topf on how classroom design affects how engaged students are in class."	

6.2 Scientific communication

As part of your assessment for Unit 1 Area of Study 3, you will need to communicate the findings of your research.

Characteristics of effective scientific communication

Effective scientific communication has some key characteristics, as summarised in Table 1.

TABLE 1 Characteristics of effective scientific communication

Characteristics	Description
Relevance	Clearly define any specific terms used in your investigation as part of your introduction. For example, if you are investigating stress, make sure you define what "psychological stress" is in the context of your research. Use appropriate terminology throughout. This includes standard psychological jargon, conventions and representations. For example, if you are discussing the flight-or-fight-or-freeze response, make sure you correctly explain its physiological and psychological aspects.
Accuracy	Make sure that all the psychological information you present is correct. For example, if you are discussing the findings of a study, report them without exaggeration or misrepresentation.
Clarity	Make sure your explanations of scientific concepts are easy to understand. Write explanations in your own words and simplify them where you can.
Significance	Highlight the importance and implications of the results in the context of your investigation. In your conclusion, identify the significance of your findings in the real world. Who could benefit from these results? How could mental health professionals apply these findings to improve patient outcomes?
Conciseness and coherence	Present information in a brief yet comprehensive manner, making sure that ideas flow logically. Include links between ideas where possible to help bring it all together.
Target audience	Tailor your communication to fit your audience. If your target audience is high school students, avoid excessively technical jargon.
Data representations, models and theories	When presenting scientific evidence, use charts, graphs or models to explain observed phenomena. For instance, use a bar graph to show differences in group outcomes for controlled experiments. Scatterplots with a line of best fit to show relationships might be more appropriate for correlational studies.

Study tip

Go back to Research review 1.7 for a refresher on writing concisely and appropriately for a target audience.

Conventions for referencing

Always include a citation whenever you quote, paraphrase or summarise ideas or information from a source, and whenever you define key terms. You should even cite yourself if you are using information from work you have done previously. This avoids plagiarism and lends credibility to your work. Include a full reference in an appropriate style – e.g. Harvard or APA – in a reference list at the end of your assessment.

TABLE 2 Examples of references formatted using Harvard and APA styles

Style	In-text citation	Reference list
Harvard	(Zhuang *et al.*, 2022)	Zhuang, X., Bennett, R., Nandy, R., Cordes, D., Bernick, C. and Ritter, A. (2022) 'Longitudinal changes in cognitive functioning and brain structure in professional boxers and mixed martial artists after they stop fighting', *Neurology*, 99(20), pp. e2275–e2284. doi:10.1212/WNL.0000000000201158
APA	(Zhuang et al., 2022)	Zhuang, X., Bennett, R., Nandy, R., Cordes, D., Bernick, C., & Ritter, A. (2022). Longitudinal changes in cognitive functioning and brain structure in professional boxers and mixed martial artists after they stop fighting. *Neurology, 99*(20), e2275–e2284. https://doi.org/10.1212/WNL.0000000000201158

DATA DRILL 6.2

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines; Generate, collate and record data

Setting up your logbook for an investigation

Logbooks are a useful way to keep track of information gathered during scientific investigations. Keeping a logbook is not only an assessment requirement, but also a good scientific skill to develop.

Good practice involves recording the date of each entry, acknowledging secondary sources and including planning notes, descriptions of activities, results, personal reflections, notes of additional work and more.

During your research, it is also good practice to keep a record of the sources of information that you have reviewed. This includes anything that you have used from someone else, such as ideas, theories or data. It is helpful to evaluate the suitability of the evidence to achieve the aim of your investigation using the CRAAP method (currency, relevance, authority, accuracy, purpose). Sources of information such as opinions (personal views), anecdotes (stories) and non-scientific ideas have low credibility and may not be suitable to use in your investigation. On the other hand, evidence (empirical data) and scientific ideas (ideas based on research) have higher credibility, as the data is considered more trustworthy and valid.

You might find it helpful to create a template for your logbook entries to make sure that you meet the assessment requirements. An example is shown in Table 3.

TABLE 3 Example template for logbook entries

Date	Notes/observations/ideas	Actions to take	Source of information	Evaluation of source (CRAAP)
5/6/23	Research question idea: How does the brain compensate for loss of function after a brain injury? Loss of function – not specific enough? What about specific loss? Language production (Broca's area) or understanding (Wernicke's area)? Type of injury – also too vague? Could make it about contact sports such as boxing or rugby union?	Research studies on boxing injuries that lead to aphasia	Chapter 6 in your Student Book	N/A
6/6/23	Tried to research "empirical studies" + "boxing" + "aphasia", but no useful sources. There is more research about memory loss.	Change research question to focus on memory loss	Google	N/A
6/6/23	Found a research paper looking at changes in cognitive functioning and brain structure in professional boxers and mixed martial artists after they stop fighting. Relevant, but a bit hard to understand.	Find easier study to analyse	Longitudinal study: Zhuang et al. (2022), https://n.neurology.org/content/99/20/e2275	C – 2022 R – Good A – Peer-reviewed paper A – Valid method, trustworthy results P – Medical research

1 Outline one advantage and one limitation of keeping:

a a physical logbook

b a digital logbook.

2 Explain how you will ensure that your data is safe.

3 Select one of the types of information from the following list and sketch a template for how you will organise the data in your logbook.

I Sources
II Activities
III Data collected (secondary data)
IV General observations
V Psychological terms, theories or other information

Study tip

Your logbook serves as an authentication tool for your data. Make sure that you keep it up to date and in a safe place. If storing it digitally, make sure that you save it regularly.

FIGURE 4 Taking good notes in your logbook will help when you come around to writing your report.

6.3 Analysis and evaluation of psychological research

Uncertainty in psychological research refers to the level of doubt concerning the reliability and validity of research findings. Uncertainly reduces the confidence with which we can construct arguments and draw conclusions.

Uncertainty can arise from various sources. You can determine the level of uncertainty by assessing:

- **repeatability**: the closeness between successive measures of the same quantity, carried out under the same conditions of measurement (including the same person measuring, same instrument, same location, etc.)
- **reproducibility**: the ability to obtain consistent results for the same psychological phenomenon using different conditions
- **bias**: systematic errors or distortions in judgment or evaluation that can affect the design, conduct and analysis of a study
- **confounding variables**: factors other than the independent variable that might affect the result, creating uncertainty about what is causing the observed effect.

RESEARCH REVIEW 6.3

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Assessing uncertainty in psychological research

Consider how you would detect each of the following when analysing secondary sources, and determine whether it would impact the validity of an investigation:

1 repeatability

2 reproducibility

3 bias

4 confounding variables.

UNIT 1 PRACTICE EXAM QUESTIONS

Multiple choice (15 marks)

1 Which part of the brain is primarily responsible for regulating balance and coordination?

A Cerebellum
B Broca's area
C Thalamus
D Temporal lobe

2 Which of the following is correct?

A Confounding variables can be detected before the results of an investigation have been collected and analysed.
B Extraneous variables are confounding variables that have not been controlled properly.
C Extraneous variables can affect the internal validity of an investigation.
D Confounding variables always result in outliers in data.

Use the following information to answer questions 3 to 6.

Michael suffered a traumatic brain injury (TBI) after a severe motorcycle accident.

3 Thanks to the help of a bystander, the oxygen loss due to the injury was minimised. Which of the following terms refers to a type of brain injury caused by a lack of oxygen?

A Ischaemic stroke
B Anoxic brain injury
C Haemorrhagic stroke
D Traumatic brain injury

4 After Michael's admission to the hospital, doctors wanted to identify which areas of his brain were most impacted by the accident. Although MRI scans produce higher quality images, the doctors ordered a CT scan. Which one of the following could explain why?

A They wanted to investigate Michael's brain activity; therefore, a functional scan was most appropriate.
B CT scans have higher temporal resolution, so doctors can see the results straight away.
C Michael may be allergic to the radioactive tracers used in MRI scans.
D Michael may have had a metallic implant.

5 Michael experienced difficulties engaging with others due to his brain injury, including maintaining eye contact, interpreting social situations and perceiving personal space. Which term best describes this aspect of his challenges?

A Verbal communication
B Non-verbal communication
C Long-term memory
D Short-term memory

6 Michael underwent rehabilitation, which involved physical therapy, cognitive retraining and social support to help him regain some lost functions. Which term refers to the brain's ability to compensate from loss of function following an injury?

A Functional plasticity
B Structural plasticity
C Synaptogenesis
D Experience-expectant plasticity

Use the following information to answer questions 7 to 11.

A child psychologist, Dr Wilson, is working with families to understand different aspects of child development. He observes children's play, social interaction and emotional responses, and talks to parents about their relationships and routines with their children.

Today, Dr Wilson is meeting Sabine, a six-year-old child, and her family.

7 Which of the following psychological terms refers to the development of abilities that allow us to form positive relationships and be successful members of a society?

A Physical development
B Emotional development
C Cognitive development
D Social development

8 During a play session, Dr Wilson observes Sabine successfully classify objects by shape and colour. According to Piaget, which stage of cognitive development is Sabine most likely in?

A Sensorimotor stage
B Preoperational stage
C Concrete operational stage
D Formal operational stage

9 Which cortical lobe is Sabine using to observe the objects she is playing with?

A Occipital lobe
B Frontal lobe
C Parietal lobe
D Temporal lobe

10 During an observation, Dr Wilson notices that Sabine becomes distressed when her mother leaves the room, and her father has difficulty calming her down. When her mother returns, Sabine approaches her, but continues to show signs of visible distress. What type of attachment style does this behaviour most likely reflect?

A Insecure resistant attachment
B Insecure avoidant attachment
C Secure attachment
D Disorganised attachment

11 Sabine's attachment study suggests that her parents are not sufficiently responsive to her needs. According to Erikson, adults who have not developed a stable identity can struggle to form caring and fulfilling relationships with others. What stage of psychosocial development could Sabine's mother be studied in?

A Identity versus role confusion
B Initiative versus guilt
C Intimacy versus isolation
D Generativity versus stagnation

Use the following information to answer questions 12 to 14.

Kiran has a fear of birds. He is terrified of walking to school and refuses to participate in any outdoor activities.

12 Which of the following mental health professionals is qualified to assess and potentially diagnose Kiran's mental health?

A Social worker
B Counsellor
C Psychologist
D Mental health nurse

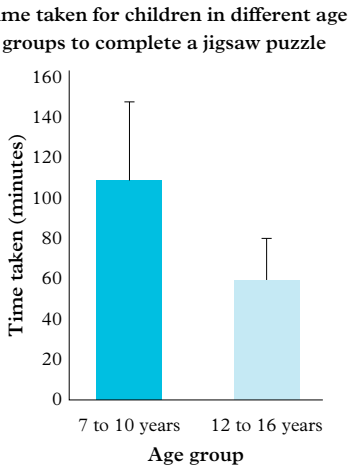
13 Which therapeutic approach is likely to help Kiran understand that birds are not dangerous, and to modify his behaviour?

A Cognitive behavioural therapy
B Psychoeducation
C Pharmacotherapy
D Humanistic therapy

14 Kiran's avoidance of the outdoors is considered:

A adaptive behaviour.
B normal behaviour.
C typical behaviour.
D maladaptive behaviour.

15 Which of the following is an appropriate evidence-based conclusion drawn from the graph presented?



A Children aged 7 to 10 years took a shorter amount of time to complete the jigsaw puzzle than children aged 12 to 16 years.
B Children aged 7 to 10 years took a longer amount of time to complete the jigsaw puzzle than children aged 12 to 16 years.
C Children who took longer to complete the jigsaw puzzle were aged between 7 and 10 years.
D Children who were quicker to complete the jigsaw puzzle were aged between 12 and 16 years.

Short answer (30 marks)

1 Mark, a 24-year-old software developer at ProTechPulse, is known for his exceptional coding skills. However, he has a learning disorder that causes him to struggle in other areas. Although Mark has not told his work colleagues, they have noticed that his handwritten notes are often illegible, and that his labels on diagrams are hard to decipher. When tasked with writing emails or completing documentation, Mark relies on the software to correct his spelling and grammar. He avoids situations requiring him to manually complete forms or sign documents because they are a source of anxiety for him.

a Identify the learning disorder that Mark has shown symptoms of.

(1 mark)

b Explain how this suspected condition can be treated.

(1 mark)

c Mark speaks to his friend, Julie, who is going through something similar. She mentions that she has found regular exercise helpful. Determine whether this is opinion, anecdote or evidence.

(1 mark)

2 Enyuan, a 45-year-old professor, suffered a stroke. Following her recovery, Enyuan's family noticed that although she could speak fluently, her sentences did not make sense. Her speech was filled with made-up words, or words that were unrelated to what she was trying to say. When her family tried to speak to her, Enyuan looked confused, as though she did not understand what they were saying. A brain scan confirmed that she had incurred brain damage.

a Enyuan is suffering from aphasia. Identify the type of aphasia she is experiencing.

(1 mark)

b Determine which specific lobe was damaged by the stroke. Use evidence from the scenario to support your response.

(2 marks)

c Explain which neuroimaging techniques the doctors could have used to scan Enyuan's brain.

(2 marks)

d Explain whether Enyuan's case study supports monism or dualism.

(2 marks)

3 Piaget conducted several tests to investigate conservation, which all involved two identical objects, or sets of objects. For example, he first arranged coins in two equal rows and asked children whether the rows contained the same number of coins. Next, he rearranged all the coins in one row so that they were more spaced out, and children were asked the question again. Children in the preoperational stage tended to respond that the spaced-out row had more coins. On the other hand, children in the concrete operational stage recognised that the number of coins had not changed. Piaget's findings were consistent across multiple tests and he concluded that children achieve conservation during the concrete operational stage.

a According to Piaget, cognitive development occurs in discrete, sequential stages. Discuss whether Piaget's theory of cognitive development supports nature or nurture.

(3 marks)

b Describe which stage of psychosocial development a child would most likely be in when they achieve conservation.

(3 marks)

c Identify two ethical guidelines that Piaget would have found challenging to adhere to when conducting his tests and explain how he addressed them.

(2 marks)

4 Critics of Piaget's research on conservation argue that the children's knowledge that the appearance of the objects was deliberately altered was a confounding variable. McGarrigle and Donaldson (1974) replicated the conservation test, but controlled the confounding variable by making the alteration of the objects "accidental". The study was conducted in a laboratory with 80 children aged between 50 and 75 months. When the child was satisfied that the rows of sweets presented were identical, a "naughty teddy" appeared, which "accidentally" rearranged one of the rows during play, spacing out the sweets. After the teddy was put away, the question was repeated. More than half the children gave the correct answer, suggesting that children learn conservation at a younger age than Piaget proposed.

a Identify the type of investigation method used by the researchers.

(1 mark)

b Describe one benefit and one limitation of laboratory-based experiments.

(2 marks)

c Explain why it is important for researchers to identify and control extraneous variables. Refer to the scenario in your response.

(2 marks)

d Evaluate the validity of Piaget's research on conservation.

(2 marks)

5 After years of playing professional rugby, Winnie is showing signs of cognitive decline and erratic behaviour. Doctors are concerned that she may have a neurological disorder due to repeated head injuries.

a Name the neurological disorder that relates to the progressive degeneration of the brain associated with repeated head trauma and concussions.

(1 mark)

b Identify two cognitive symptoms that Winnie may develop as her disorder progresses.

(2 marks)

c One approach to normality best describes Winnie's change in behaviour. Describe this approach.

(2 marks)

UNIT 2

How do internal and external factors influence behaviour and mental processes?

FIGURE 1 In Unit 2 you will look at how colour influences our perception of food.

WORD WIZARD

Draw a line to match each term with the correct definition.

A PERSON PERCEPTION	1 the act of changing one's behaviour to match the responses of others in a group
B ATTITUDE	2 the impression formed of another person based on our firsthand interactions with them and second-hand information learnt about them
C STEREOTYPE	3 the behavioural and cognitive ability to process specific information actively, while ignoring other competing information
D DISCRIMINATION	4 a depth cue that can be made sense of by our brains using information from just one eye
E GROUP	5 an individual who can perceive the taste of phenylthiocarbamide (PTC) due to more sensitive taste perception
F OBEDIENCE	6 when we misinterpret real sensory stimuli to create a mismatch between the real-world stimulus and our perception
G CONFORMITY	7 a phenomenon where individuals experience an integration of senses when one sense is stimulated
H ATTENTION	8 unfair behaviour or unequal treatment towards others based upon their group membership or other characteristics
I PERCEPTION	9 the ability to experience and interpret what we have consumed; also known as taste perception
J MONOCULAR DEPTH CUE	10 the process by which our brains organise and interpret sensory information; it allows us to consciously experience the information
K GUSTATORY PERCEPTION	11 a relatively enduring positive or negative evaluation of an attitude object
L SUPERTASTER	12 behaviour that complies with the demands of a direct order
M VISUAL ILLUSION	13 a commonly held, over-simplified belief about members of a particular group
N SYNAESTHESIA	14 a disorder created by a damaged right parietal lobe where a patient ignores one side of their field of vision
O SPATIAL NEGLECT	15 a collection of two or more individuals who interact with each other, are aware of their membership in the group and strive to achieve mutual goals

CHAPTER 7

Social cognition

Social cognition and schemata

Social cognition includes how we process, store and apply information about others in social situations. It involves "schemata" – mental frameworks that shape our perception and understanding of others and the social world. Schemata are shaped by:

- **person perception**: use of first- or second-hand information – such as self-schemata, physical cues, saliency detection and social categorisation – to form impressions and make judgments about others
- **attributions**: the categorisation of others' behaviours as either dispositional (internal/personal) or situational (external/environmental)
- **attitudes**: our cognitive, affective and behavioural responses to an attitude object, which can be expressed openly and voluntarily (explicit/declarative) or involuntarily and uncontrollably (implicit/unconscious)
- **stereotypes**: simplified and over-generalised beliefs (cognitions) about others based on their membership of a group (e.g. gender, age and race), or the groups we place them in based on perceived characteristics (social categorisation).

Cognitive dissonance and cognitive biases

Cognitive dissonance arises when we hold conflicting beliefs or attitudes, or when our cognitions are inconsistent with our behaviour. The tension can be released using cognitive biases, which are errors in thought processes that affect decision-making and problem-solving.

Cognitive biases include: actor–observer bias, anchoring bias, attentional bias, confirmation bias, false-consensus bias, halo effect, hindsight, misinformation effect, optimism bias and self-serving bias (the Dunning–Kruger effect). Functional fixedness and the misinformation effect can also reduce cognitive dissonance.

Heuristics

Heuristics are mental shortcuts that allow us to make quick and efficient decisions, particularly in social contexts. While heuristics help to conserve mental effort and time, they are prone to errors and biases. Three common heuristics are:

- the availability heuristic, which is influenced by priming and how easily memories can be retrieved
- the representativeness heuristic, which involves categorising based on shared traits
- the affect heuristic, where emotional states dictate decision-making.

Stereotypes, prejudice, discrimination and stigma

Prejudice refers to negative attitudes towards a group based on insufficient or incorrect information. This often comes from stereotypes – fixed ideas we might have about certain groups. Discrimination occurs when people act out their prejudice. Stigma is a negative label tied to specific characteristics that make someone different. Stereotypes, prejudice, discrimination and stigma are interrelated and can have significant negative impacts on a person's mental wellbeing.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
define the term "social cognition"	☐	☐	☐	Topic 7.1 Pages 266–273
explain the role of person perception in social cognition, including self-schema and social categorisation	☐	☐	☐	Topic 7.1 Pages 266–273
explain what egocentric pattern projection is	☐	☐	☐	Topic 7.1 Pages 266–273
explain the role of attributions in social cognition, including internal and external attributions	☐	☐	☐	Topic 7.1 Pages 266–273
explain what fundamental attribution error is	☐	☐	☐	Topic 7.1 Pages 266–273
explain the role of attitudes in social cognition, including explicit and implicit attitudes	☐	☐	☐	Topic 7.1 Pages 266–273
describe the tri-component model of attitudes	☐	☐	☐	Topic 7.1 Pages 266–273
analyse case studies to identify the affective, cognitive and behavioural components of attitude	☐	☐	☐	Topic 7.1 Pages 266–273
describe the role of stereotypes in social cognition	☐	☐	☐	Topic 7.1 Pages 266–273
discuss how social cognition affects interpersonal interactions and decision-making	☐	☐	☐	Topic 7.1 Pages 266–273
define the term "cognitive dissonance"	☐	☐	☐	Topic 7.2 Pages 274–278
explain what a cognitive bias is	☐	☐	☐	Topic 7.2 Pages 274–278
describe different forms of cognitive bias	☐	☐	☐	Topic 7.2 Pages 274–278
discuss how cognitive biases can help to reduce or resolve cognitive dissonance	☐	☐	☐	Topic 7.2 Pages 274–278
explain what a heuristic is	☐	☐	☐	Topic 7.3 Pages 279–282
compare the availability heuristic, the representativeness heuristic and the affect heuristic	☐	☐	☐	Topic 7.3 Pages 279–282
describe the positive and negative influences of heuristics on decision-making and problem-solving	☐	☐	☐	Topic 7.3 Pages 279–282
define the terms "prejudice", "discrimination" and "stigma"	☐	☐	☐	Topic 7.4 Pages 283–291
provide examples of prejudice, discrimination and stigma	☐	☐	☐	Topic 7.4 Pages 283–291
discuss the effects of prejudice, discrimination and stigma on mental wellbeing	☐	☐	☐	Topic 7.4 Pages 283–291
discuss ways to reduce the influence of prejudice, discrimination and stigma	☐	☐	☐	Topic 7.4 Pages 283–291

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

GROUNDWORK 7

Multiple choice

1 Cognitive dissonance refers to:
- **A** an innate ability to think critically.
- **B** a mental comfort zone where biases do not exist.
- **C** the discomfort felt when holding contradictory beliefs.
- **D** the act of justifying one's actions to reduce guilt.

2 What is an advantage of using heuristics in social situations?
- **A** They ensure accurate decision-making.
- **B** They save mental effort and time.
- **C** They eliminate all cognitive biases.
- **D** They are always emotionally driven.

3 Assigning all favourable traits to the groups we belong to is identified as:
- **A** social categorisation.
- **B** the halo effect.
- **C** in-group bias.
- **D** personal biases.

4 Which of the following is a dispositional factor?
- **A** Motivation
- **B** Situation
- **C** Luck
- **D** The attitude of another

5 Identify 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** Liking the Cancer Council Australia for the work they do
- **D** Running every day for health reasons

FIGURE 1 Cognitive dissonance is...

Short answer

6 Mary is late to work, which she attributes to the heavy traffic. But when Sarah also arrives late, Mary thinks that Sarah is irresponsible. Identify which biases and mental frameworks are involved. Justify your response with reference to the scenario.

7 Compare implicit and explicit attitudes.

8 Distinguish between prejudice and discrimination.

9 Explain how the affect heuristic differs from the availability heuristic.

10 Explain what fundamental attribution error is, using an example.

Study tip

If you are really stuck on a multiple choice question, try any of the following:

- eliminate what you know to be wrong
- narrow your choice to the potentially best answer
- eliminate absurd answers
- eliminate options that contain absolute words.

CASE CRACKER 7

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Exploring Michael Barclay's experiences with discrimination and prejudice

The following story was adapted from an *A Current Affair* story that aired on 12 September 2023.

In Perth, Michael Barclay, a Māori military veteran, experienced discriminatory treatment at The Windsor Hotel due to his mataora, a culturally significant facial tattoo. When Barclay and his wife requested to see the menu for dinner, the staff member – who was also the manager – informed them that they could not be served because of Barclay's tattoo. Even after Barclay explained its cultural importance, the manager remained unyielding, forcing the couple to leave. Although the pub's policy against facial tattoos was not visibly displayed at the location, the couple later discovered a website notice that prohibited facial tattoos, while permitting dogs. Barclay, a resident of Australia for 40 years, is considering lodging a complaint with the Human Rights Commission. The incident brings to light issues related to cultural discrimination and prejudice.

Source: Langdon (2023)

1 Identify the type of discrimination – direct, indirect or intersectional – that Michael Barclay experienced in the pub. Use evidence from the scenario to support your answer.

2 Explain how cognitive dissonance might play a role in the manager's behaviour toward Barclay.

3 Explain how the manager could use a cognitive bias to overcome her cognitive dissonance.

4 With reference to the case study, describe what a stereotype is.

Study tip

If the question asks you to "use evidence from the scenario", your answer must include information from the stimulus. In this case, you do not need to paraphrase; using the exact or close-to-exact words from the stimulus makes it clear to the examiner what you have done.

DATA DRILL 7

KEY SCIENCE SKILLS: Generate, collate and record data

Organising data about person perception

Generally, tables are the first step to organising data and presenting results. You use them to identify changes to the independent variable (the variable that is purposefully manipulated by the researcher) and to record measurements of the dependent variable (the outcome of the change). Calculations can then be performed to process the data.

The following guidelines will help you with constructing your table.

- Record the independent variable in the first column. Each row of the first column corresponds to a different condition.
- While it is not mandatory, it is good practice to record the number of participants in each level or condition. This is given a symbol of "n" for a sample or "N" for a population.
- Raw and/or processed data for the dependent variable is recorded in subsequent columns. Means are typically indicated using "M" and variability can be accounted for using standard deviation, or "SD".
- The first row of the table should contain descriptive column headings and units, if relevant.
- A table caption (number and description) is located above the table. In psychology, measures of the dependent variable are often more complicated than in other sciences because we use scales and questionnaires. Therefore, it is helpful to include enough information in the caption so that readers can understand what the values in the table mean.

Study tip

Before you begin to collect data, it is also helpful to create a table for recording raw data and observations. You should create this in your logbook as part of authenticating your work. Raw data tables are not usually included in the final report, but if they are, this is usually in an appendix after the reference list. Figure 2 shows how processed data can be organised in a table.

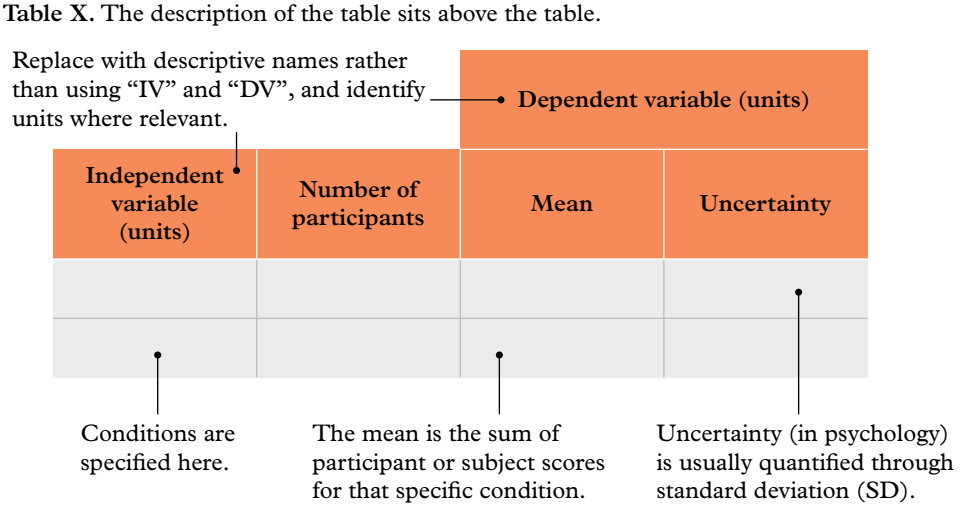


FIGURE 2 Format of table containing processed data

Figure 2 shows a typical table in psychology. If you are taking other VCE sciences, such as Chemistry or Physics, you would typically include columns for multiple trials of the dependent variable. These sciences typically measure the same thing multiple times; whereas in psychology, we measure a large number of people once.

In class, students were learning about stereotypes, prejudice and discrimination. They decided to investigate the influence of wearing school uniforms on perceived academic capability. They recruited 40 participants and asked them to engage in identical academic activities. Observers rated participant capabilities on a 10-point Likert scale, where a score of 10 indicated the greatest perceived academic capability and 1 indicated the least. The raw data is shown in Table 1.

TABLE 1 The perceived academic capabilities of students who did or did not wear a school uniform

Participant number	Clothing	Perceived academic capability (1 to 10)
1	Wearing uniform	8
2	Wearing uniform	7
3	Wearing uniform	9
4	Wearing uniform	8
5	Wearing uniform	7
6	Wearing uniform	9
7	Wearing uniform	8
8	Wearing uniform	8
9	Wearing uniform	7
10	Wearing uniform	8
11	Not wearing uniform	5
12	Not wearing uniform	6
13	Not wearing uniform	5
14	Not wearing uniform	4
15	Not wearing uniform	5
16	Not wearing uniform	4
17	Not wearing uniform	6
18	Not wearing uniform	5
19	Not wearing uniform	6
20	Not wearing uniform	5

1 Identify the independent and dependent variables in the data.

Independent variable: _____

Dependent variable: _____

2 Describe how the dependent variable was measured.

_____

_____

3 Calculate the average (mean) scores of each group and present the results in a table.

INVESTIGATION INSPECTOR 7

KEY SCIENCE SKILLS: Plan and conduct investigations; Analyse and evaluate data and investigation methods

Evaluating uncertainty and external validity in studies about stereotypes

In psychological studies, researchers are typically interested in further understanding the behaviours of a specific group of people, i.e. the target population. However, it is usually impossible to test everyone in a population. The participants in a study are typically a selection, or sample, of those from the target population. Researchers aim to make inferences about the target population based on the estimates and findings from the sample.

For the research to be reliable and valid, the sample should be representative of the key characteristics of the target population. For example, if a researcher is interested in studying the effects of social media use on the self-esteem of teenagers in Australia, then participants in the sample should ideally be a representative sample of teenagers in Australia. This helps to avoid bias based on characteristics such as age, gender, education, abilities, intelligence, memory, income, occupation, physical or mental health, etc.

Bias is a potential confounding variable if it introduces uncertainty in the findings. Additionally, if the sample is not representative of the target population, you will need to identify and acknowledge this as a limitation; it would impact your ability to generalise your findings and claim that it is valid for the target population.

1 Daniel Yarmey's 1993 study found that people readily stereotype others, and even categorise them as a "criminal" or "non-criminal", based purely on facial and vocal characteristics. Participants comprised 240 undergraduate students, and the "targets" – those being judged by the participants – consisted of 30 unfamiliar white males aged 25 to 30 years.

FIGURE 3 In Yarmey's study, students were asked to categorise individuals as "criminal" or "non-criminal" based on their appearance and voice.

a Evaluate the representativeness of Yarmey's study.

b Identify another potential confounding variable and explain how it affects the validity of the study.

2 Participant variables are the unique combination of personal characteristics that a participant possesses. They can be extraneous variables that need to be identified and controlled in experimental designs to improve the validity of results. This helps to increase certainty that differences are due to changes in the independent variable instead of differences in participants in each group.

a With reference to Yarmey's 1993 study, explain how uncontrolled participant variables can impact validity.

b Suggest how participant variables can be controlled in experimental designs.

EVALUATING ETHICS 7

KEY SCIENCE SKILLS: Comply with ethical and safety guidelines

Evaluating explanatory statements for informed consent in studies about fundamental attribution error

An informed consent document contains an explanatory statement. This presents all the relevant and important information about a study to participants so that they can make an informed decision about whether they are willing to participate.

The statement must be written in clear and easy-to-understand language, identify all risks and provide a point of contact for any questions. For those who cannot legally consent, such as children, consent must be obtained from their guardians. A checklist for creating an explanatory statement is shown in Figure 4.

Checklist for creating an explanatory statement

- ☐ **Title and objective(s):** Clearly state the title or purpose of the investigation.
- ☐ **Methods:** Briefly outline how the investigation will be conducted.
- ☐ **Participant information:** Describe the criteria for participant selection (e.g. age, abilities, health, etc.).
- ☐ **Demands on participants:** Explain what will be required of participants during the research.
- ☐ **Risks and benefits:** Highlight any potential risks and how they will be mitigated, as well as any benefits to participating.
- ☐ **Language clarity:** Ensure that language is simple and free from jargon, and tailored to the participants' age, education and cultural background.
- ☐ **Opportunity for questions:** Identify when and how participants can ask questions.
- ☐ **Consent:** Explain how consent can be given.
- ☐ **Legal guardians:** If applicable, indicate how you will obtain consent from caregivers or legal guardians of participants unable or too young to give informed consent.
- ☐ **Ethical approvals:** Note whether ethical approval is necessary and if it has been obtained.

FIGURE 4 A checklist for creating an explanatory statement

A sample explanatory statement is shown in Figure 5.

Explanatory statement

Aim: To investigate whether people make the fundamental attribution error, even with factual knowledge to contradict this

Please read the following information carefully before deciding whether to participate in this study.

This investigation is a modification of the investigation done by Ross et al. (1977) on the biases in social perception. The study will take approximately 30 minutes. You will design a trivia quiz and test a classmate (contestant). Afterwards, you will be asked to complete a short online survey.

We do not expect there to be any risks as the investigation is being conducted under normal classroom conditions. Participation is voluntary as part of your course offering. You have the right to withdraw your participation at any time by discontinuing the questions or by not submitting your response. Submission of your results implies consent; therefore, once your results are submitted, consent cannot be withdrawn. Data collected will be deidentified to maintain your privacy.

Data from the study will be made available to the school's psychology students for analysis and interpretation.

If you have any questions about your rights in this research, or any questions, concerns, suggestions or complaints that are not being addressed by the researcher, or in the case of research-related harm, please inform your teacher or contact the school's head of department.

FIGURE 5 A sample explanatory statement

1 Identify if – and, if so, where – the researcher has demonstrated adherence to the ethical guidelines regarding the rights of participants.

Informed consent	
Voluntary participation	
Right to withdraw	
Deception	
Debriefing	
Confidentiality	

RESEARCH REVIEW 7

KEY SCIENCE SKILLS: Develop aims and questions, formulate hypotheses and make predictions; Construct evidence-based arguments and draw conclusions; Analyse, evaluate and communicate scientific ideas

Developing an investigation based on claims about prejudice and discrimination

You may be required to conduct your research investigation based on a claim. Selecting a claim can be tricky, particularly if you are not sure about a topic or if you find more than one topic extremely fascinating. To help you select a claim, consider the following questions:

- Do I find one claim more interesting than the others?
- Do I understand the terms in this claim more than in others?
- Which claim do I have the most existing knowledge about?

Once you have chosen a claim, you will need to create a research question and make sure that you can find sufficient sources of evidence to help you answer the research question. If you are struggling to find evidence or you do not understand the evidence that you find, you may want to rethink your question and even the claim.

1 Consider the following claims about stereotypes, prejudice and discrimination:

I Prejudice is a product of social environment.

II Discrimination prevails in today's society.

III Ageism can affect behaviours.

Ask yourself the three questions above for each of the three claims, then select one and create a research question.

2 Investigate the claim you chose in question **1** and identify three credible sources. For the purpose of this activity, this research can be brief. Write down the references for the three sources you have chosen.

3 Your research investigation begins with an introduction. In this section, you need to introduce all the relevant key terms in your research. You also need to include relevant background theory, studies or psychological concepts.

a Identify and define the key terms in your research question.

b Briefly describe a relevant psychological theory, study or concept related to the research question.

Study tip

Your introduction should clearly link the claim to a more specific and focused research question. To check that you have covered all the key points, highlight each part of the claim in a different colour. Then, highlight the corresponding parts of your introduction and the research question in the same colour. Make sure that all aspects of your claim are addressed.

CHAPTER 8

Factors that influence individual and group behaviour

Social influence – how individuals change their behaviours and decisions based on the presence or under the influence of others – can stem from groups and culture, obedience, conformity and media.

Groups and culture

Characteristics of our social groups and culture – including roles, specific behaviours expected of individuals, and status and power – affect individual behaviour. Power usually arises from a person's status or relative position within a group.

Group decision-making is influenced by groupthink and group shift. Groupthink occurs when individuals conform to a group decision to maintain group harmony. Group shift amplifies individual opinions in a group setting, resulting in more exaggerated or extreme behaviour and decisions.

Culture refers to the shared beliefs, customs and values of the members of a particular group or society. Cultural norms stem from shared beliefs within a culture. Adherence to norms influences behaviour by encouraging or discouraging specific actions.

Obedience

Obedience is the act of following commands from someone in a higher position within a social hierarchy. Social psychologist Stanley Milgram found that the degree and likelihood of obedience is affected by proximity (emotional or physical closeness), legitimacy of authority figure (perceived status and power) and group pressure.

Conformity

Conformity is the act of altering one's behaviours, thoughts or feelings to align with those of a group. The extent of conformity is determined by normative influence, informational influence, culture, group size, unanimity, deindividuation and social loafing.

Media

Social media platforms can enhance social connectedness and access to valuable information, and lead to healthy social comparisons that drive self-improvement. However, it can also lead to unhealthy social comparisons, increased feelings of isolation, and cyberbullying. Similarly, video games can enhance social connectedness, but can also lead to addictive behaviours.

Nonconformity

In real life, people do challenge decisions and resist conformity. Acts of nonconformity contribute to diverse thinking and can improve group decision-making. Acts of nonconformity include: anti-conformity, independence and dissent.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
list examples of types of social groups	☐	☐	☐	Topic 8.1 Pages 298–308
explain how roles within a social group influence individual behaviour	☐	☐	☐	Topic 8.1 Pages 298–308
explain how status and power within a social group influence individual behaviour	☐	☐	☐	Topic 8.1 Pages 298–308
explain how groupthink and group shift influence individual behaviour	☐	☐	☐	Topic 8.1 Pages 298–308
explain how culture influences individual behaviour	☐	☐	☐	Topic 8.1 Pages 298–308
explain what a cultural norm is	☐	☐	☐	Topic 8.1 Pages 298–308
define the term "obedience"	☐	☐	☐	Topic 8.2 Pages 309–315
outline the method and key findings from Milgram's research	☐	☐	☐	Topic 8.2 Pages 309–315
outline the implications and criticisms of Milgram's research	☐	☐	☐	Topic 8.2 Pages 309–315
explain different factors that affect the degree and likelihood of obedience	☐	☐	☐	Topic 8.2 Pages 309–315
define the terms "social norm" and "conformity"	☐	☐	☐	Topic 8.3 Pages 316–321
outline the method and key findings from Asch's research	☐	☐	☐	Topic 8.3 Pages 316–321
outline the implications and criticisms of Asch's research	☐	☐	☐	Topic 8.3 Pages 316–321
discuss the factors that influence conformity	☐	☐	☐	Topic 8.3 Pages 316–321
describe the positive and negative influences of different media sources on individual and group behaviour	☐	☐	☐	Topic 8.4 Pages 322–327
define the terms "anticonformity" and "independence"	☐	☐	☐	Topic 8.5 Pages 328–331
discuss how anticonformity and independence empower individual decision-making when in groups	☐	☐	☐	Topic 8.5 Pages 328–331

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

GROUNDWORK 8

Multiple choice

1 Which type of power is derived from an individual's knowledge or expertise?
- **A** Coercive power
- **B** Reward power
- **C** Informational power
- **D** Legitimate power

2 Neha often adapts her behaviour to fit in with her peers, even if it conflicts with her personal values. This is an example of:
- **A** social influence.
- **B** role ambiguity.
- **C** status incongruence.
- **D** cultural norms.

3 In his 1951 study, Asch asked participants to perform a visual discrimination task in which they matched a standard line with one of three other lines. This experiment demonstrated:
- **A** conformity.
- **B** group decision-making.
- **C** group cohesion.
- **D** competition.

4 In Milgram's studies, which factor was found to have the most significant impact on obedience?
- **A** Social proximity
- **B** Legitimacy of the authority figure
- **C** Group pressure
- **D** Cultural norms

5 Which of the following is a benefit of dissent in a group setting?
- **A** Promotes diverse thinking
- **B** Enhances groupthink
- **C** Encourages biased solutions
- **D** Promotes group harmony

6 Martie chooses not to tip at a restaurant in Japan. His action is mostly influenced by:
- **A** normative influence.
- **B** informational influence.
- **C** social loafing.
- **D** culture.

7 James follows a lot of influencers on Instagram and often compares his appearance with theirs. He has started to feel bad about himself. This is an example of:
- **A** upward comparison leading to motivation.
- **B** downward comparison leading to gratitude.
- **C** upward comparison leading to a decrease in self-esteem.
- **D** downward comparison leading to a decrease in self-esteem.

Short answer

8 Contrast anticonformity and independence, using examples to support your answer.

9 Describe the role of cultural norms in shaping individual behaviour.

FIGURE 1 Taking your shoes off before entering your home is considered a norm in some cultures.

10 Explain what is meant by the terms "reward power" and "coercive power", and provide an example of each.

CASE CRACKER 8

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Exploring the role of social influence in the Ice Bucket Challenge

In 2014, the Ice Bucket Challenge became a global phenomenon on social media platforms, such as Facebook and Twitter. The challenge involved dumping a bucket of ice-cold water on oneself and then nominating others to do the same within 24 hours.

The role of celebrities was pivotal in amplifying the reach of the campaign. High-profile individuals from the entertainment industry (e.g. Oprah and Lady Gaga), sports (e.g. LeBron James) and other public spheres (e.g. Bill Gates and Jeff Bezos) participated, lending their influence and star power to attract a broader audience. Their involvement not only garnered media attention but also encouraged mass participation, making the challenge almost inescapable on social media feeds.

The aim of the campaign was to raise awareness and funds for amyotrophic lateral sclerosis (ALS) research. It was massively successful, generating more than $115 million of funding for the ALS Association. Funds from the campaign facilitated the discovery of five new genes related to ALS, new clinical trials testing potential treatments, and an expansion in the association's clinical network.

It showcased the powerful influence of social media on people's behaviour to support a charitable cause.

FIGURE 2 In 2014, more than 17 million people participated in the Ice Bucket Challenge.

1 Identify the type of social influence that primarily drove people to participate in the Ice Bucket Challenge.

- **A** Informational influence
- **B** Normative influence
- **C** Obedience to authority
- **D** Compliance

2 With reference to the scenario, identify the type of power that was most evident and explain how this encouraged participation in the Ice Bucket Challenge.

3 Explain how the Ice Bucket Challenge demonstrates the concept of conformity.

4 Identify two positive and two negative effects of social media on the behaviour of individuals, with reference to the challenge.

DATA DRILL 8

KEY SCIENCE SKILLS: Generate, collate and record data

Presenting data about perceived social isolation

Tables are useful to organise and present data, but it is much easier to identify trends, patterns or relationships between variables if the data is displayed visually.

To choose the right graph to display your data, you need to consider the type of data you have collected and what you are trying to display. Table 1 provides a guide for your decision-making.

TABLE 1 Guide for choosing the right graph to display your data

	Purpose		
Type of data	**To compare (best for controlled experiments)**	**To show a relationship (best for correlational studies)**	**To show composition and distributions**
Discrete or categorical	Bar chart	Scatterplot	Pie chart
Continuous	Line graph		Histogram

For most of these graph types, there are a number of key features you must include. The acronym DIALS is a good way to help you remember what these are:

D Include a **description** of the graph as a caption or title

I Make sure the axis **intervals** are appropriate for the scales

A Plot the data on the right **axes**. Your IV is on the *x*-axis and your DV is on the *y*-axis

L Make sure both axes are **labelled** correctly and include units, where relevant

S Set up your **scales** with appropriate minimum and maximum values.

1 The graph in Figure 3 shows the results from Milgram's study.

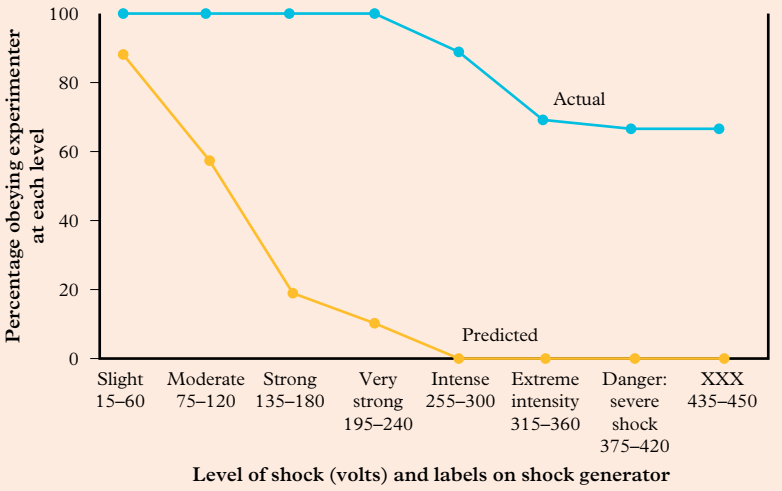


FIGURE 3 The results from Milgram's study

Identify the type of graph used and suggest why it was considered the most appropriate graph to present the data.

2 Primack et al. (2017) investigated social media use and perceived social isolation among young adults in the USA. Of the 1787 participants, 50.3 per cent were female, 57.5 per cent were white, 13.0 per cent were African American, 20.6% were Hispanic and 8.9 per cent were biracial, multiracial or other. In terms of household income, 22.9 per cent of participants were in the "low" category (<$30,000) and 38.7 per cent were in the "high" category (earning ≥ $75,000).

a Determine the best graph type(s) to present participant demographic information.

Gender: _____

Race/ethnicity: _____

Income: _____

b Create a graph to present income data from Primack et al.'s study. Make sure that you follow DIALS.

INVESTIGATION INSPECTOR 8

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods; Construct evidence-based arguments and draw conclusions.

Investigating limitations of the Stanford prison experiment

Limitations are assumptions, features or constraints from an investigation that limit a researcher's ability to confidently answer the research question and/or evaluate a claim. They can also limit the generalisability of the findings to a broader population, environment or task. Limitations can reduce the quality, reliability or validity of a study's findings.

They can arise from various aspects of the research process, including constraints in the research question, the design, the method, sampling issues, ethical considerations and so on. Limitations are not the same as errors, extraneous variables, confounding variables or uncertainty, but all of these may give rise to limitations. You will need to identify and explain limitations, evaluate the effect of limitations on the reliability and validity of your investigation, and offer suggestions for how future research could overcome these limitations.

Read about the Stanford prison experiment in Real-world psychology 8.1 in your Student Book.

1 Identify two potential limitations of the study and explain their effect on the reliability and/or validity of the results.

Limitation 1:	
Explanation:	
Consequence:	

Limitation 2:	
Explanation:	
Consequence:	

2 For each limitation you have identified, suggest an improvement that future studies could implement to overcome them.

Study tip

You can organise your discussion about limitations using the following template.

1 Identify the limitation.
2 Describe what the limitation is and how you were able to identify it.
3 Explain the effect of the limitation on the validity of the study.
4 Suggest ways in which future studies could overcome the limitation.

EVALUATING ETHICS 8

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Exploring limitations related to ethics in studies about social influence

A common criticism with classical studies in psychology such as the Stanford prison experiment and Milgram's obedience study (Topic 8.2 in your Student Book) is due to the ethical limitation associated with replicating the study to test the reliability and validity of the findings. This is because by modern ethical standards, these studies would not likely gain approval from an ethics board.

FIGURE 4 There were ethical violations in the Stanford prison experiment.

1 Distinguish between voluntary participation and withdrawal rights.

2 Identify and explain two ethical violations in Zimbardo's Stanford prison experiment.

3 Identify and explain two ethical violations in Milgram's obedience study.

RESEARCH REVIEW 8

KEY SCIENCE SKILLS: Construct evidence-based arguments and draw conclusions

Exploring the implications of psychological studies on social influence

Implications in research refer to the potential consequences or effects that the findings of a study might have in the real world. For instance, if research results indicated that students who reported getting more than eight hours of sleep each night achieved significantly higher test scores than those who reported less than eight hours of sleep, the implications could include:

- the shift towards promotion of healthy sleep habits among students by educational institutions
- the development of government initiatives and policies, such as altering school start times or incorporating sleep education into health curriculums
- the requirement for further research to explore the cognitive impacts of sleep deprivation on adolescents.

Identify an implication for each of the following social psychology studies.

FIGURE 5 Consider the implications of studies on conformity.

1 Zimbardo's Stanford prison experiment.

2 Milgram's obedience study.

3 Asch's conformity study.

CHAPTER 9

Perception

We make sense of the world by relying on our ability to attend to sense and attend to important stimuli, and then assign meaning to the world through perception.

Attention

Attention is the cognitive ability to actively process specific stimuli while ignoring other competing information. This includes sustained attention, selective attention and divided attention. Our brains are capable of handling different types and amounts of cognitive processes, including automatic processes which rely on muscle memory and require minimal effort, and controlled processes which are complex or unfamiliar tasks that require high levels of mental effort. The objects of our attention and how we interact with the world depend on two interconnected processes: sensation and perception.

Sensation

Sensation involves detecting stimuli through our sense organs. If the strength of the stimulus energy is sufficient, the stimuli is received, converted into neural impulses and relayed to the brain.

Perception

Perception is where we assign meaning to the stimuli. Incoming stimuli is filtered, organised and then interpreted based on existing mental schemata.

Bottom-up and top-down processing

Two approaches explain how perception occurs: bottom-up and top-down processing. Bottom-up processing involves constructing an understanding based on incoming sensory data, without relying on previous knowledge. Top-down processing is influenced by perceptual set (a unique combination of past experiences, knowledge, expectations, motivations, culture, beliefs and emotions) to make inferences about incoming sensory information. Both processes often occur simultaneously.

Factors affecting perception

Perception is a complex process that is influenced by biological, psychological and social factors.

Biological factors relate to anatomical and genetic differences in the body that affect sensation and, therefore, how we perceive stimuli. If our ability to sense information is changed, our perception of the stimuli will also change.

Psychological factors direct our attention, shape our expectations and, therefore, influence what we are able to perceive. These factors are unique to individuals and are related to our perceptual set. Perceptual constancies allow us to perceive what we see as unchanging in orientation, size, shape and colour despite changes in the environmental conditions affecting these attributes. Gestalt principles guide our visual system to interpret what we see as meaningful wholes, rather than isolated parts. Depth perception is another psychological factor shaped by monocular and binocular cues.

Social factors such as culture also influence perception. Cultural norms and beliefs can affect what is deemed important to focus on and how stimuli are interpreted.

In the case of gustatory perception, social and cultural factors further contribute, as familiarity with certain foods and cultural norms can either align or conflict with individual preferences.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
explain what attention is	☐	☐	☐	Topic 9.1 Pages 344–348
compare sustained, selective and divided attention	☐	☐	☐	Topic 9.1 Pages 344–348
compare automatic and controlled processes	☐	☐	☐	Topic 9.1 Pages 344–348
explain the role of sensation and perception in making sense of the world	☐	☐	☐	Topic 9.2 Pages 349–355
identify the stimulus energy, sense organs and sense receptors involved in sensation of different senses	☐	☐	☐	Topic 9.2 Pages 349–355
explain what "absolute threshold" is	☐	☐	☐	Topic 9.2 Pages 349–355
compare bottom-up and top-down processing	☐	☐	☐	Topic 9.2 Pages 349–355
explain how biological factors influence visual perception, such as physiological make-up, age and genetics	☐	☐	☐	Topic 9.3 Pages 356–368
explain how psychological factors influence visual perception, such as perceptual set, perceptual constancies, Gestalt principles and depth cues	☐	☐	☐	Topic 9.3 Pages 356–368
explain how social factors influence visual perception, such as culture	☐	☐	☐	Topic 9.3 Pages 356–368
explain how biological factors influence gustatory perception, such as physiological make-up, age and genetics	☐	☐	☐	Topic 9.4 Pages 369–377
explain how psychological factors influence gustatory perception, such as perceptual set	☐	☐	☐	Topic 9.4 Pages 369–377
explain how social factors influence gustatory perception, such as culture	☐	☐	☐	Topic 9.4 Pages 369–377

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

FIGURE 1 Visual perception allows you to recognise this as an image of lemons. Gustatory perception enables you to anticipate their sour taste.

GROUNDWORK 9

Multiple choice

1 Which of the following shows the correct sequence for the process of visual perception?

A Reception, transduction, transmission, selection, organisation and interpretation

B Reception, selection, transmission, transduction, organisation and interpretation

C Reception, selection, transmission, organisation, interpretation and transduction

D Transduction, transmission, selection, reception, organisation and interpretation

2 Which of the following describes the process of transduction in gustatory perception?

A Detection of pressure when food reaches the tongue

B Detection of the presence of, or changes in, taste sensitivity

C Breakdown of food by saliva into chemical compounds that can bind to our taste buds

D Transformation of chemical energy into a nerve impulse

3 The absolute threshold for a visual stimulus is:

A the normal amount of light the photoreceptors can receive before any damage occurs to the eye.

B the minimum amount of energy that must be present before visual sensation occurs.

C the level of illumination of light.

D the minimum amount of change in light intensity that can be detected by photoreceptors.

4 Barbara is studying for an exam and tunes out the sound of her parents watching television in the next room. She is demonstrating:

A sustained attention.

B selective attention.

C divided attention.

D multitasking.

5 You are watching two trucks on a highway. They are approximately 20 m apart, but you can tell that they are identical. Which of the following concepts helps you to draw this conclusion?

A Orientation constancy

B Size constancy

C Shape constancy

D Brightness/colour constancy

6 Which of the following correctly classifies the factors that influence perceptual set?

	Recognising a song from your childhood and feeling nostalgic	More easily perceiving different shades of a colour when they are part of your language	Feeling hungry and, therefore, noticing food-related cues more prominently	Being anxious and perceiving neutral situations as hostile
A	Past experience	Culture	Motivation	Emotion
B	Culture	Motivation	Emotion	Past experience
C	Emotion	Past experience	Culture	Motivation
D	Motivation	Emotion	Past experience	Culture

7 Which of the following demonstrates bottom-up processing?

A Walter recognises the breed of his friend's dog as a greyhound because his parents used to own one.

B When overseas in Japan, Zoe is often greeted by locals at night who say "konbanwa". Zoe assumes this must mean good evening.

C Rosie attends her first French lesson and learns that "oui" means "yes" after her teacher writes out the definition on the board

D Rupert sees the shadow of an animal and registers from the silhouette that the animal is a cat.

Short answer

8 Identify the key components of sight and taste sensation by completing the table.

Sense	Stimulus energy	Sensory organ	Sensory receptor
Sight			
Taste			

9 Contrast automatic and controlled processes. Provide an example for each.

10 Compare bottom-up processing and top-down processing. Use examples to support your answer.

CASE CRACKER 9

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Exploring the role of perception in how we see The Dress

In 2015, a photograph of a dress went viral because people could not agree on its colours; some saw it as white and gold, while others saw it as blue and black.

This became a real-world example of how visual perception can differ greatly among individuals, and sparked numerous scientific investigations. Controlling for biological differences, researchers such as Lafer-Sousa et al. (2015) found that the phenomenon was due to the ways individual brains perceive and interpret colours in changing light conditions.

FIGURE 2 The Dress: What colours do you see when you look at the photo? Is The Dress white and gold or is it blue and black?

1 Determine whether the difference in an individual's perception of The Dress is due to bottom-up or top-down processing. Justify your response.

Study tip

Remember that "determine" means to work out the answer based on the information provided and your prior knowledge. Clearly state the answer to the "determine" command term. The second command term, "justify", means to use evidence or reasoning to support your answer. Signposts such as "therefore" and "thus" indicate reasoning.

2 Identify and describe which psychological factor offers the best explanation for individual perception as suggested by the research.

3 Recall the two different types of photoreceptors in the eye and describe their roles in how individuals would perceive The Dress.

DATA DRILL 9

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Processing data from experiments related to visual and gustatory perception

Two Psychology professors conducted separate investigations with their classes to teach them about visual and gustatory perception.

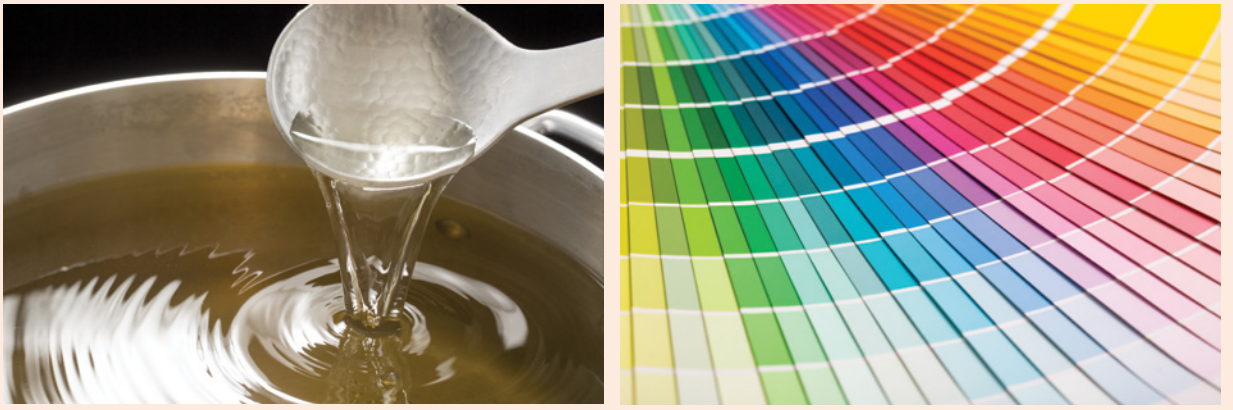


FIGURE 3 The Psychology classes studied visual and gustatory perception.

Dr Sophia's class studied the taste preferences of individuals from different age groups. The students offered participants an umami-rich soup and asked them to rate its taste on a scale of 1 (did not like at all) to 10 (loved it). The students collected the following data:

7, 8, 6, 7, 5, 8, 6, 7, 9, 7

1 Calculate the:

a mean

b median

c mode.

2 From the values you calculated in question **1**, determine which is the most appropriate measure of central tendency and justify your response.

Dr Thompson's class decided to investigate how different lighting conditions affected individuals' ability to correctly identify colours. Participants were shown a series of coloured cards and asked to name the colour. The number of mistakes made by each participant was recorded.

TABLE 1 Number of mistakes made by each participant

Participant	Number of mistakes
A	2
B	4
C	3
D	5
E	3
F	2
G	6
H	3

3 Calculate the:

a mean

b standard deviation.

INVESTIGATION INSPECTOR 9

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Analysing and evaluating uncertainties in a study about attention

Recall that uncertainty refers to the ambiguity that exists in data or findings. Uncertainty can be identified by looking for contradictory or incomplete data and evaluating potential alternative explanations for the results, or considering factors that might influence their interpretation.

In VCE Psychology, you will use qualitative methods to detect uncertainty. This involves looking for contradictory or incomplete data, examining patterns, and considering alternative explanations (confounding variables) that could impact results. You may also come across quantitative methods, such as looking at the spread of data (standard deviation). Let's practise qualitative detection of uncertainty using the 2019 study by Glass and Kang.

In this study, the researchers investigated the effect of electronic device usage for non-academic purposes during class on student academic performance. They recruited 116 university students (34 males, aged between 18 and 36 years) who participated as part of their course offering. The study was conducted in a two-part university course, where students were allowed access to electronic devices in half of the lectures. A within-subjects design was used. Students self-reported whether or not they had used an electronic device in each class.

1 Evaluate the following scenarios to determine the effect on certainty, including the impact on validity.

a Suppose that 20 of the 116 students did not consistently report whether they used electronic devices in class.

b Imagine that the lectures where devices were allowed covered more complex content compared to those where devices were not allowed.

c Suppose the researchers repeated the study the following year with a different group of university students. This time they found that using electronic devices for non-academic purposes significantly improved academic performance.

2 Suggest why a within-subjects design was used rather than a between-subjects design.

EVALUATING ETHICS 9

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Assessing risks and ethics for a taste test

While it is rare to use chemicals or other hazardous substances in psychology, you still need to consider and manage any potential psychological or physical harm in your investigations. Therefore, you should be aware of how to identify and manage these forms of harm.

Risk assessments help identify potential risks and hazards before starting investigations, enabling you to modify the experimental design to mitigate them. It is good practice to consider both proactive (how to prevent it from happening) and reactive (what do to if it does happen) strategies. Additionally, safety data sheets (SDSs) provide valuable information about the hazardous properties of substances, and ensure that you are aware of any precautions or safety measures that need to be taken.

Study tip

A good way to present your risk assessment is in a table that includes a description of the hazards as well as the proactive and reactive strategies to manage the risks.

Consider the following scenario: A group of researchers want to investigate how the concentration of citric acid affects taste sensitivity in students aged 15 to 16 years. The independent variable is the concentration of citric acid (0.1 per cent, 0.5 per cent, 1.0 per cent, 1.5 per cent) in solution. Sour taste sensitivity is measured by participants' self-reported perception using a Likert scale from 1 to 10.

1 Help the researchers by completing a risk assessment for the study.

a Find the SDS for citric acid and identify at least two potential risks, hazards and management strategies from the SDS that are relevant to the experiment.

b Identify another two or three safety considerations and management strategies relevant to the experiment.

2 Explain how the students should obtain informed consent before conducting the experiment.

RESEARCH REVIEW 9

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Understanding and evaluating the correct language to communicate ideas about perception

Scientific language in psychology must be precise, avoiding definitive terms such as "prove", "proven", "always" or "never", as they suggest conclusive evidence. This is not appropriate in scientific research, including psychological research. It is also standard to use third-person narrative rather than first-person (words such as "I", "our", "we", etc.). For example, rather than stating "I proved that implicit attitudes were stronger than explicit attitudes", you may write: "The study supported the theory that implicit attitudes were stronger than explicit attitudes."

1 The information below is about gustatory perception and the influence of various factors such as age, physiology and genetics on how one perceives tastes. Read through the paragraph and underline each use of a definitive term and each instance where something is written in first or second person. Then, determine whether the use of these terms was appropriate.

> Gustatory perception is the sensory impression of taste and is highly subject to individual differences. For example, age, physiological conditions and genetic make-up all contribute to how you experience taste. Research has proven that genetics influence taste perception, but it is yet to prove that it is the sole factor influencing your taste perception. Older individuals, for instance, generally always report a decline in taste sensitivity. We find that children are more likely to be supertasters, experiencing flavours more intensely than adults. Physiology, such as the number of taste buds one has, also affects gustatory perception. Ultimately, understanding the mechanisms behind taste perception can offer insights into health, nutrition and even psychological wellbeing.

2 Part of good research is being able to recognise strengths and limitations of past research.

a Investigate one article on the link between genetics and taste perception. Create an APA reference for the study.

b Identify one limitation of the article and justify your response using scientific language.

c Identify one strength of the article and justify your response using scientific language.

CHAPTER 10

Distortions of perception

Fallibility of vision

Visual illusions occur when our perception of a visual stimulus differs from reality. These illusions are relatively consistent between people and over time. Visual illusions such as the Müller-Lyer, Ames room and Spinning Dancer illusions are caused by psychological factors and the lack of depth cues.

In the Müller-Lyer illusion, two lines of identical length appear unequal due to the orientation of the arrowheads at their ends. Theories to explain the illusion include the carpentered world hypothesis, the perceptual compromise theory (which involves misapplication of size constancy) and the Gestalt principle of closure.

Similarly, the Ames room illusion occurs when we maintain shape constancy (assuming the room is square when it is actually trapezoidal in shape with a slanting roof) at the expense of size constancy. The Spinning Dancer illusion can appear to spin either clockwise or counterclockwise due to the image of the dancer lacking visual depth cues.

Agnosia

Injury to the brain can result in agnosia, a condition that occurs when the brain's ability to process sensory information is disrupted. The specific form of agnosia – and, therefore, symptoms experienced by a person – depends on the location of the injury. Visual agnosia refers to the inability to name, recognise or describe the use of an object when looking at it. Prosopagnosia is a specific form of visual agnosia relating to the recognition of faces.

Fallibility of taste perception

Taste perception is a complex sensory experience involving the integration of vision, taste, smell and touch. The tongue contains papillae, which are small, raised structures that contain sensory receptors called taste buds. Different types of papillae detect different sensory information: filiform papillae detect texture; fungiform papillae perceive sweet, sour, bitter and umami tastes; foliate papillae detect sour and salty tastes; and circumvallate papillae are primarily responsible for detecting bitter tastes.

A supertaster is an individual with heightened sensitivity to certain tastes. Supertasters typically have a genetic predisposition to a greater number of taste buds. This heightened sensitivity is usually associated with distaste for bitter foods. Taste perception can also be influenced by exposure to miraculin, a chemical that temporarily alters the perception of sour foods to taste sweet. In addition, the judgment of flavours is affected by perceptual set. Past experiences influence expectations about how a food should taste, including colour intensity and texture.

Distortions to perceptions in healthy people

Synaesthesia and spatial neglect are two neurological conditions that occur in healthy people, but result in unique, distorted perceptual experiences.

Synaesthesia occurs due to increased neural connectivity between sensory areas in the cortex. It results in simultaneous stimulation of more than one sensory pathway. The condition is generally hereditary. It is more prevalent among women and artists, and is thought to enhance memory and creativity.

Spatial neglect typically stems from damage to the right parietal lobe, resulting in a lack of awareness or response to stimuli on one (typically the left) side of the body. It can also influence memory and, therefore, perception.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
describe what a visual illusion is	☐	☐	☐	Topic 10.1 Pages 384–390
explain how the brain processes the Ames room illusion, with reference to the psychological factors affecting perception	☐	☐	☐	Topic 10.1 Pages 384–390
explain how the brain processes the Müller-Lyer illusion, with reference to the psychological factors affecting perception	☐	☐	☐	Topic 10.1 Pages 384–390
explain how the brain processes the Spinning Dancer illusion, with reference to the psychological factors affecting perception	☐	☐	☐	Topic 10.1 Pages 384–390
explain how agnosia affects perception, including visual agnosia and prosopagnosia	☐	☐	☐	Topic 10.1 Pages 384–390
describe the structure of the human tongue	☐	☐	☐	Topic 10.2 Pages 391–396
compare supertasters, medium-tasters and non-tasters	☐	☐	☐	Topic 10.2 Pages 391–396
explain the effect of exposure to miraculin on gustatory perception	☐	☐	☐	Topic 10.2 Pages 391–396
explain the factors that affect judgment of food flavours	☐	☐	☐	Topic 10.2 Pages 391–396
explain what synaesthesia is and how it influences perception	☐	☐	☐	Topic 10.3 Pages 397–403
explain what spatial neglect is and how it influences perception	☐	☐	☐	Topic 10.3 Pages 397–403

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

FIGURE 1 Miraculin could make a sour fruit – such as a lemon – taste sweet, like lollies.

GROUNDWORK 10

Multiple choice

1 The Ames room illusion can explain that:

A viewing objects over a stretch of visible terrain may distort perception.

B perception is more accurate when we use both monocular and binocular cues.

C we always maintain size constancy over shape constancy.

D if two people appear to be the same distance away but retinal images suggest that they are different sizes, then the visual perception would be determined by the latter.

2 The Müller-Lyer illusion suggests that when the retinal images of two lines are identical:

A people will tend to interpret objects in an illusory stimulus as being the same size.

B people will perceive the edges of buildings or lines as railway tracks.

C people will not necessarily make an interpretation that two objects in the same visual field are of the same size.

D the carpentered world hypothesis is supported.

3 Which type of agnosia involves a failure to recognise faces despite intact sensory abilities?

A General agnosia

B Prosopagnosia

C Visual agnosia

D Sensory agnosia

4 Emma drinks a sour-tasting lemonade and finds it incredibly sweet after eating a berry from a "miracle fruit" shrub. What chemical is responsible for this change in taste perception?

A Citric acid

B Aspartame

C Miraculin

D Capsaicin

5 Sarah is a synaesthete who perceives words as having specific tastes. What type of synaesthesia is Sarah likely experiencing?

A Chromesthesia

B Lexical–gustatory synaesthesia

C Auditory–tactile synaesthesia

D Grapheme–colour synaesthesia

6 What is the primary function of filiform papillae on the tongue?

A Detecting bitter taste

B Detecting texture and providing friction

C Detecting sweet and sour tastes

D Detecting salty and umami tastes

Short answer

7 Define the term "visual illusion".

8 Recall the sensory stimuli that integrate to form our perception of taste.

9 "Our perception of the Müller-Lyer illusion involves a misapplication of size constancy." Explain what this means.

10 Explain the concept of a supertaster, with reference to biological factors.

CASE CRACKER 10

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Exploring the case of the man who mistook his wife for a hat

In psychology, we use pseudonyms or the initials of patients' names to maintain confidentiality, particularly while they are still alive. In this case study, we will learn about the curious case of Dr P, as told by his neurologist, Dr Oliver Sacks, in his book *The Man Who Mistook His Wife for a Hat*.

Dr P was a highly accomplished musician and teacher who had developed visual agnosia. He was unaware of his condition, but eventually was persuaded by others to see an ophthalmologist, who then referred him to Dr Sacks. During his initial consultation, Dr P had difficulty distinguishing between his foot and his shoe, and when getting ready to leave, he attempted to pick up his wife's head, mistaking it for his hat.

In a follow-up meeting, Dr Sacks presented Dr P with a rose and asked: "What is it?" Dr P replied: "About six inches in length. A convoluted red form with a linear green attachment." When prompted again to name the item, Dr P provided an even more detailed analysis of the rose but could not name it.

Dr P's agnosia led him to misinterpret everyday objects and, for the most part, he was unable to recognise students, his family or even a portrait of himself. However, Dr P's other senses were intact. He could, for instance, recognise people by the way they spoke, and he could name some objects, like the rose, through smell. This may explain why it took so long for other people to realise the severity of his condition.

When tested for visual memory, Dr P described walking through an area well known to him. He recalled buildings and features to his right but omitted anything on the left. Dr Sacks asked Dr P to imagine walking through the area from the opposite end. Again, Dr P only described features to his right.

Dr P's ailment stemmed from a form of brain damage affecting his ability to interpret and contextualise visual information. His case provides a compelling example of how neural malfunction can lead to complex perceptual and cognitive issues. His symptoms were not due to eyesight problems or neurological degradation (e.g. dementia), but originated from a disruption in the brain's visual pathways. This emphasises that perception is a complex interaction between sensation and cognitive processing.

1 Recall the area of the brain that is responsible for processing visual information.

2 Compare visual agnosia and spatial neglect.

3 Determine, with reference to the scenario, whether Dr P had spatial neglect.

DATA DRILL 10

KEY SCIENCE SKILLS: Generate, collate and record data; Construct evidence-based arguments and draw conclusions

Organising data about cultural influences on perception

A study conducted by Deregowski and colleagues (1972) investigated how the societal rules that govern our lives alter our visual perception of two- and three-dimensional images. The authors found that those living in a culture where photographs or pictures were uncommon were often unable to perceive three-dimensional perspectives within a two-dimensional photograph.

Noting the advancement of technology and the increase in the use of mobile devices globally, a student decided to replicate this study and investigate whether the findings are still valid today. The student showed 10 participants from Uganda and 10 participants from Brisbane the same photograph that was shown in the Deregowski study. The results are shown in Table 1.

TABLE 1 Number of participants able to see three-dimensional perspective within a two-dimensional image

Able to perceive three-dimensional perspective from two-dimensional image?	
Australian participants	**Ugandan participants**
Yes	Yes
Yes	Yes
Yes	Yes
Yes	No
Yes	Yes
Yes	Yes
Yes	Yes
Yes	Yes
Yes	No
Yes	Yes
Yes	No
Yes	Yes

1 Identify the type of data collected in this study.

2 Construct a table to summarise the processed data.

3 Identify the type of graph that would be most appropriate to present the data from the study. Justify your choice.

4 Construct a graph to represent the data.

INVESTIGATION INSPECTOR 10

KEY SCIENCE SKILLS: Develop aims and questions, formulate hypotheses and make predictions; Plan and conduct experiments

Exploring the rat-man experiment

Perceptual sets can affect the way we perceive certain images. One of the ways in which we can alter someone's perception is through the use of expectation. If a person is shown a particular set of images prior to seeing an ambiguous image (an image with two possible perceptions), it is more likely that they will see the image they have been primed with rather than the second image that is within the picture. This is how a number of visual illusions work.

One experiment that demonstrated the effect of expectation on perception was the study conducted by Bugelski and Alampay (1961). The experimenters primed participants with images of either human faces or animals, then showed them the infamous rat-man image and asked them to identify what they saw. The results collected were dichotomous in nature: rat (or animal) or man.

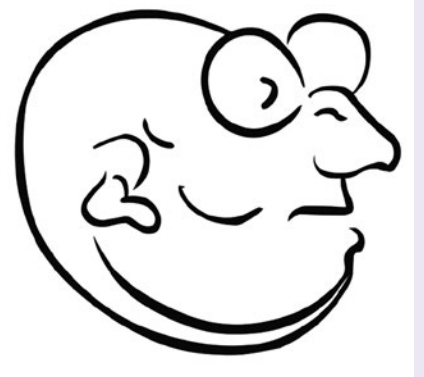


FIGURE 2 Rat-man

1 Identify the independent and dependent variables in this study.

Independent variable	
Dependent variable	

2 Explain why the researchers had to use a between-subjects design.

3 Determine whether the data collected was qualitative or quantitative.

EVALUATING ETHICS 10

KEY SCIENCE SKILLS: Comply with safety and ethical guidelines

Evaluating ethics in research about visual distortions

Dr Smith conducted research on the impact of visual distortions in healthy individuals using virtual reality (VR) technology. Participants were exposed to various distorted images, and their emotional and cognitive responses were recorded. Dr Smith observed some patients showing signs of distress during the experiment, but encouraged them to continue. Afterwards, participants were given a questionnaire about their experience.

FIGURE 3 Dr Smith investigated the effect of visual distortions using VR technology.

1 Dr Smith did not include a question asking participants if they have a history of epilepsy. Which ethical concept has been overlooked?

A Integrity
B Justice
C Non-maleficence
D Beneficence

2 Which ethical guideline did Dr Smith violate during the experiment?

A Right to withdraw
B Deception
C Informed consent
D Voluntary participation

3 Compare debriefing and non-maleficence.

RESEARCH REVIEW 10

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods; Construct evidence-based arguments and draw conclusions

Discussing cultural biases in the McGurk Effect study

The McGurk Effect is a perceptual phenomenon that occurs when a person perceives a mismatch between another person's lip movements and what they are saying. This effect demonstrates an interaction between hearing and vision in speech perception. The level of the effect may vary across languages, and is also affected by external factors (such as visual distraction and syllable structure) and internal factors (such as aphasia).

In the original study, participants watched videos of a person saying a syllable, "ga", but heard audio of a different syllable, "ba". Most participants reported hearing a third syllable, "da", that was a blend of the visual and auditory stimuli. The participants in the study were all English-speaking, and were primarily from Western countries.

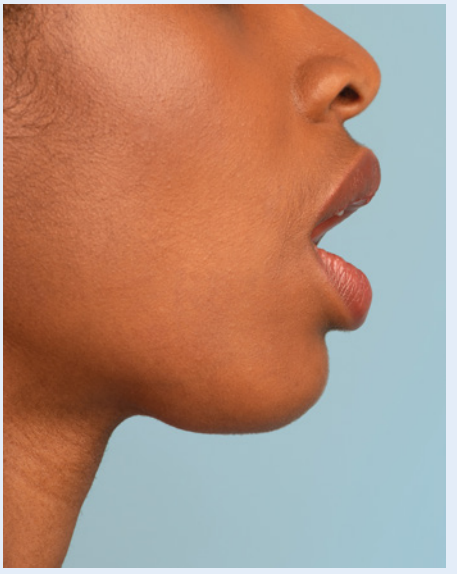


FIGURE 4 The original McGurk Effect study looked at the mismatch between observed lip movements and perceived sound.

1 In what ways can cultural biases in data collection and interpretation be problematic?

A They limit the ability to generalise findings.

B They may perpetuate stereotypes.

C They could lead to ineffective or harmful applications of the research.

D All of the above.

2 Explain how cultural differences could influence the findings of the original McGurk Effect study.

3 Propose a modification to the study to make it more culturally inclusive.

CHAPTER 11

Student-designed investigation

Chapter 11 provides a succinct guide on the steps you need to complete for your student investigation. The aim of the investigation is for you to either adapt an investigation you have completed in class or design your own. The task requires you to select a topic related to Unit 2, collect primary data and use this to draw an evidence-based conclusion. Your success depends on your ability to draw on key knowledge, including investigation design, scientific evidence and science communication. The steps you will follow are summarised below.

Designing your investigation

1. Select a topic related to Unit 2 to investigate. Craft a clear research question and review relevant literature to ensure that you understand the relevant theory.
2. Determine whether you will adapt an existing experiment or design your own to investigate the research question.
3. Select your variables carefully: manipulate the independent variable, measure the dependent variable and control other influencing variables, then write a testable hypothesis.
4. Decide on your investigation methodology, research method and the type of data you will collect (qualitative or quantitative). Identify how you will gather participants and what materials you will use, and create a step-by-step procedure.
5. Ensure that your investigation is conducted safely by completing a risk assessment and evaluating how you will conduct the investigation to make sure it aligns with the ethical concepts and guidelines.

Generating, analysing and evaluating evidence

6. Prepare for your experiment by creating a table in your logbook to record your raw data and observations.
7. Stick to your method, but make note of any changes or unexpected events. During the experiment, record results and observations immediately in your logbook. This will help you later when you write up your findings.
8. Once you have generated your data, choose the best type of graph or table to illustrate trends or relationships between your variables.
9. Analyse the trends observed in your data and relate these to your hypothesis and research question.
10. Evaluate errors in your investigation by identifying the type of error: random, systematic or personal. Discuss these errors in relation to concepts such as accuracy, precision and reliability, which affect the reliability and validity of your findings.

Communicating your findings

11. Outline your key findings and state whether your initial hypothesis was supported or disproved by the evidence you have generated and analysed.
12. Identify limitations in your discussion or conclusion, and suggest ways they could be overcome in future studies.
13. Choose a suitable format to present your findings. In Unit 4 Area of Study 3, you will need to present your work as a scientific poster, so consider practising this format.

CHAPTER CHECKLIST

Before you start this chapter, you can use the "I can…" statements to assess your understanding of each key knowledge dot point for the chapter and rate yourself by ticking the appropriate box in the "rating" columns. This is also a useful revision tool to identify any gaps in your knowledge.

I can…	Confidently	Partially	Not really	Revision link in your Student Book
describe the role of scientific investigation in reducing uncertainty	☐	☐	☐	Topic 11.1 Pages 418–428
identify the psychological science concepts specific to the selected scientific investigation and their significance	☐	☐	☐	Topic 11.1 Pages 418–428
distinguish between aim, hypothesis, model and theory	☐	☐	☐	Topic 11.1 Pages 418–428
define key terms related to the scientific investigation	☐	☐	☐	Topic 11.1 Pages 418–428
select a scientific methodology relevant to the investigation	☐	☐	☐	Topic 11.1 Pages 418–428
design a method to generate qualitative and/or quantitative data relevant to the investigation	☐	☐	☐	Topic 11.1 Pages 418–428
evaluate the health, safety and ethical guidelines relevant to the investigation	☐	☐	☐	Topic 11.1 Pages 418–428
identify which findings are consistent with, or challenge, current scientific models or theories	☐	☐	☐	Topic 11.2 Pages 429–435
outline the characteristics of primary data	☐	☐	☐	Topic 11.2 Pages 429–435
organise, analyse and evaluate generated primary data to identify patterns and relationships, including sources of error and uncertainty	☐	☐	☐	Topic 11.2 Pages 429–435
use a logbook to authenticate generated primary data	☐	☐	☐	Topic 11.2 Pages 429–435
evaluate the accuracy, precision, repeatability, reproducibility and validity of measurements in relation to the investigation	☐	☐	☐	Topic 11.2 Pages 429–435
identify the limitations of investigation methodologies and methods, and of data generation and/or analysis	☐	☐	☐	Topic 11.2 Pages 429–435
use the conventions of scientific communication, including scientific terminology and representations, standard abbreviations and units of measurement	☐	☐	☐	Topic 11.3 Pages 436–439
present key findings and implications of the selected scientific investigation	☐	☐	☐	Topic 11.3 Pages 436–439

Source: Adapted from *VCE Psychology Study Design (2023–2027)* reproduced by permission © VCAA

11.1 Investigation design

The primary aim of any scientific investigation is to produce results that are accurate, reliable and valid. However, no investigation is without limitations, errors or uncertainties. Modifications to an original investigation can offer an opportunity to address issues, and to improve the quality of the research and the certainty of the conclusions drawn.

Study tip

Need help with these concepts? Go to Topic 1.7 in your Student Book to review the terms accuracy, precision, repeatability, reproducibility and validity. Go to Topic 1.8 to review limitations. Go to Topic 11.2 to review investigation modifications.

What can be modified?

Some of the most common modifications are:

- **sampling methods**: changes in how you select your sample can significantly affect the representativeness and, therefore, the generalisability of your results
- **sample size**: increasing sample size can improve precision, reduce variability and increase reproducibility, increase representativeness and improve external validity
- **type of design**: the research design itself can be changed to better control for variables, reduce errors and increase validity
- **variables**: introduction of controlled variables, or even alteration of independent and dependent variables, can make the investigation more robust
- **materials**: sometimes the materials used may introduce errors or biases; equipment may have been faulty or lacked precision in their measurement, so changing these can improve accuracy or precision
- **method**: the way you conduct your experiment – e.g. using a standardised procedure – can increase repeatability and reproducibility.

How can you modify the investigation?

You may also need to identify the type of modification you are making:

- **extend**: increasing the scope of the investigation to learn more by making the task or environment more realistic, investigating the same question in a different context or activity, or broadening the sample by investigating whether the same results are obtained for different subjects
- **redirect**: changing the focus or objective of the investigation to allow you to investigate a different aspect, quality or characteristic
- **refine**: making the original study better, more accurate or more precise by improving methods of data collection, using better equipment or materials, narrowing the scope of the investigation, or better controlling extraneous variables to reduce confounds.

How do you decide what to modify?

You can make a decision about what exact aspect to modify by examining your data for errors, looking for variables that may introduce uncertainty or variability, or identifying limitations. Identify one main modification. In a high school setting, you may have more than one modification, but ensure that there is a primary one. Keep it simple and make sure you have the resources to achieve the aim.

INVESTIGATION INSPECTOR 11.1

KEY SCIENCE SKILLS: Develop aims and questions, formulate hypotheses and make predictions; Plan and conduct investigations; Analyse and evaluate data and investigation methods; Construct evidence-based arguments and draw conclusions

Practising the modification of an investigation based on limitations

In this activity, you will select and modify an investigation that you have completed in class.

FIGURE 1 What investigation related to Unit 2 will you choose to modify?

1 Select an investigation and describe two limitations.

Name of investigation:

Limitation 1:

Limitation 2:

2 Propose how you will adapt the original investigation to address one or both of the limitations identified in question **1**.

a Briefly outline the proposed modification.

b Predict and explain how the modification will improve the original study.

3 In addition to – or instead of – modifying the method, you may like to consider redirecting the focus on your investigation.

a Construct an aim for your modified investigation.

b Identify a new independent and/or dependent variable.

c Write a hypothesis for your modified investigation.

11.2 Scientific evidence

It is important to know that despite best efforts, investigations are subject to errors. You will need to identify, analyse and evaluate errors in the data you generate as part of your investigation. You may also do this in the planning and design stages, where you are looking to identify limitations of a previous investigation.

How do you identify, analyse and evaluate errors?

The types of measurement errors and personal errors, their causes, indicators and consequences, and how to address them are summarised in Table 1.

TABLE 1 Types of errors and how to identify and control for them

	Types of measurement error		Personal error
	Random error	**Systematic error**	
Definition	Unpredictable fluctuations that occur in all types of measurement; vary in an irregular manner and are often due to chance	Consistent, repeatable errors that are introduced by a fixed system or bias	Come from human mistakes in reading or recording data; should not be included in reporting and analysis of data; instead, the experiment should be repeated correctly
Potential causes	• Variability in participant responses • Uncontrolled environmental factors such as room temperature or lighting • Instrumentation fluctuations • Lack of standardised procedures	• Observation error • Instrument error (e.g. not calibrated or tared) • Environmental influence • Participant bias or experimenter bias • Time of day effects • Confounding variables	• Data entry or recording error • Calculation errors • Incorrect use of equipment or not following the procedure
Indicators	• Variability of data around a line of best fit in a graph • Variability in repeated measures of the dependent variable • A large standard deviation • A low *r* value or correlation coefficient	• Data consistently skewed • Line of best fit being higher or lower than expected; not passing through 0 when expected • High absolute or percentage error	• Anomalies or outliers that don't fit the pattern of other data points • Missing data • Data entry errors
Consequence	Lowers precision and reproducibility	Reduces accuracy and validity	Reduces validity and reproducibility
How to address	• Increase the sample size or number of trials • Use more precise measuring tools • Use standardised procedures	• Calibrate instruments • Modify design to reduce participant and experimenter bias • Identify and control extraneous variables	• Use digital methods for recording data when possible • Double-check all data entries and calculations • Use a logbook to record all actions and observations

Study tip

In scientific terms, the term "error" has different meanings. Error can refer to a calculation that measures the difference between the measured or observed value and a true (known) value. This can either be calculated as an absolute value (absolute error) or a percentage (percentage error). Such values can indicate a systematic error, particularly if there is a corresponding high *r* value. However, this is not a common statistic in psychology and is mostly used in the other sciences where the true value is known.

DATA DRILL 11.2

KEY SCIENCE SKILLS: Analyse and evaluate data and investigation methods

Analysing and evaluating errors in your investigation

A researcher conducted a psychological study to investigate the relationship between sleep duration and academic performance – as indicated by grade point average (GPA) – among high school students. Data from the study is given in Table 2.

TABLE 2 Results from an investigation about the effect of sleep duration on high school student GPA

Participant Number	GPA	Sleep duration (hours)							Time of survey
		Day 1	Day 2	Day 3	Day 4	Day 5	Mean	SD	
1	4	7	6.5	7.5	6.8	7.2	7.0	0.5	Morning
2	5.9	9	8.5	9.2	8.7	9.1	8.9	0.4	Evening
3	2.9	5	4.5	5.2	5.1	4.8	4.9	0.4	Morning
4	5.7	8	7.5	8.2	8.1	7.8	7.9	0.4	Evening
5	2.7	7.5	7	8	7.2	7.5	7.4	0.5	Morning
6	4.1	6	5.5	6.2	5.8	6.1	5.9	0.4	Evening
7	4.5	7	6.5	7.5	6.8	7.2	7.0	0.5	Morning
8	4.4	8	7.5	8.2	8.1	7.8	7.9	0.4	Evening
9	5.3	7.5	7	0.8	7.2	7.5	6.0	3.4	Morning
10	3.8	6.5	6	7	6.2	6.5	6.4	0.5	Evening

1 Analyse the data in Table 2.

a Identify and explain a potential error in the data. In your response, identify the type of error.

b Suggest an improvement to overcome/address the error.

2 Participants were instructed to record the time they went to sleep and the time they woke up as soon as possible after waking. Sleep duration was calculated as the difference between the "going to sleep" time and the "waking up" time.

a Identify and explain a systematic error that may have occurred in the data collection. In your response, identify the type of error.

b Suggest an improvement to overcome/address the error.

11.3 Science communication

The main type of referencing style used in psychology comes from the American Psychological Association (APA). APA is an author–date citation style. This means that in-text citations should only contain the author's surname and the year of publication. Full details of all the sources used in your report should be listed in alphabetical order in a reference list.

Why is it important to cite your sources?

When conducting an investigation, a researcher often builds upon the information and ideas of others. When you borrow information from others, you must give them credit. It is not uncommon for psychological research to have one or more citations in every sentence of an introduction. Citing sources accomplishes the following:

- it provides a way to give proper credit to the sources used in writing the paper
- it enables the reader to find the information for themselves
- it adds credibility to and provides strength for your arguments.

How do you cite a source in-text?

There are two ways to cite sources within a scientific report, paper or poster.

Parenthetical citation

In parenthetical citations, the source information is placed within brackets at the end of the sentence, before the full stop. The format usually includes the author's surname and the publication year. The formatting changes depending on the number of authors.

TABLE 2 How to format parenthetical citations for different numbers of authors

Number of authors	Example
One	Implicit biases can affect decision-making processes in social contexts (Williams, 2019).
Two	Memory retrieval is facilitated by hippocampal activity (Williams & Johnson, 2020).
Three or more	Cognitive dissonance can influence attitude changes (Williams et al., 2021). Note: "et al." means "and others".

Narrative citation

In narrative citations, the author's surname becomes part of the sentence itself. The year is placed in parentheses immediately after the author's surname. As with parenthetical citation, the formatting depends on the number of authors.

TABLE 3 How to format narrative citations for different numbers of authors

Number of authors	Example
One	Williams (2019) argues that implicit biases can affect decision-making processes in social contexts.
Two	Williams and Johnson (2020) suggest that memory retrieval is facilitated by hippocampal activity.
Three or more	Williams et al. (2021) asserted that cognitive dissonance can influence attitude changes. Williams and colleagues (2021) asserted that cognitive dissonance can influence attitude changes.

How do you cite a source in a reference list?

A reference list is a compilation of all the sources that you have cited directly in the body of your paper. This means that every source in the reference list has some corresponding in-text citation within your work. The purpose of a reference list is to provide readers with the information they need to find and read sources cited in the body of the work.

Study tip

A reference list and a bibliography are not the same thing. A reference list only includes sources cited in the body of a paper, while a bibliography includes all the sources cited and also any other works used during the research process. Check with your teacher whether you need to include a reference list or a bibliography.

Entries in a reference list are organised alphabetically, and typically include the author's surname, the title of the work, the publication date, and other relevant publication details. In psychology, most of your research should focus on journal articles or online sources.

RESEARCH REVIEW 11.3

KEY SCIENCE SKILLS: Analyse, evaluate and communicate scientific ideas

Correctly referencing secondary sources of information

1 The following citations are incorrectly formatted. Rewrite them in the correct style.

a Climate change is a major concern (2020, Johnson).

b In 2020 Johnson, it is stated that climate change is a major concern.

c The concern for climate change is major (Johnson).

2 Let's 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.

Investigate one publication by Hubel and Wiesel that investigates cat vision.

a Identify the date of the publication.

b Identify the type of publication.

A Journal article

B Book

C News article

c Identify the publisher.

d Format a citation to include in your reference list using APA style.

Study tip

Keeping track of all your sources and research from the start will make it easier to write a rounded discussion. Use your logbook to keep a list of your references and the dates of their publication.

UNIT 2 PRACTICE EXAM QUESTIONS

Multiple choice (15 marks)

1 Which of the following is an example of direct discrimination?

A A rooftop restaurant that has no lift, making it inaccessible for people in wheelchairs

B A shop assistant refusing to serve Aboriginal customers

C A business rule where managers must work full-time

D A law requiring drivers to have a certain level of vision

Use the following information to answer questions 2 and 3.

Jessica, a science teacher, is observing a group of students during a laboratory experiment on plant growth. She notices that Marcello, who is wearing a colourful lab coat, takes the lead. Meanwhile, Dennis is frequently checking his phone and appears disengaged.

2 Jessica thinks Dennis is disinterested in science and is lazy. This might be an example of:

A egocentric pattern projections.

B confirmation bias.

C actor–observer bias.

D fundamental attribution error.

3 Jessica assumes that all students will be as excited about the plant experiment as she is. This demonstrates:

A self-schema.

B egocentric pattern projections.

C person perception.

D social categorisation.

4 Which heuristic is influenced by how easily we can recall memories related to a situation?

A Representativeness heuristic

B Affect heuristic

C Availability heuristic

D Base-rate fallacy

Use the following information to answer questions 5 to 7.

For their Psychology assignment, students were allocated to groups of four. One group included Lisa, a high-achieving student who is respected and listened to by her peers. The other members of the group were Sunari, Liam and Mark.

5 As the group began working on the assignment, Lisa became the natural project leader because she had a deep understanding of the content and was highly organised. What type of power is Lisa exhibiting?

A Referent power

B Coercive power

C Expert power

D Informational power

6 How might a less diligent member of the group perform in this scenario, given Lisa's leadership?

A They would contribute actively to the project.

B They may engage in social loafing.

C They would take on a leadership role themselves.

D They would voice dissenting opinions more often.

7 What is a potential risk for the group, given Lisa's strong influence?

A Higher likelihood of groupthink

B Enhanced creativity and innovation

C Increased risk of dissent among group members

D Decreased cohesion among group members

8 A student refuses to obey a substitute teacher but obeys their regular teacher. What concept does this scenario best illustrate?

A Status and power

B Group pressure

C Social proximity

D Legitimacy of the authority figure

9 Which of the following pairs correctly classifies the tasks as controlled or automatic processes?

	Controlled process	Automatic process
A	Riding a bike for the first time	Writing an assignment
B	Chopping vegetables for the first time	Walking
C	Reading in your first language	Learning to play a new musical instrument
D	Chewing gum	Having a conversation with a friend

10 In a camouflage pattern, which Gestalt principle is primarily being exploited?

A Figure–ground organisation
B Proximity
C Closure
D Similarity

11 You look at a painting and see a row of trees diminishing in size. Which pictorial cue is being used?

A Linear perspective
B Texture gradient
C Height in the visual field
D Interposition

12 A language that uses a single term to describe textures such as rigid, stiff, hard, firm and tough is most likely to:

A enhance the ability to distinguish between textures.
B limit the ability to perceive finer differences in textures.
C have no impact on taste perception.
D improve the ability to identify different foods.

13 Danielle includes the following piece of text in the discussion section of her scientific report: "Most students perceived the line lengths in the Müller-Lyer illusion to be different. This could be explained using the carpentered world hypothesis (1969, Gregory)."

What error has she made?

A The citation has not been formatted correctly.
B The piece of text does not belong in the discussion section.
C The carpentered world hypothesis has been incorrectly identified; she should talk about the misapplication of size constancy.
D The wrong narrative perspective has been used.

14 Sarah is at a gourmet food tasting evening and is served a cup of Kopi Luwak coffee. She is extremely resistant to trying it because she knows that it has been digested by a civet cat and obtained through the cat's faecal matter. This is due to:

A Sarah being a supertaster.
B the colour intensity of the coffee.
C the texture of the coffee.
D Sarah's perceptual set.

15 In September, Class 11B completed the rat-man investigation, in which students were primed with images of either animals or human faces, then asked whether they perceive the rat-man as an animal (rat) or a man.

As part of their student-designed investigation in term 4, one student decides to replicate the rat-man investigation with Year 7 students to determine whether there are any differences in experiment outcomes with age.

For a valid comparison of the results, the student must:

A identify limitations in the original experiment and make the required modifications before assessing the Year 7 students.
B also include Year 8, 9 and 10 students in their sample to provide their arguments with strength.
C reduce uncertainty in their new data by increasing the sample size of Year 7 participants as much as possible.
D show the Year 7 students the same primer images.

Short answer (30 marks)

1 Emily is going to a party where she will meet her boyfriend's friend for the first time. She feels anxious about the impression she will make. Throughout the evening, she finds herself attributing the behaviours of her boyfriend's friend to various factors.

a Emily initially thought her boyfriend's friend was quiet due to his disposition, but later found out that he had a bad day. Compare dispositional and situational factors, with reference to the scenario.

(4 marks)

b Emily believed everyone would enjoy a game of charades because she loves it. Explain the difference between self-schema and egocentric pattern projection using this situation.

(4 marks)

2 Mr Gallaway conducts a study within his Year 11 Psychology class to investigate the relationship between the primary social media platform used and perceived happiness. He distributed a survey to each student, asking them to identify the primary social media platform they use. They were also asked to score their perceived happiness level using a 5-point Likert scale, where 1 was "very unhappy" and 5 was "very happy".

The data obtained is shown in Table 1.

TABLE 1 Primary social media platform used and perceived happiness

Student number	Primary social media platform	Perceived happiness score
1	Instagram	3
2	Instagram	3
3	Instagram	2
4	Instagram	2
5	TikTok	2
6	TikTok	3
7	TikTok	1
8	TikTok	1
9	TikTok	5
10	Discord	5
11	Discord	5
12	YouTube	5
13	YouTube	4
14	YouTube	5
15	YouTube	5

Explain how social comparison may play a role in the results obtained.

(3 marks)

3 In 1971, psychologist Philip Zimbardo conducted a study to investigate the effect of power and status on behaviour. This was the famous Stanford prison experiment, where he recruited college students and randomly assigned them to the role of either guard or prisoner.

The guards were given no specific instructions on how to behave but quickly adopted authoritarian roles, displaying abusive and degrading behaviour towards the prisoners. The prisoners experienced extreme psychological distress, with some developing emotional disturbances within days.

The study was originally planned for two weeks but had to be terminated after only six days due to the severe psychological and emotional toll it took on the participants.

a Compare the effects of status and power on the two groups in the experiment.

(3 marks)

b In Zimbardo's experiment, participants conformed to their roles. Explain how group pressure impacted the level of obedience in the Stanford prison experiment.

(3 marks)

c Describe the concept of deindividuation and explain how it can influence conformity, using an example from the experiment.

(2 marks)

d Zimbardo's experiment has faced severe criticism over the years for its breach of ethics. Identify one relevant ethical concept and explain how it has been violated in Zimbardo's experiment.

(2 marks)

4 The following questions relate to the role of attention in making sense of the world.

a With reference to a specific type of attention, describe the effect of a learning disability – such as attention deficit hyperactivity disorder (ADHD) – on attention.

(1 mark)

b State three potential consequences of attempting to multitask when both tasks require high levels of attention and mental effort.

(3 marks)

5 Mark is scared of spiders.

a Explain how perceptual set might influence Mark's perception of a small, dark shape.

(2 marks)

b Describe two biological influences that could impair Mark's visual perception.

(2 marks)

c One night, Mark sees a spider, which triggers his stress response. As Mark flees from the spider, he trips and hits his head. Unfortunately for Mark, the trauma causes permanent damage to his brain. After the accident, Mark has difficulty recognising people's faces. Name the condition that Mark is experiencing.

(1 mark)

UNITS 1 & 2 PRACTICE EXAM QUESTIONS

Multiple choice (25 marks)

1 Classify the following sources of information as either anecdote, opinion or evidence.

	"Based on our survey of 1000 students, 70 per cent report feeling stressed during exam season."	"I think stress during exams is overrated. It's not as bad as people make it seem."	"My cousin always drinks herbal tea before exams and she says it really calms her down."
A	Anecdote	Opinion	Evidence
B	Evidence	Anecdote	Opinion
C	Evidence	Opinion	Anecdote
D	Opinion	Anecdote	Evidence

2 Determine the median of the following data set: 12, 6, 7, 5, 3, 8, 10.

A 6
B 7
C 7.5
D 8

3 Winn excels in athletics and comes from a family of athletes. She also grew up with excellent training facilities and coaching. What would psychologists most likely say about Winn's athletic abilities?

A They are primarily due to hereditary factors.
B They are primarily due to environmental factors.
C They are due to a combination of hereditary and environmental factors.
D They are unrelated to either hereditary or environmental factors.

4 Correctly categorise the following factors that influence a person's wellbeing as biological, psychological or social.

	Biological	Psychological	Social
A	Diet	Relationships	Resilience
B	Medication use	Sleep	Substance use
C	Feelings	Family	Level of education
D	Sleep	Resilience	Family

5 Which of the following was a key finding in Harry Harlow's study?

A The infant monkeys preferred the wire mother.
B To foster attachment, contact comfort was more important than nourishment.
C To foster attachment, nourishment was more important than contact comfort.
D Monkeys raised by the cloth mother struggled to socialise.

Use the following information to answer questions 6 and 7.

Vinush's parents always scold him for asking too many questions, and discourage him from trying to play new games. Vinush starts to feel bad when he tries to explore new things.

6 Which stage of Erikson's theory of psychosocial development is Vinush likely struggling with?

A Initiative versus guilt
B Autonomy versus shame and doubt
C Trust versus mistrust
D Industry versus inferiority

7 If Vinush's parents continue to discourage his desire to learn new things, what is the most likely outcome for Vinush, according to Erikson's theory?

A He will not develop a sense of purpose.
B He will develop independence.
C He will develop dependence on others.
D He will develop feelings of guilt.

8 Which of the following is an example of adaptive behaviour?

A Completely avoiding social interactions

B Experiencing a persistent fear of harmless objects

C Brushing teeth regularly for good oral health

D Engaging in self-harming activities as a coping mechanism

9 Figure 1 shows the prevalence of mental disorders among Australian children aged 4 to 11 years. Data is based on whether children experienced a mental disorder in the 12 months leading up to the survey.

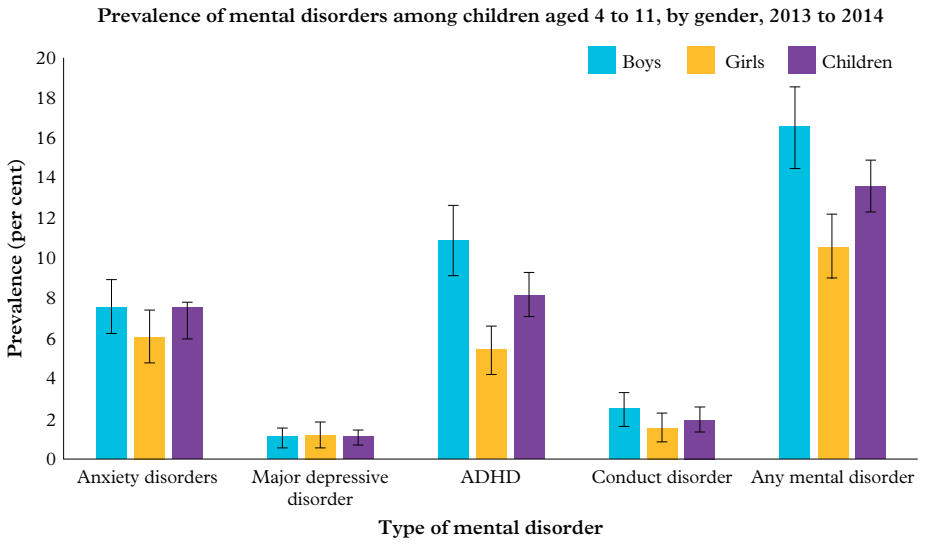


FIGURE 1 The prevalence of mental disorders among children aged 4 to 11 years, by gender, 2013 to 2014

Which of the following claims **cannot** be made from the data shown?

A Mental disorders appear to be more prevalent among boys compared to girls.

B Over 16 per cent of boys aged 4 to 11 years experienced a mental disorder in the 12 months leading up to the survey.

C ADHD was the most prevalent mental disorder among all groups surveyed.

D More than 80 per cent of all children aged 4 to 11 years did not experience a mental disorder in the 12 months leading up to the survey.

10 Jack thinks that all mental processes are a result of physiological processes in the central nervous system. Which view does he most closely align with?

A Monism

B Dualism

C Nativism

D Empiricism

11 Sperry and Gazzaniga successfully treated epileptic patients by severing a thick band of nerve fibres that connects the two hemispheres of the brain. This band of nerve fibres is called the:

A corpus callosum.

B cerebrum.

C spinal cord.

D optic nerve.

12 Which part of the brain is responsible for higher order processes such as cognition, emotion and language?

A Thalamus

B Cerebellum

C Amygdala

D Cerebrum

Use the following information to answer questions 13 and 14.

After years of playing professional rugby, Gregory is showing signs of cognitive decline and erratic behaviour.

13 Which term refers specifically to Gregory's progressive degeneration of the brain associated with repeated head trauma and concussions?

A Concussion

B Chronic traumatic encephalopathy

C Ischaemic stroke

D Degeneration

14 Due to his condition, Gregory experiences problems with cognition, mood and:

A memory.

B neurotoxicity.

C behaviour.

D rerouting.

15 Which of the following is true about hypoxic and anoxic brain injury?

A Hypoxic brain injury is caused by a stroke, while anoxic brain injury is caused by oxygen deprivation.

B Hypoxic brain injury occurs when the brain receives less oxygen than required, whereas anoxic brain injury occurs when there is no oxygen supply to the brain.

C Hypoxic brain injury is caused by a physical impact to the head, while anoxic brain injury is caused by alcohol and drug use.

D There is no difference between hypoxic and anoxic brain injury.

16 It is argued that smokers who are addicted to cigarettes and are unwilling or unable to change their smoking habits end up developing a set of attitudes to justify their behaviour. Which of the following explains this?

A 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.

B Smokers understand that smoking is bad for them, but they continue to smoke because it looks cool.

C The health risk involved with smoking has nothing to do with smokers shifting their attitudes to match their behaviour.

D Smokers do not feel the need to justify their reasons for smoking.

17 Jane received a good grade in her first Psychology exam and attributed it to her intelligence. She failed her second exam and blamed it on the difficulty of the questions. Which cognitive bias is she exhibiting?

A Halo effect

B Anchoring bias

C Hindsight bias

D Self-serving bias

18 Saliency detection is:

A focusing of the most noticeable elements in a social setting.

B ignoring social cues.

C identifying with a social category.

D choosing to interact with familiar people.

19 Preeti adopts the opinions of her senior managers because she thinks they are more knowledgeable than she is. Identify the type of social influence causing Preeti to conform.

A Deindividuation

B Status and power

C Normative influence

D Informational influence

20 Jessica, Olivia and Marina are casual fans of a new K-pop group, Charmers. They enjoy their music, but mostly listen to other artists. When the girls find out that Charmers are holding a concert in Melbourne, they pay for the most expensive tickets. The day before the concert, they spend the whole afternoon trying to find out where Charmers are staying, and checking their social media posts to locate them within the city. This is an example of:

A group polarisation.

B group conformity.

C group shift.

D groupthink.

21 Dr Almond wishes to study the ability of participants of different ages to multitask. He separates participants into three main groups: one group completes two tasks that involve automatic processes, one group completes two tasks that involve controlled processes, and one group completes two tasks in which one involves an automatic process and one involves a controlled process. Which of the following experimental designs is the most appropriate for Dr Almond to achieve his aim?

A A controlled experiment with within-subjects design

B A controlled experiment with between-subjects design

C A controlled experiment with mixed design

D A correlational study

22 Dr Seawright conducts an investigation to study the effect of light colour on speed of sensation/detection. She sets up a lamp with a series of different filters that change the colour of the light passing through to a white screen. She recruits 10 participants through random sampling and asks them to hit a buzzer when they first see the light appear on the screen. During the investigation, Dr Seawright finds that none of the participants press the buzzer.

Which of the following is the most likely error in the experiment?

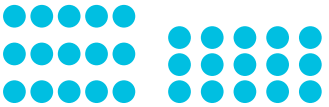
A The participants have poor vision.

B The intensity of the light stimulus may not have met the absolute threshold.

C The buzzer was not functioning correctly.

D The sample size was too small.

23 You perceive each set of dots as a single unit due to the Gestalt principle:



A proximity.
B similarity.
C figure–ground.
D closure.

24 Due to her reduced ability to perceive tastes, Joanne has started adding hot sauce to her meals to enhance the flavour. Which is the most likely factor affecting her perception of taste?

A Age
B Genetics
C Perceptual set
D Exposure to miraculin

25 The Ames room illusion is used to explain that:

A viewing objects over a stretch of visible terrain can distort perception.
B perception is more accurate when we use both monocular and binocular cues.
C size constancy is always maintained over shape constancy.
D if two people appear to be the same distance away but retinal images suggest that they are different sizes, then the visual perception would be determined by the latter.

Short answer (50 marks)

1 Dr Adams is conducting research on the impact of social media on self-esteem among teenagers. She gathers a group of 100 participants aged 13 to 18 years, and administers a survey asking about their average weekly social media usage (hours) and self-perception using items adapted from Harter's Self-Perception Profile for Adolescents (Harter, 2012).

a Dr Adams wishes to establish a causal relationship between social media use and self-esteem. Identify the scientific investigation methodology she should use.

(1 mark)

b Identify the independent and dependent variables in Dr Adams' investigation.

(2 marks)

Independent variable: _____

Dependent variable: _____

c Identify one potential confounding variable in Dr Adams' investigation.

(1 mark)

d Dr Adams uses a survey with a 5-point Likert scale to measure participant self-esteem. The responses are coded from 1 to 5, where 1 is "strongly disagree" and 5 is "strongly agree".

i Identify the type of data collected from a survey using a Likert scale.

(1 mark)

ii A benefit of using surveys is that they are easy to replicate and score. However, they are also subject to limitations. Recall a limitation of using surveys.

(1 mark)

2 Rahul is a 14-year-old who has recently moved to a new country and is struggling to learn the local language. His younger sister, who is 8 years old, seems to be picking up the language much more quickly.

a Compare sensitive and critical periods, with reference to the scenario.

(4 marks)

b Rahul sees his sister pour cordial from a short, wide glass into a tall, narrow glass. This makes her very happy because she thinks she has more cordial. Identify the milestone has Rahul's sister has yet to achieve.

(1 mark)

c Identify the stage of cognitive development that Rahul's younger sister is in.

(1 mark)

d Rahul's mother has a history of anxiety. Name the risk factor related to Rahul and his sister's higher likelihood to experiencing anxiety.

(1 mark)

3 Jason, a high school student, avoids participating in class discussions because he believes his peers will make fun of him. He spends his recess and lunch breaks alone and refuses to engage in any social activities.

a Contrast adaptive and maladaptive behaviours, with reference to the scenario.

(2 marks)

b If left unchecked, maladaptive behaviours can escalate and cause individuals to develop a form of mental illness. Describe an approach to normality that a doctor might use to classify Jason's behaviour as typical or atypical.

(2 marks)

c Over time, Jason starts to experience anxiety more frequently. His parents think is it time for him to seek help from a professional. Identify the type of psychologist his doctor would refer him to for diagnosis.

(1 mark)

d Explain how cognitive behavioural therapy works, with reference to Jason's condition.

(3 marks)

4 Selena recently suffered a stroke. Following her recovery, friends and family noticed that while Selena appeared to understand what they were saying, when she spoke, her speech was slow, effortful and fragmented. Selena was an enthusiastic reader and had a fantastic vocabulary, but since the stroke she has struggled to find appropriate words. A subsequent brain scan revealed damage to her brain.

a Given Selena's symptoms, determine the specific hemispheric lobe that was likely damaged due to the stroke. Justify your choice using evidence from the scenario.

(3 marks)

b Identify the neuroimaging technique that the doctors could have used to obtain the most detailed image of Selena's brain, and explain how it could have been used in her diagnosis.

(2 marks)

c Identify the type of aphasia that Selena is experiencing.

(1 mark)

d Identify a strength and limitation of using case studies, such as studying people with brain damage, in psychological research.

(2 marks)

5 Mike was a professional rugby player. Due to his history of head injuries, his doctor recommended that he take early retirement from playing. For the past 20 years, Mike has been coaching high school rugby.

a To reach a professional level, Mike would have had well-developed motor and coordination skills. Distinguish between the functions of the cerebrum and the cerebellum in coordinating movement.

(1 mark)

b Identify and describe the neuronal process that facilitates learning a new skill through repeated practice.

(2 marks)

Recently, Mike has been experiencing confusion during training, forgetting where he put things and mixing up players' names. He has mood swings and makes poor choices. His doctors think he has likely developed chronic traumatic encephalopathy (CTE).

c Describe a social impact of CTE that Mike is at risk of developing as his condition worsens.

(1 mark)

d Explain what Mike could do to improve his memory.

(1 mark)

6 Castiel feels strongly against people who are racist, but he laughs at a racist joke his boss tells at lunch.

a Identify which parts of the tri-component model of attitudes are contradicting in Castiel's case.

(1 mark)

b Explain how cognitive dissonance may arise from this scenario.

(2 marks)

c Identify and explain the social influence that could explain Castiel's behaviour.

(3 marks)

d Contrast status and power, with reference to the scenario.

(3 marks)

e Identify the part of Castiel's brain that plays an important role in regulating his emotions and assists him with behaving appropriately in social situations.

(1 mark)

7 Carlos, an exchange student from Columbia, has just arrived in Australia. During breakfast at his host family's house, he is offered Vegemite on toast. Having never tried it before, Carlos is hesitant but he gives it a go. He finds the taste very unappealing and cannot understand why Australians enjoy it so much.

a Sensation refers to the biological aspect of detecting stimuli through our sense organs. Describe the steps involved in gustatory sensation.

(3 marks)

b Describe a psychological factor that could impact Carlos' perception of Vegemite.

(1 mark)

c Carlos picks up the Vegemite jar to read the label. Compare the roles of accommodation and convergence in allowing our eyes to adjust to and focus on objects.

(2 marks)

CHAPTER 12

Investigations

To complete VCE Psychology, you will need to complete at least 10 hours of practical work for each of Units 1 and 2. Practical work can cover a range of scientific investigation methodologies, such as controlled experiments, modelling, case studies, classification and identification, literature reviews, fieldwork, simulations, correlational studies and product, process or system development. All investigations that are undertaken as part of your course, as well as internal assessments, should be written in a logbook that will be monitored and submitted to teachers. Before undertaking an investigation for the first time, ethical concerns should be considered, including the importance of sociocultural, economic, political and legal factors that may arise from science-related decision-making.

SAFETY IN THE LABORATORY

This chapter will highlight key safety concerns for each investigation, though there are some general safety concerns to be considered before completing all practical work.

- → Do not eat or drink in the lab.
- → Always be aware of your peers and act in a way that will not cause harm.
- → Wear a lab coat, safety glasses, close-toed shoes and gloves when appropriate.
- → Review the school's safety procedures and location of the eyewash, shower, spill kits and first-aid kits.
- → Handle all chemicals with care and consult your teacher and risk assessments for all hazards involved with each particular chemical.
- → Keep open flames away from flammable materials.
- → Handle hot material with appropriate equipment (for example, heat-resistant gloves or tongs).
- → Always check that electrical equipment is not damaged and that there are no exposed wires before use.
- → Fieldwork should be completed in groups, with a full risk assessment completed before any excursion.

It is the responsibility of the teacher and school to conduct a risk assessment before any investigation covered in this book.

KEEPING A LOGBOOK

You are required to maintain a logbook of practical work for recording, authentication and assessment purposes. Make sure that you clearly document your observations for each investigation and record all of your responses to the questions in your logbook.

FIGURE 1 Modelling is one type of scientific investigation methodology that you will come across throughout VCE Psychology. In the 4.4A Modelling investigation you will use materials such as plasticine to build a model of the brain.

2.2 How can we promote mental wellbeing with mobile apps?

INVESTIGATION: PRODUCT, PROCESS OR SYSTEM DEVELOPMENT

Investigation worksheet
2.2 How can we promote mental wellbeing with mobile apps?

Context

Mobile applications can provide valuable tools and resources to help support psychological development and wellbeing. There are many apps available to help promote wellbeing, but not all these apps apply the biopsychosocial approach to understanding wellbeing. In this investigation you will design an application that uses an understanding of the biopsychosocial model to help promote mental wellbeing.

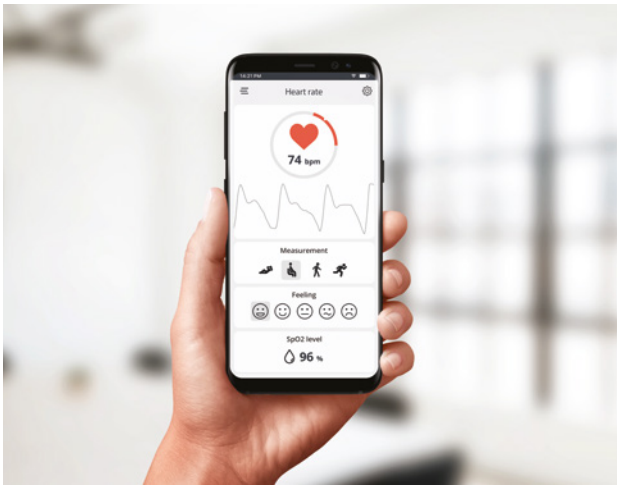


FIGURE 1 A mobile health application

Aim

To design an application that uses understanding of the biopsychosocial model to promote mental wellbeing.

Materials

- Computers or tablets with internet access
- Drawing/design software or poster paper, markers and other art supplies

Method

1. Identify the target market for your application. You may wish to choose a specific demographic (such as children, adolescents, parents or senior citizens) or a broader demographic (for example, all adults over the age of 18).
2. Research three to five popular mental wellbeing apps for your demographic. For each application you research, take note of:
   - the highlights of the app (what features are most engaging, informative, easy to use and help promote wellbeing)
   - the shortcomings of the app (what features are missing, hard to use, behind a paywall or could be improved on).
3. Use your research from step 2 to brainstorm app features you could include that address biopsychosocial factors. These features should aim to improve and promote mental wellbeing by considering physical health, psychological wellbeing, and social support. Remember to keep features and information relevant to your demographic.
4. Select which ideas you will incorporate into your application and use these features to define the application's primary purpose. Outline how the app will contribute to improving the user's mental wellbeing by addressing biopsychosocial factors.
5. Use design software or art supplies to create digital or hand-drawn mock-ups of your app interfaces. Annotate your interfaces with the reasoning behind your selection of information, features, functionality and design choices.

6 Share your interfaces with three students and ask them to each provide three points of feedback on your app.

Discussion

1 Which components of your application incorporated the biopsychosocial model to promote wellbeing? Describe how they worked.
2 Based on the feedback you received from your peers, describe what you would change about your app interface if you had to redesign it.
3 Discuss whether you believe a well-designed mental wellbeing app is sufficient to replace intervention from a mental health professional.

Conclusion

Discuss the importance of the biopsychosocial model for considering mental wellbeing and psychological development.

2.4 INVESTIGATION: CONTROLLED EXPERIMENT

How can we assess conservation as part of cognitive development?


Investigation worksheet
2.4 How can we assess conservation as part of cognitive development?


Risk assessment
2.4 How can we assess conservation as part of cognitive development?

Context

Piaget's theory of cognitive development proposed that while in the pre-operational stage, children aged 2 to 7 years are unable to grasp the concept of conservation (that an object can remain the same despite changing appearance). However, Piaget proposed that by the time children reach the concrete operational stage (between 7 and 12 years) they can begin to understand conservation and that they should have mastered it by the formal operational stage (12+ years).

This investigation will allow you to assess whether children that fall into the age groups associated with Piaget's stages of cognitive development above have mastered the skill of conservation or not.

Aim

To investigate whether children within the age brackets of 2 to 7 years, 7 to 12 years and 12 years and over have the cognitive skill of conservation or not.

Materials

- Playdough – two lumps of the same size and colour
- A pen or pencil to record responses
- At least one participant from each of the following age groups: 2 to 7 years, 7 to 12 years, 12 years and over

Method

1 Place the two lumps of playdough of the same size and colour in front of your first participant.

2 Ask the participant, "Are these lumps of playdough the same size?"

3 If the participant replies "yes", go on to Step 4. If they reply "no", have them make the two balls the same size to their satisfaction.

4 Roll one lump of playdough into a long sausage and one lump into a shorter sausage.

5 Ask the participant, "Are these lumps of playdough the same size?"

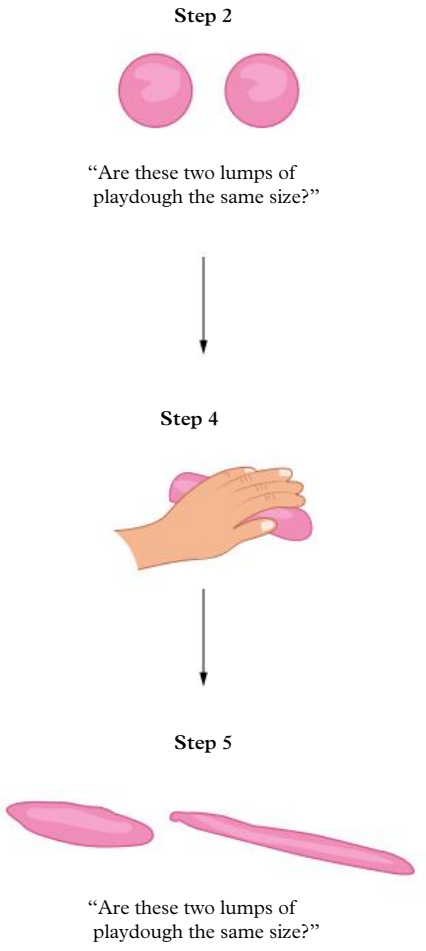


FIGURE 1 Participants will be shown the same two lumps of playdough in different forms to assess conservation.

6 If the participant replies "yes", record their response to the question in the results table column "Did the child show an understanding of conservation?" as "yes". If the participant

replies "no", ask which lump of playdough is bigger and get them to point out which one. Record their response as "no" in the same column.

7 Based on the participant's response, state which of Piaget's four stages they are likely to be in, using the fourth column of the table.

8 Repeat steps 1 to 7 with the other two participants.

Results

	Age of participant	Did the child show an understanding of conservation?	What stage of Piaget's theory of cognitive development is the child likely to be in?
Participant 1 (age 2 to 7)			
Participant 2 (age 7 to 12)			
Participant 3 (age 12+)			

Discussion

1 Identify the operationalised IV and operationalised DV from this experiment.

2 Did your results support Piaget's theory of cognitive development? Justify your response with reference to your collected data.

3 Identify one limitation of this experiment and explain the impact of this limitation on the generalisability of your results.

Conclusion

Formulate a conclusion for the experiment you conducted.

What if?

1 What if we added another age group comprising children aged between 0 and 2 to the experiment?

2 What if the participants were blindfolded and could only touch the playdough, not see it?

3.1A How can we categorise typical and atypical behaviour?

INVESTIGATION: CLASSIFICATION AND IDENTIFICATION

Investigation worksheet
3.1A How can we categorise typical and atypical behaviour?

Resource
Observation checklist

Context

This investigation is designed to contextualise the occurrence of typical and atypical behaviours.

Aim

To identify and categorise typical and atypical behaviours according to psychological criteria, through observation.

Materials

- Clipboard
- Pen
- Observation checklist (available in your obook pro)

Method

1 Select a location in your school where you can observe the behaviours of other students without disturbing them.
2 Using the checklist your obook pro, note down the first five specific behaviours that you observe from one or more students in your school.
3 In the appropriate row of the table, classify each observed behaviour as either typical or atypical. Justify your response with reference to relevant psychological criteria.

Results

1 What percentage of the behaviours that you observed were classified as typical or atypical?
2 Calculate the class mean percentage of typical and atypical behaviours observed and record this in Table 1.

TABLE 1 Mean percentage of observed behaviours

	Typical behaviours	Atypical behaviours
Mean percentage of observed behaviours		

3 As a class, record in Table 2 the number of times that each of the psychological criteria was used by class members to classify behaviours as typical or atypical. Calculate this as a percentage.

TABLE 2 Number of times psychological criteria was used

Psychological criteria	Number of times used by class	Percentage
Cultural perspectives		
Social norms		
Maladaptive behaviours		
Statistical rarity		
Personal distress		

Discussion

1 Overall, were more typical or atypical behaviours observed? With reference to psychological theory, explain why this might have happened.
2 Which psychological criteria was used to categorise behaviours the most? Discuss why this might have occurred.

3 Which psychological criteria was used to categorise behaviours the least? Discuss why this might have occurred.
4 Identify two potential sources of error in this investigation. Explain their impact on the validity of the results.
5 Suggest improvements to increase the validity of this study.

Conclusion

Formulate a conclusion for the present investigation. Comment on any relevant limitations to the conclusion drawn.

What if?

1 What if the participants knew they were being observed?
2 What if you observed the same participant every day for two weeks?

3.1B INVESTIGATION: CORRELATIONAL STUDY

Is there a relationship between the number of atypical behaviours exhibited daily and perceived mental wellbeing?

Investigation worksheet
3.1B Is there a relationship between the number of atypical behaviours exhibited daily and perceived mental wellbeing?

Risk assessment
3.1B Is there a relationship between the number of atypical behaviours exhibited daily and perceived mental wellbeing?

Resource
Tracking sheet and questionnaire

Context

Atypical behaviours are those that deviate from what is usually displayed by an individual, while typical behaviours are those that are consistent with how an individual usually behaves. When assessing a client, psychologists will often look to identify whether a client has been displaying any atypical behaviours, because this might be indicative of an issue or problem being faced by the client. In this investigation you will determine whether there is a correlation between the number of daily atypical behaviours exhibited and a person's perceived mental wellbeing.

Aim

To investigate whether there is a correlation between the number of atypical behaviours exhibited daily and the overall levels of wellbeing in a sample of individuals.

Materials

- Atypical behaviour tracking sheet and wellbeing questionnaire (available in your obook pro)
- A computer with statistical software (Microsoft Excel or Google Sheets)

Method

1. Recruit a sample of 10 participants from your school or community who are willing to take part in the study. Ensure that you inform them of their participant rights and the purpose of the study.
2. Provide participants with four copies of the atypical behaviour tracking sheet and wellbeing questionnaire. Instruct them to complete the daily tracker and questionnaire at the end of the day, every day for four days.
3. Calculate the average wellbeing score and the average number of atypical behaviours for each participant. Make sure to deidentify participants.
4. Use Microsoft Excel (or Google Sheets or similar statistical software) to plot a correlation graph between participants' average number of atypical behaviours and average wellbeing scores and provide a correlation coefficient.

Discussion

1. Interpret the correlation coefficient to describe the strength and direction of the relationship between atypical behaviours and wellbeing.
2. Data collected in this correlational study relied on self-reporting. Identify one strength and limitation of self-reports.
3. Explain why it was important that participants completed the tracker and questionnaire at the end of the day rather than at the start of the day.
4. Identify two implications of your findings.
5. Did the results of this investigation establish a causal relationship between the number of atypical behaviours exhibited and perceived wellbeing? Discuss why or why not.

4.4A INVESTIGATION: MODELLING

How can we model the structure of the brain?

Investigation worksheet
4.4A How can we model the structure of the brain?

Risk assessment
4.4A How can we model the structure of the brain?

Context

The brain is a complex organ that controls our behaviours and emotions. Understanding the structure of the brain and its components can help us better understand how processes occur within the brain. Modelling and understanding areas of the brain can also give us information about the impacts of specific brain injuries. In this investigation you will use playdough to construct a model representation of the brain.

FIGURE 1 In this investigation you will construct a three-dimensional model of the brain using playdough.

Aim

To construct a model of the brain showing major brain parts.

Materials

- Tubs of playdough or plasticine (in at least five different colours)
- Paper
- Coloured markers
- Scissors
- Toothpicks
- Sticky tape

Method

1 Break into pairs and ensure that your group has access to all the different colours of playdough.

2 Create a three-dimensional model of the brain using the playdough that shows the following key structures:
   - left and right frontal lobes and primary motor cortices
   - left and right temporal lobes and primary auditory cortices
   - left and right parietal lobes and primary somatosensory cortices
   - left and right occipital lobes and primary visual cortices
   - corpus callosum
   - Broca's area
   - Wernicke's area
   - cerebrum.

3 For each part listed in Step 2, write down the name of the part on a piece of paper and stick it onto a toothpick. Stick the toothpick into the area it represents to label your model.

Discussion

1 Describe the function of each of the following parts:
   a frontal lobe
   b occipital lobe
   c temporal lobe
   d parietal lobe
   e primary motor cortex
   f primary somatosensory cortex
   g Wernicke's area.

2 Explain what impacts someone would experience if they had their corpus callosum severed.

3 Suggest why the primary motor cortex and primary somatosensory cortex are located next to each other.

4.4B
INVESTIGATION: CASE STUDY

How can damage to the frontal lobe impact our experience of emotion?

Investigation worksheet
4.4B How can damage to the frontal lobe impact our experience of emotion?

Context

Examine Malcom Myatt's case explained in the article below to answer the discussion questions.

Unable To Feel Sad, Stroke Victim Malcolm Myatt Is Now A Permanent Smiley Face

By Susan Scutti, 13 August 2013

Malcolm Myatt, 68, a retired truck driver who lives in Staffordshire, England, thought of himself as generally fit and healthy; he played football until he was 52 and also acted as a referee for games beyond that age, he told the *Daily Mail*. But around the time he turned 62, he suffered a stroke. After warning his wife that he might not make it through the night, the doctors explained that the stroke had damaged his frontal lobe. After a 19-week stay in the hospital, Myatt left with little feeling in his left side – he has no function in his left arm and must walk with a stick – and damage to his short-term memory. He also suffered another significant after-effect from the stroke, though "suffer" may not be the right word to use.

Myatt no longer feels sadness.

The frontal lobes, which stretch across both the right and left hemispheres of the brain, are the parts of our minds that participate in motor function, critical thinking, language, problem solving, memory, impulse control, and socialization, including sexual behavior. Because they provide the foundation of emotion and judgment, they are frequently seen as the seat of personality. Specifically, the right frontal lobe negotiates the non-verbal aspects of communication and negative emotions, while the left frontal lobe deals with logic, language abilities, and positive emotions.

The right lobe is also perceived as the seat of empathy as it is the part of ourselves that can detect when someone is angry, sad, or scared by the tone of his or her voice or facial expression. Both lobes are also generally thought to play a role in our spatial orientation and how we pick up clues from our environment. In cases of mild to moderate traumatic brain injury, magnetic resonance imaging reviews show that the frontal area is the most common region of injury, according to the *Journal of Neurosurgery*. Many people who suffer brain injury, then, may have difficulty with reasoning and emotion.

The part of Myatt's brain that was damaged by the stroke was the right frontal lobe. Although frontal lobe damage is often permanent, rehabilitation often helps people regain some amount of functioning. Unfortunately, in many cases of frontal lobe damage, sufferers have problems with controlling their emotion, but it is rare for someone to entirely lose one emotion. Yet, by all accounts, that is certainly Myatt's experience.

"I am never depressed. Being sad wouldn't help anything anyway. It's an advantage really," this grandfather of two, who now has a permanent smile on his face, told the *Daily Mail*.

His wife, Kath, puts it another way. "When he starts laughing everyone in the room does. He's infectious," she told the *Telegraph*.

FIGURE 1 Malcolm Myatt, pictured with his wife after his stroke

Discussion

1 Using your knowledge of the link between brain structure and function, explain why emotional and motor problems are not uncommon after brain damage.

2 With reference to the role of the frontal lobe, explain why Malcolm was left with motor damage and an inability to feel sadness.

3 Create a visual representation of the motor homunculus indicating the area that was most likely damaged in Malcolm. Make sure to indicate which hemisphere was affected.

4 Outline the role of the hemisphere to which Malcom suffered damage.

5 Explain how Malcolm's doctors could use observation to gather data on the effects of Malcolm's brain damage.

6 Identify the advantages and disadvantages of case studies as scientific investigations.

7 Discuss which neuroimaging technique would be helpful in locating the damage to the brain when Malcolm performed motor tasks with his hand.

Conclusion

What conclusions can be made about the role of the frontal lobe in mental processes and behaviour, based on Malcolm's case?

What if?

1 What if Malcolm's stroke caused damage to his left frontal lobe? Suggest the behavioural observations that would indicate that damage has occurred in this area.

5.1 INVESTIGATION: LITERATURE REVIEW

What strategies are effective in maximising brain plasticity and function?

Investigation worksheet
5.1 What strategies are effective in maximising brain plasticity and function?

Context

Brain plasticity, also known as neuroplasticity, refers to the brain's ability to adapt, reorganise and optimise its function. Factors that can promote brain plasticity can, by extension, also play a pivotal role in enhancing cognitive function. In this activity, you will explore research on brain plasticity and the factors that influence plasticity to evaluate which strategies can be applied to help maximise brain plasticity and function.

FIGURE 1 Keeping hydrated is important for maximising brain function

Aim

To investigate which strategies are effective in maximising brain plasticity and function.

Method

1. Gather secondary data related to brain plasticity and function to answer the discussion prompts below. You can source your secondary data from the internet, scientific journals, books, scientific magazines, videos or podcasts.
2. Use the CRAAP method (refer to Topic 6.1 in Chapter 6 of your Student Book) to evaluate the reliability of your sources.
3. Make notes about what you have learnt. You can organise your information in different ways.
4. Prepare a written report that answers the discussion questions below.

Discussion

1. What is brain plasticity and what factors influence brain plasticity?
2. What factors (biological, psychological, social) promote brain plasticity and optimal brain functioning and how do they work?
3. What are the strategies, interventions or practices that have been studied or proposed to promote brain plasticity? How effective are these strategies?
4. How can the insights gained from research on brain plasticity be applied in educational settings, clinical practice or everyday life?

5.6 How can we minimise head injuries in contact sports?

INVESTIGATION: PRODUCT, PROCESS OR SYSTEM DEVELOPMENT

Investigation worksheet
5.6 How can we minimise head injuries in contact sports?

Context

Chronic traumatic encephalopathy (CTE) has become an important topic of discussion within sports and neuroscience. Research suggests that those who have played and currently play high-contact sports are at a high risk of developing the progressive brain disorder. The damage and degeneration of the brain caused by the impact of head injuries is probably associated with the development of CTE, but this is yet to be confirmed. Contact sports can often lead to concussions, which are traumatic brain injuries that alter the way the brain functions. At present, athletes must wear the recommended protective wear for their sport and follow a doctor's recommendations if they want to return to the sport after a concussion.

Aim

To design a preventative piece of sporting equipment that can be used to minimise head injuries in contact sport.

Method

1 Research a contact sport or range of sports and investigate how head injuries and concussions usually occur in that sport(s).

In your research you will want to consider:

- areas of the brain that are frequently affected
- how most injuries occur (collisions, falling, etc.)
- the types of impact (for example, blows, shaking, jolting) that can occur
- how much force is usually behind the injury
- the sort of surface and equipment the sport is played on and whether this can affect head injuries.

Make notes on the following research prompts and use them to guide your research in the next design steps.

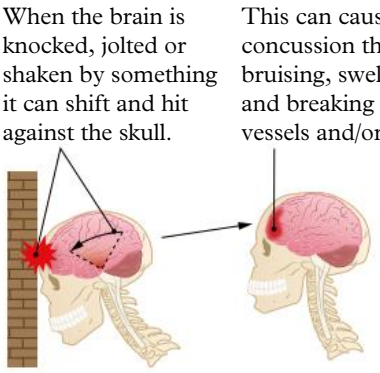


FIGURE 1 How concussion and head injury occurs in contact sports

2 Use your findings from step 1 to research what sort of safety equipment might be effective in preventing injury in your chosen sport. Identify what features could be added or modified to maximise protection in relation to your specific sport. Research different materials used for safety equipment and compare their effectiveness in preventing injury.

3 Use the research you have collected to design your product. Sketch a labelled diagram of your design that shows a justification for your choice of features and materials used (you may choose to do this by hand or on your device).

Discussion

1 Explain the link between head injuries in athletes and CTE.

2 Describe the measure you have designed to help prevent or reduce head injuries in sport.

3 Discuss the scientific knowledge you have used to support the use of your preventative measure in contact sport.

4 Identify one limitation of your product design. Explain how this limitation could be improved next time.

5 State whether you believe your product would be able to eliminate the chances of concussion occurring in your chosen sport. Justify your answer.

7.1
INVESTIGATION: CONTROLLED EXPERIMENT

How does age affect person perception?


Investigation worksheet
7.1 How does age affect person perception?


Risk assessment
7.1 How does age affect person perception?


Resource
Image test

Context

Whenever we meet and interact with another person, we gather information about them, such as their personality, intelligence, occupation, hobbies, likes and dislikes. We gradually develop an accumulation of this information that contributes to our social cognition.

Because social cognition develops over time and experience, it is possible to infer that understandings we base our person perception on change as we grow older and have more wisdom. In this experiment, you will explore whether there are general differences in person perception across different age groups, and the extent to which they are different.

Aim

To determine whether person perception, as a measure of social cognition, is different across age groups.

Materials

- Copy of the image test (available in your obook pro). The image test can be distributed electronically or in hard copy.

Method

1. Using a sampling procedure of your choice, generate three sample groups consisting of at least 10 participants per group. Each group must consist of participants in a specific age group. For example, participants aged 14 to 18 years, participants aged 25 to 35 years and participants aged 50 years and over. Ensure that your sample groups cover a range of years.
2. Instruct participants to complete the image test in a quiet environment free from distractions. Participants should complete the image test individually.
3. Inform participants that they need to be honest in their responses, and that it is not a test, but a measure of their personal opinions regarding the images.
4. Debrief participants following the conclusion of the image test. Analyse the data to determine patterns of person perception across the age groups.

Results

1. Determine which personality traits were most commonly used for each of the images (the mode).
2. Of personality traits chosen, determine whether there were trends in the preferences of traits.
3. Determine whether there were common themes for the reasons participants chose those personality traits.
4. Determine whether there were common occupations that were indicated by participants for each of the images.
5. Determine whether there were common themes for the reasons participants chose those occupations.

Discussion

1. Write a hypothesis for this experiment.
2. Outline the reasons why the results support or do not support the hypothesis, making direct reference to your data.
3. Summarise any key themes and commonly occurring personality traits that were evident in the results. Include reference to any relevant ideas on social categorisation, saliency detection and physical cues.
4. Discuss what your results suggest about age and person perception.

5 Identify two potential issues or factors that may have affected your results and explain their potential impact.
6 Propose two improvements to the experiment that could address any potential issues you identified in the previous question.

Conclusion

Provide a paragraph to summarise the purpose of the experiment, results and the key findings that could be drawn from the experiment in relation to age, person perception and social cognition.

What if?

1 What if the independent variable was changed to gender?
2 What if you used priming on participants before they conduct the image test?

8.4A INVESTIGATION: CORRELATIONAL STUDY

Is there a relationship between time spent on social media and perceived social connectedness?

Investigation worksheet
8.4A Is there a relationship between time spent on social media and perceived social connectedness?

Risk assessment
8.4A Is there a relationship between time spent on social media and perceived social connectedness?

Resource
Participant questionnaire and results table

Context

FIGURE 1 Spending time on social media each day is common among young people, but can it leave us feeling more disconnected?

Social media has become an essential part of day-to-day life for most people, particularly adolescents. While social media can keep us connected to people we care about and connect us to different groups and networks, studies have linked excessive social media use to feelings of loneliness (Savci & Aysan, 2016; Marttila, Koivula, & Räsänen, 2021). In this task, you will conduct a correlational study by surveying members of your class or school and examining results to determine whether a relationship exists between time spent on social media and perception of social connectedness.

Aim

To determine whether a relationship exists between time spent on social media and perception of social connectedness.

Materials

- Copy of a questionnaire for each participant (available in your obook pro)
- Results table (available in your obook pro)
- Computer with access to a graphing program, such as Microsoft Excel

Method

1. Find 20 participants to participate in your correlational study.
2. Supply each participant with a copy of the questionnaire and inform them of their participant rights.
3. Collect all responses from the questionnaires and enter this data into the results table.
4. Enter the results into Microsoft Excel to create a scatterplot that shows the relationship between time spent on social media and perception of social connectedness.
5. Use your understanding of correlation (refer to Topic 1.6 in your Psychology toolkit if needed) to determine if a relationship between the two variables exists.

Discussion

1. Identify the independent and dependent variables in this study.
2. Write a hypothesis for this investigation.
3. Use the scatterplot you created to answer the following:
   - **a** What sort of relationship was shown from your scatterplot? Justify your answer.
   - **b** What does the relationship seen in your scatterplot suggest about time spent on social media and perceived social connectedness?
4. Describe how social media use can positively and negatively affect our sense of social connectedness.
5. What other factors (apart from social media use) could have influenced participants' perception of social connectedness?
6. Describe one change you could make to this study to improve the reliability of results.
7. Explain why this study is considered a correlational study rather than a controlled experiment.

Conclusion

1. Collate all your responses from the discussion questions/prompts and generate a final summary about the relationship between time spent on social media and perceived social connectedness.

What if?

1. What if time spent on social media was changed to time spent playing video games – would you expect to see a similar relationship?

8.4B INVESTIGATION: CASE STUDY

How can advertising affect our individual behaviour?

Investigation worksheet
8.4B How can advertising affect our individual behaviour?

Context

Corporations and businesses have a long history of using advertising as a means of encouraging the public to use a particular service or purchase a particular product. Methods of advertising have changed along with technology. Advertisements now extend beyond printed media, such as newspapers and magazines, to television advertisements, websites and social media platforms. The intended purpose of advertising, however, has remained constant, with producers and designers of advertisements deliberately and strategically designing advertisements to influence individual behaviour through social psychology concepts.

In this task, you will conduct a case study by examining three advertisements of different mediums. You will then use psychological theory to analyse your observations on the design of the advertisements.

Aim

To analyse which social psychology concepts are used in advertising.

Materials

- Computer with internet access

Method

1. Select a product or service that you are interested in (such as food, clothing, a cleaning service or a similar product or service).
2. Conduct online research to find three different advertisements related to the product or service of your choice. Your advertisements should come from different companies and be varied in their approach to communicating their message (for example, different media formats, styles, who or what is being involved in the advertisement).
3. Write a written report on your case study, based on the discussion questions/prompts below.

Discussion

1. Analyse each advertisement by addressing the following:
   - **a** Summarise the events of the advertisement, addressing the story of the advertisement and how it is portrayed.
   - **b** Identify whether there are any figures of authority in the advertisement.
   - **c** Identify the types of powers that are being used in the advertisement.
   - **d** Identify whether concepts of obedience or conformity are used in the advertisement.
   - **e** If obedience is being used in the advertisement, identify which factors contributing to obedience are being used in the advertisement and how they are used.
   - **f** If conformity is being used in the advertisement, identify which factors contributing to conformity are being used in the advertisement and how they are used.
   - **g** Identify whether upward and/or downward comparison is being promoted in the advertisement and how it is being promoted.
   - **h** Summarise the effects of social comparison being used in the advertisement.
2. Using your responses from the previous step, write a comparison of the three advertisements. Highlight similarities and differences for any approaches or social psychology concepts used between the advertisements.
3. Use the internet or information from Chapter 8 of your Student Book to explain the psychological strategies used in advertising to influence behaviours.

Conclusion

1. Collate all your responses from the discussion questions/prompts and generate a final summary about how advertising can be used to influence individual behaviours.

What if?

1. What if the advertisements you examined were only printed? Would the same strategies and social psychology concepts be as effective in printed advertisements?

9.1 Have you been paying attention?

INVESTIGATION: FIELDWORK

Investigation worksheet
9.1 Have you been paying attention?

Risk assessment
9.1 Have you been paying attention?

Context

We live in a fast-paced world where environmental stimuli are constantly competing for our attention. Something as simple as walking through a shopping centre can be challenging if we cannot maintain our attention on the takeaway shop we want to buy lunch from, direct our attention to where we are walking so that we do not bump into other people, or tune out the music playing from each shop we pass.

In this investigation, you will observe the behaviour of people in a busy environment and explore how they use their attention to interact with the world.

Aim

To observe the behaviour of people in your local environment and evaluate how they are using their attention to interact with the world.

Materials

- A pen or pencil to record observations.
  Note: this investigation can also be completed using a laptop.

Method

1. Visit a busy environment. Examples include the school yard during lunchtime, your local shopping centre or a café. Find a spot at your location where you can sit down and observe at least five different people (ideally, between 10 and 15).
2. Assign each person an identifier, such as a number, letter, colour or simply use a description of their appearance. **Note:** When you organise your responses later, you will need to deidentify them.
3. Observe their behaviour and record this data in a table similar to that shown in Table 1. You might like to note down things such as where their vision is directed, whether or how they are engaging with objects or people around them, whether there is a discrete task they are completing and how long it takes them to complete it.

Results

TABLE 1 Observations from investigation. Add as many rows as required.

Participant	Description	Observations	Types of attention
1			
2			
3			
4			
5			
6			

Discussion

1. In Topic 9.1 of Chapter 9 of your Student Book, you learnt about three types of attention: sustained attention, selective attention and divided attention.
   - **a** Define the three types of attention and give examples of each from your investigation.
   - **b** Identify whether or not you (the investigator) are demonstrating the three types of attention during your data collection. Justify your response.
2. For each individual, identify the types of attention that they are demonstrating and justify your responses.
3. Select an example of divided attention from your investigation.
   - **a** List the tasks that the individual is performing and classify them as automatic or controlled processes.
   - **b** Explain how the individual is able to perform the tasks simultaneously.
   - **c** Predict what will happen if the individual begins an additional task.
4. Explain why selective attention is an important process that allows us to demonstrate sustained attention. Provide evidence of this relationship by referring to an example from your investigation.

9.2 How does perceptual set affect your perception of rat-man?

INVESTIGATION: CONTROLLED EXPERIMENT

Investigation worksheet
9.2 How does perceptual set affect your perception of rat-man?

Risk assessment
9.2 How does perceptual set affect your perception of rat-man?

Resource
Figure 1 printout

Context

Bugelski and Alampay (1961) performed the famous rat-man experiment. One group of participants was shown a series of line drawings of animals. The other group was shown a series of line drawings of human faces. Both of these are shown in Figure 1.

FIGURE 1 Participants were shown either line drawings of animals or human faces.

All participants were then showed the ambiguous rat-man stimulus shown in Figure 2. The majority of the first group identified it as a rat or mouse, while the majority of the second group identified it as an old man. This shows how perceptual set, created by immediate prior experience, influences perception.

FIGURE 2 The ambiguous "rat-man" stimulus – do you see a rat or a man?

In this investigation, you will conduct your own experiment on the effect of perceptual set on the perception of an ambiguous figure.

Aim

To investigate the effect of perceptual set on the perception of an ambiguous figure.

Materials

- Four black line drawings of different animals (Figure 1)
- Four black line drawings of different human faces (Figure 1)
- Image of ambiguous figure, "rat-man" (Figure 2)
- A pen or pencil to record responses. **Note**: this investigation can also be completed using a laptop.
- Ideally, a total of 20 participants for each group (animals line drawings; human faces line drawings). **Note**: you will also need one person to show the images and one to record the results.

Method

1. Divide the participants into two groups and place them in different areas or rooms (independent groups design).
2. Show each participant in Group 1 the series of four animals for 30 seconds and then the ambiguous figure (rat-man) in one room or area. Record responses in a table similar to Table 1.
3. Show each participant in Group 2 the series of four faces for 30 seconds and then the ambiguous figure in another room or area. Record responses in a table similar to Table 1.

Results

TABLE 1 An example of a data sheet to collect data for this investigation. Add as many rows as required.

Participant	Group	What is the ambiguous figure? An animal, face or other?
1	1	
2	1	
3	1	
4	2	
5	2	
6	2	

1 Collate individual results to create a class set of data.
2 Calculate the percentages of participants perceiving the ambiguous figure as an "animal", "face", or "other". Record your results in Table 2.

TABLE 2 Calculated percentages

Group	% seen as "animal"	% seen as "face"	% seen as "other"
1 (animals)			
2 (faces)			

Discussion

1 Identify the operationalised IV and operationalised DV from this experiment.
2 Write a hypothesis for this experiment.
3 Explain whether your hypothesis was supported by the results of your experiment.
4 Identify whether this experiment demonstrates bottom-up or top-down processing. Justify your response.
5 Explain how perceptual set affects perception.
6 Identify and explain any possible extraneous or confounding variables.
7 Outline the steps you could take to control these unwanted variables in the future.

Conclusion

Formulate a conclusion for the experiment you conducted.

What if?

1 What if you used photographs of people instead of black line drawings?
2 What if you used a different ambiguous figure such as "young woman/old woman"?

9.3 INVESTIGATION: SIMULATION

What does the world look like with red–green colour vision deficiency?

Investigation worksheet
9.3 What does the world look like with red–green colour vision deficiency?

Resource
Color Blind Pal

Context

Colour vision deficiency or colour blindness affects many people worldwide. In fact, it is estimated that 1 in 12 men (8 per cent) and 1 in 200 women (0.5 per cent) across the globe have red–green colour vision deficiency. There are four categories of red–green colour vision deficiency (Figure 1).

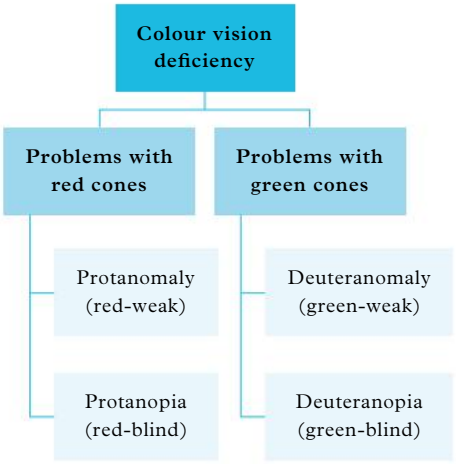


FIGURE 1 Red–green colour blindness

In this investigation, you will use an app to simulate deficiencies in red and green colour vision, as well as complete red and green colour blindness, and make predictions about how this will affect your visual perception.

Aim

To investigate colour vision deficiency and colour blindness using a simulator.

Materials

- Either an iOS or Android mobile phone or tablet with a camera, or a Mac laptop with a camera
- The Color Blind Pal app

Method

1 Go to the Color Blind Pal website (link in your obook pro) and follow the instructions to download the Color Blind Pal app for iOS, Android or Mac devices.

2 Launch the app and go to Preferences by clicking the cog icon (– second icon in the top left corner). Select Color Blindness Type. There are four types of filters you will use:
   - "Protanopia (red deficiency)" – protanomaly
   - "Deuteranopia (green deficiency)" – deuteranomaly
   - "Simulate protanopia" – protanopia
   - "Simulate deuteranopia" – deuteranopia.

Note: Alternatively, you can select the levels icon (– first icon in the top right corner) to easily switch between filters. R is protanomaly, G is deuteranomaly, R̶ is protanopia and G̶ is deuteranopia.

3 Once you have selected your filter, click the magnifying glass icon (– large middle icon on the top) to switch it to the filter mode. The icon should become three rings overlapping in the middle like a Venn diagram ( ).

Part A – Simulating colour deficiency

1 Look at Figures 1 to 8 using the "Protanopia (red deficiency)" and "Deuteranopia (green deficiency)" filters. You can either use the camera on your device or load the image file directly into the app using the gallery icon ( ). Describe your observations. You might like to record your results in a table.

FIGURE 1 A red apple tree

FIGURE 2 Data represented by pie charts and column graphs

FIGURE 3 Composite image of a park in spring, summer, autumn and winter

FIGURE 4 Pencils in different shades of green

FIGURE 5 Bananas of different ripeness

FIGURE 6 Slippery road warning sign on a mountain road

FIGURE 7 Traffic light

FIGURE 8 Rash on baby's cheek

Part B – Simulating colour blindness

1 Look at Figures 1 to 8 using the "Simulate protanopia" and "Simulate deuteranopia" filters. Describe your observations.

Discussion

Part A – Simulating colour deficiency

1 Identify the type of photoreceptor affected in colour vision deficiency.

2 Compare each of the images viewed with the protanomaly and deuteranomaly and describe any differences in colour perception.

3 People with deuteranomaly have greater sensitivity to shades of khaki (tan). Suggest an advantage of this.

Part B – Simulating colour blindness

1 Describe the main biological difference between colour deficiency (–anomaly) and colour blindness (–anopia).

2 Summarise the differences between your observations with the colour deficiency filter compared to the colour blindness filter.

3 Colour is an important factor that affects how you make sense of and interact with the world around you.

- **a** Describe the implications of red–green colour vision deficiency on your visual perception of Figures 1 to 8.
- **b** For each, explain how altered colour perception could affect your behaviour.
- **c** Select one image and suggest some colour-independent clues that people with red–green colour vision deficiency could use to make sense of their surroundings.

4 Short- and long-sightedness can be corrected using glasses that contain different shaped lenses. Conduct some research to determine whether colour deficiency can be corrected in a similar manner. If it can, provide a brief summary of how.

10.2 INVESTIGATION: CONTROLLED EXPERIMENT
Does perceptual set influence our judgment of flavours?

Investigation worksheet
10.2 Does perceptual set influence our judgment of flavours?

Risk assessment
10.2 Does perceptual set influence our judgment of flavours?

DISCLAIMER: This investigation involves participants consuming a range of foods. Ensure that allergies are checked and full consent is given prior to conducting. Be sure to inform participants that the variety of foods might include items they would not normally be accustomed to eating.

Context

Our expectations of what food will taste like can strongly influence our judgment of food flavours. Our perception is influenced by our past experiences and culture. Foods that have been considered "normal" to our culture and experience are likely to be judged as desirable, whereas foods that are foreign to our culture and experience are likely to be considered undesirable.

FIGURE 1 Did you know that dried cricket powder can contain up to three times more protein than red meat per gram? Insect protein sources could be the way of the future, that is, if many people can change their perception of insects!

Aim

To determine whether perceptual set has an effect on the judgment of food flavours.

Materials

- Two "exotic" food samples (for example, insect lollipops, green ant marmalade, flavoured crickets)
- Two popular food samples (such as avocado, strawberries, potato chips)
- Napkin or plate for food samples to be placed on for each subject
- Tongs or utensils for serving food samples
- Labels for food samples (experimental group)
- Blindfolds
- Cups
- Water
- Data table
- Pen for recording

Method

1 Recruit volunteer subjects. Identify subjects with any known food allergies and excuse them from participating.
2 Explain participants' rights to each subject.
3 Randomly place subjects into either the control or experimental condition by placing names in a hat, drawing out one by one and allocating in turn to each condition.
4 Prepare food samples by placing a small amount for "tasting" onto a plate or napkin. Prepare a set of labels for the foods to be presented to the experimental group and place next to each food sample.
5 Ideally, set up a space to test each subject individually if possible.
6 Create a data table to record results for both the control and experimental groups that includes:
   - a confidential subject identification (such as a number) for each subject
   - rating scale of 1 to 5 for each food to be tested, where 1 = strongly disliked taste and 5 = strongly liked taste.

   Alternatively, you can use the example results table provided in your obook pro.
7 Test your control group by:
   - placing blindfolds on subjects so they are unable to see the food samples
   - providing a cup of water to each subject to take a small sip in between food samples

- presenting each subject with their plate of samples (ask them to taste each food sample in a specified order)
- asking subjects to identify their enjoyment of the flavour of each food on a scale of 1 to 5.

8 Record the rating on a scale of 1 to 5 in a data table.

9 Repeat Step 7 for your experimental group, but do not blindfold participants.

Results

1 Calculate a mean rating score for the experimental and control groups.

2 Present the data in a graph with labelled axes. Include a title for your graph.

3 Describe the data for each group.

Discussion

1 Was there a difference between the mean scores for each group? Describe the difference.

2 Identify the IV and DV for this experiment.

3 Was this data objective or subjective? Give reasons for your choice.

4 What experimental research design was used in this experiment?

5 Why was water given to subjects in between each food sample?

6 If there was a difference in mean scores for each group, explain the reasons for this difference. Include a reference to perceptual set, and how this may have influenced any difference observed.

7 Explain why the control group was blindfolded and the experimental group was not.

8 Identify ways in which this was a fair test.

9 Identify potential extraneous variables that may have influenced the results of this experiment.

10 Discuss the importance of ethical considerations in conducting this experiment and explain how each ethical consideration was addressed by the experimenter.

Conclusion

With reference to the findings of this experiment, discuss whether perceptual set can influence the judgment of food.

What if?

1 What if foods were not labelled for the experimental group?

2 What if only exotic foods were used in this experiment?

3 What if only commonly eaten foods were used in this experiment?

10.3 How can a non-synaesthete acquire synaesthesia?

INVESTIGATION: LITERATURE REVIEW

Investigation worksheet
10.3 How can a non-synaesthete acquire synaesthesia?

Context

Synaesthesia is a neurological condition that describes when a person experiences more than one sensory response when exposed to a stimulus. The experience of synaesthesia can result from genetics, where genes are passed on that alter the neural pruning stages during development. Non-synaesthetes can also acquire synaesthesia later in life due to changes in brain structure and function. In this investigation, you will examine the events that can cause acquired synaesthesia and explore how this may alter a person's perception of the world.

FIGURE 1 Most synaesthetes are born with their condition, but there have been cases of people developing synaesthesia later on in life. Imagine if your perception changed so that you began to associate each letter with a colour or each sound with a taste.

Aim

To investigate the events can cause acquired synaesthesia and examine how acquired synaesthesia affects a person's perception of the world.

Method

1. Gather secondary data related to synaesthesia and discussion prompts below. You can source your secondary data from the internet, scientific journals, books, scientific magazines, videos or podcasts.
2. Use the CRAAP method (refer to Topic 6.1 in Chapter 6 of your Student Book) to evaluate the reliability of your sources.
3. Make notes about what you have learnt. You can organise your information in different ways.
4. Prepare a written report that answers the discussion questions below.

Discussion

1. What is synaesthesia and what types of synaesthesia exist?
2. What causes the occurrence of synaesthesia in people who have always been synaesthetes?
3. What causes the occurrence of synaesthesia in people who are non-synaesthetes? Give specific examples where possible and include descriptions of the types of synaesthesia acquired.
4. How do people who acquire synaesthesia later in life find the experience compared to their previous perception of the world?

Answers

Chapter 1

RESEARCH REVIEW 1.1

Student answers will vary, but a sample response is:

Research question	How does sleep deprivation affect attention and memory in adolescents?
Aim	To examine the effects of sleep deprivation on attention and memory in adolescents
Independent variable	Whether or not individuals are sleep deprived
Dependent variable	Level of attention and memory
Hypothesis	If adolescents experience sleep deprivation (less than 7 hours of sleep), then their average attention and memory scores will be lower compared to those who had adequate sleep (more than 7 hours).

INVESTIGATION INSPECTOR 1.2

1 Student answers will vary, but should identify the most appropriate design and provide a justification for their choice by considering the strengths and limitations of different designs. A sample response is:

A mixed design would be most appropriate for this experiment because there are multiple independent variables. In this experiment, participants could be separated into groups for different types of tasks (between-subjects design for the independent variable task type) and then all participants could perform their tasks at different times of day (within-subjects design for the independent variable time of day). This approach would allow the investigation of interaction effects between the time of day and task type, while controlling for potential confounding variables.

2 Student answers will vary, but should identify at least one strength and weakness of each type of design, and factors that would influence choice. A sample response is:

The choice of design often depends on the research question and practical considerations. Within subjects designs control for individual differences and often require fewer participants, but they can introduce order effects. Between-subjects designs avoid order effects, but require more participants and introduce participant variables. Factors to consider include the availability of participants, the nature of the experiment (e.g. whether it would be unethical or impractical for the same participants to be in different conditions), and the likelihood of order effects. Ultimately, the best design will balance these considerations to yield reliable and valid results.

EVALUATING ETHICS 1.3

1 Student answers will vary, but should identify the ethical dilemma that arises from the potential harm to patients in the control group resulting from the placebo. A sample response is:

Placebos, a fake or inactive treatment, are often used in research to establish the effectiveness of new treatment. However, administering a placebo to patients seeking relief from symptoms creates an ethical dilemma. The potential benefit from the study results conflicts with the potential for harm to the patients by delaying their treatment. If patients are receiving a placebo instead of an active treatment, their condition remains untreated and may even worsen.

2 Student answers will vary, but should identify one relevant ethical concept (e.g. beneficence, non-maleficence) and one relevant guideline (e.g. deception, informed consent, potential harm to patient) that is violated in this scenario. A sample response is:

Ethical concept	How is it breached?
Non-maleficence	Patients receiving the placebo could experience harm, since they are not receiving any treatment.
Ethical guideline	**How is it breached?**
Informed consent	Patients have the right to be fully informed about the nature of the treatment they are receiving and the expected outcomes. Administering a placebo without disclosing its inert nature may cause more harm to the patient, especially if they think they are receiving treatment.

DATA DRILL 1.4

1 A

2 Both qualitative and quantitative. Participants responded to descriptions of their stress levels. These qualitative descriptions were assigned numerical, quantitative values. For example, if they responded with "little or no stress", this was assigned a value of 1.

3 While subjective data captures personal experiences, objective data provides a standardised measure for comparison.

Type of data	Definition	Example from Dr Chi's investigation
Subjective	Data that is based on individual feelings and perceptions	Participants' personal descriptions of their stress levels
Objective	Data that is factual, gathered through measurement	The numerical values assigned to participant descriptions (e.g. giving "little or no stress" a value of 1)

4 Discrete data. They are distinct and separate values (e.g. 1 for "little or no stress") rather than measurements that can vary continuously.

DATA DRILL 1.5

1 **a** Student answers will vary, but they should place the cross in the top-left quadrant.

b The results are very close to each other but are not close to the true value of 8.7 cm.

2 The questionnaire is reliable, as it consistently measures coffee consumptions, but it is not valid, since it doesn't accurately measure the intended construct, which is stress levels.

3 Systematic error. The timing error consistently skews the results by 5 seconds, which may lead to inaccuracies in the data.

4 **a** Uncertainty. The exact value of the perceived happiness cannot be directly measured or precisely quantified.

b Student answers will vary, but should suggest ways to reduce uncertainty. A sample response is:

To reduce uncertainty, you could use a scale (e.g. a Likert scale) to generate more quantitative, standardised data, instead of using open-ended survey questions.

5 The score of 90 is an outlier as it is very different from the rest. It could skew the mean and give an inaccurate representation of the data, if not properly accounted for in the analysis.

CASE CRACKER 1.6

1 Student answers will vary, but should state their position and identify evidence that supports that position. Students should consider the methodology and/or the significance of the results.

2 Student answers will vary, but should identify relevant confounding variables. Examples include: quality of sleep, study habits, difficulty level of classes, individual differences in learning abilities, and mental wellbeing conditions. Based on the description provided, these factors were not controlled for and one or all of them could have affected student academic performance. Additionally, self-reported sleep hours could be prone to inaccuracies and bias.

3 Student answers will vary, but the following checklist should be used to ensure that all aspects are addressed:

- ☐ concluding statement
- ☐ statement of whether results support or refute the hypothesis
- ☐ summary of results
- ☐ main limitations that may affect result validity
- ☐ judgment on the overall success of the investigation
- ☐ implications of the study.

RESEARCH REVIEW 1.7

1 Student answers will vary, but should be shorter than the original passage, without changing the key messaging. A sample response is:

Research shows that over five hours of social media usage daily significantly lowers self-esteem in teenagers.

2 Student answers will vary, but should decrease in complexity and sophistication when targeted to a teacher compared to a peer. The response presented to the five-year-old should be the most simplistic.

3 **a** Students should discover that the graph does not adhere to the guidelines set by APA. In particular:

- The units for "Distance" should be specified in the column heading, not after each value in the table, i.e. the column heading should read "Distance (m)" and the values in each cell underneath should read "1", "2", "3", "4" and "5".
- The table should not use vertical borders to separate data.
- The table title should not end in a full stop.

b

Table 1

Effect of Distance on the Volume of Different Pitched Sounds

Distance (m)	Volume (dB) at...			
	100 Hz	250 Hz	500 Hz	1000 Hz
1	75	69	65	53
2	64	58	50	47
3	58	51	39	32
4	49	42	30	27
5	41	35	22	20

Note: Data collected by author on the 30th of August 2023.

Unit 1 Word Wizard

A 11	**B** 4	**C** 12	**D** 6	**E** 10
F 2	**G** 5	**H** 13	**I** 15	**J** 7
K 14	**L** 1	**M** 9	**N** 3	**O** 8

Chapter 2

GROUNDWORK 2

1 A **2** B **3** C **4** B **5** D

6 Cognitive development: the development of mental processes and abilities throughout the lifespan (e.g. the development of schemata).

Emotional development: the development of emotions and strategies to deal with emotions throughout the lifespan (e.g. the ability to reflect).

Social development: the development of healthy relationships (e.g. learning to trust others).

Student examples may differ.

7 Student answers will vary, but examples include: family, culture, friendships, education, nutrition, illness and wealth.

8 **a** The biopsychosocial model is a holistic framework used to consider how biological, psychological and social factors interact and influence a person's psychological development and wellbeing.

b Student answers will vary, but could include the identification and description of one of the following:

- psychological: excessive worrying and negative thoughts (risk factor)
- biological: family history of mental illness (risk factor)
- social: a supportive social network (protective factor).

9 Student answers will vary, but should identify at least one similarity, at least one difference, and the significance of the similarities and/or differences.

10 Student answers will vary, but should identify differences and their significance.

CASE CRACKER 2

1 Student answers will vary, but examples include:

- family: Layne's older brother and father loved surfing, which means that she was regularly exposed to the beach and surfing.
- trauma: Layne experienced trauma – first, after her adopted mother's death; next, when finding out that she was adopted; and again, after finding out that she was conceived through date rape.

2 Student answers will vary, but should provide a considered and balanced argument identifying evidence from the case study that demonstrates the role of nature and other evidence that supports the impact of nurture on Layne's development.

DATA DRILL 2

1 Words/reading/vocabulary are vital to brain development.

2 genes, hormones, neurotransmitters, mental illness

3 Genes affect brain development.

INVESTIGATION INSPECTOR 2

1 Student answers will vary, but should define what a representative sample is and explain how not using one impacts validity. A sample response is:

A representative sample accurately reflects the key characteristics of the larger population being studied, which increases external validity and the ability to generalise findings. If a sample is not representative, it may be biased, meaning that the population may be overrepresented or underrepresented in the sample. This decreases external validity and the ability to generalise findings.

2 Student answers will vary, but should describe the sampling method, identify how it could be used in the context of Leon's study, and identify a limitation.

EVALUATING ETHICS 2

1 As the participants were infants, aged 9 to 30 months, they would not have been able to participate voluntarily, give informed consent, or be able to withdraw if they did not want to participate. These three ethical guidelines were violated in the Strange Situation experiment. However, in practice, parents or caregivers can legally consent on behalf of their children.

2 Similar to infants, animals (such as the rhesus monkeys in Harlow's experiment) cannot consent to, volunteer to participate in, or withdraw from studies.

RESEARCH REVIEW 2

1 *The Sydney Morning Herald* (online newspaper)

2 Mass media communication, because it is a news article that presents information to a wide audience (the audience base of *The Sydney Morning Herald*)

3 Strengths include that information reaches a large audience and that this type of information can raise awareness about scientific issues. Weaknesses include that this type of information may over-simplify scientific concepts or exaggerate information, and that information may not provide sufficient detail or context.

4 Student answers will vary, but a sample response is:

Media publications such as the article above are not appropriate for use in a literature review because the information has not been peer-reviewed by scientific experts.

Chapter 3

GROUNDWORK 3

1 A 2 C 3 D 4 B 5 C 6 C

7 Situational approach

8 Sociocultural approach

9 Student answers will vary, but should identify specific examples from the scenario that support the situational and sociocultural approaches to defining normality. A sample response is:

Dana is studying science. Taking the situational approach to defining normality, it would be normal for her to follow safety protocols by wearing personal protective clothing (PPE), such as a laboratory coat, gloves, goggles and close-toed shoes, when she is performing lab work. On the other hand, taking the sociocultural approach, continuing to wear PPE outside the lab and around the campus regularly may be considered abnormal.

10 Cognitive behavioural therapy (CBT) is a form of therapy that helps individuals identify and change unhelpful thought patterns and behaviours that contribute to their emotional distress, and replace them with more adaptive cognitions and behaviours.

CASE CRACKER 3

1 Student answers will vary, but should include the definitions for adaptive and maladaptive behaviours, and examples of each from the scenario to demonstrate the difference between them. A sample response is:

Adaptive behaviours are helpful behaviours that enable an individual to adjust effectively to certain situations or environments. Maladaptive behaviours might help an individual cope in the short term, but are harmful in the long run. Hannah's "meltdowns" and "shutdowns" to cope with stress and overwhelm are examples of maladaptive behaviours. Reframing their ASD to reduce stress by becoming more compassionate with themself is an example of an adaptive behaviour.

2 Hannah used a coping mechanism called masking, which involves concealing their atypical behaviour by imitating neurotypical behaviours. Hannah observed and mimicked the behaviours of their peers and replicated them in similar social situations.

3 Student answers will vary, but misconceptions could include that individuals with autism are not social, that they are not empathetic, that there is a relationship between appearance and autism, and that autism is only seen in males. A sample response is:

A common misconception about ASD is that individuals with ASD cannot be social or empathetic. Individuals with ASD can form relationships and show empathy. They might process and express these feelings differently to neurotypical individuals.

DATA DRILL 3

1 Scatterplot

2 There is a strong positive correlation ($r = +0.8841$) between stress levels and depression rate.

3 Student answers will vary, but should comment on the quality of the data. Students could suggest that the certainty in the data may be reduced, the correlation may be weaker, and the relationship observed may differ or be unclear.

INVESTIGATION INSPECTOR 3

1 Whether the study environment is brightly or poorly lit

2 Student test performance, specifically test performance

3 To determine the effect of lighting conditions on student test scores

4 Student answers will vary, but should include subject selection, experimental conditions and methods. For example, Sabir could recruit volunteer participants and obtain informed consent for their participation. Participants could be separated into condition 1, in which they study in a brightly-lit room, and condition 2, in which they study with only a desk lamp switched on. These conditions could be maintained for two months, and test scores could be recorded and compared.

EVALUATING ETHICS 3

1 Mrs. Ainsley appears to have upheld confidentiality by deidentifying (removing identifying information from) student responses. This is important considering the sensitive nature of the data collected, which included personal mental health diagnoses and treatment details.

2 Student answers will vary, but could include one of the following:

- confidentiality: even though the data was deidentified, students could work out who likely had the disorders because they knew that the data was collected from only two classes.
- informed consent: the scenario does not mention that Mrs. Ainsley obtained consent. As the participants were students, she should have obtained consent from their parents or caregivers.
- voluntary participation and right to withdraw: it is unclear whether participation was voluntary or if students would have felt peer pressure to participate, and whether they could choose to withdraw their responses.

RESEARCH REVIEW 3

1 Variables: type of treatment (medication or CBT), severity of psychological disorder or presence of psychological disorder

Key terms: "is" and "best" ask you to select the most superior of the two options.

2 Student answers will vary, but should identify a specific psychological disorder, type of medication for the selected disorder, and a target population. A sample response is:

Is Ritalin (methylphenidate) or CBT the best treatment for teenagers with ADHD?

3 Student answers will vary, but should include open-ended guiding terms such as "how" and "to what extent". A sample response is:

How effectively do Ritalin (methylphenidate) and CBT reduce the symptoms of ADHD in teenagers?

4 Student answers will vary, but questions could start with:
- "Understand and explain…"
- "Identify and describe specific examples of…"
- "Identify the differences between…"

Sample questions include "Understand and explain cognitive behaviour therapy" and "Describe the effectiveness of CBT for treating ADHD".

Chapter 4

GROUNDWORK 4

1 C **2** C **3** C **4** B **5** A

6 Case studies are in-depth studies of one patient or a small group of patients who generally have a rare disorder. They allow for ethical investigation of the brain because creating these injuries would be highly unethical. Therefore, case studies can be used to further the understanding of the brain.

7 Broca's area, which is responsible for speech articulation. Dalina can still comprehend what she wants to say, but cannot actually say it.

8 The hypothalamus is a small structure that is vital for basic survival. It regulates sleep, body temperature, the expression of emotions, and the four F's: feeding, fighting, fleeing and fornication.

9 Hindbrain. Its major component is the medulla, which is a continuation of the spinal cord. It controls breathing, heartbeat and digestion.

10 The primary cortices are responsible for the processing of sensory information and the generation of response commands. Each processes a different type of sensory input: vision in the primary visual cortex (occipital lobe), hearing in the primary auditory cortex (temporal lobe), touch in the primary somatosensory cortex (parietal lobe) and movement in the primary motor cortex (frontal lobe). Each lobe also contains association areas, which combine information from other areas of the brain and carry out further processing.

CASE CRACKER 4

1 The parietal lobe processes somatosensory information such as touch, temperature and pressure. The parietal lobe also integrates and interprets sensory information to help us to understand what we are experiencing internally in our bodies and externally in our environment.

2 Contralateral organisation is where one side of the brain controls and processes sensory input and motor output from the opposite side of the body.

3 Jane has lost the ability to sense environmental information from her left side. Considering contralateral organisation, this means that Jane's opposite side, i.e. the right parietal lobe, is damaged.

4 CT or MRI scans. Both techniques provide detailed images of the brain's structure, and can help identify any potential damage or abnormalities in the parietal lobe.

DATA DRILL 4

1 The control group

2 The control group had a higher variability in amygdala activity (SD = 11.28) than the experiment group (SD = 11.15).

INVESTIGATION INSPECTOR 4

1 Student answers will vary, but should:
- identify a methodology (e.g. controlled experiment or correlation study)
- identify a design (e.g. within-, between- or matched subjects)
- provide reasons to support their choice.

A sample response is:

It is recommended that Professor Moretti's group use a controlled experiment with a matched design. The experimental design allows researchers to draw a causal conclusion. A matched design allows them to compare differences in hippocampus volume between distinct groups while controlling for participant variables.

2 Student answers will vary, but should suggest random or stratified random sampling, and provide a reason to support their choice.

3 Student answers will vary, but should identify two extraneous variables and describe how each might affect the results. Examples include participant variables such as age, driving experience, and whether they navigate from memory or use digital assistance.

EVALUATING ETHICS 4

1 A

2 Student answers will vary, but should identify and describe principles such as voluntary participation, informed consent and the right to withdraw.

3 Student answers will vary, but could include the use of appropriate PPE, that researchers should be trained to handle animals, and that equipment should be checked before beginning.

RESEARCH REVIEW 4

1 Source 2 > Source 3 > Source 1

2 Source 1 is not appropriate because it demonstrates non-scientific ideas, which are based on popular belief. Source 2 is the most suitable piece of evidence because it is based on a review of scientific research that addresses the question. The source appears reliable as the results are supported by multiple sources. Source 3 is suitable; however, closer examination reveals some limitations. It cites a small sample size and a lack of consideration of confounding variables, which lowers the validity of the findings.

Chapter 5

GROUNDWORK 5

1 D **2** B **3** C **4** D **5** A **6** A **7** C

8 Student answers will vary, but should describe similarities and differences between structural and functional plasticity. A sample response is:

Structural plasticity refers to the brain's ability to change in physical structure because of experience throughout life. On the other hand, functional plasticity refers to the brain's ability to adapt to damage or overcome loss of function. Both involve processes such as neurogenesis, synaptogenesis, synaptic pruning, sprouting, etc.

9 Student answers will vary, but should describe the key features of each disorder, their associated symptoms and effects on biopsychosocial functioning.

10 Student answers will vary, but should identify similarities and differences between ABI and CTE. Similarities include that they are both neurological conditions that result from brain damage and occur after birth. Differences include their cause, progression, symptoms and diagnosis.

CASE CRACKER 5

1 Student answers will vary, but should identify similarities and differences between the two processes. One similarity is that they both involve changes to neurons. One difference is that neurogenesis involves the generation of new neurons, while synaptogenesis involves the formation of new synapses between existing neurons.

2 Student answers will vary, but should explain the purpose of myelination and link this to Mechelli's study on bilingualism. A sample response is:

Mechelli's study shows an increase in the density of white matter in bilingual individuals, which is largely made up of myelinated axons. Myelination enhances the speed and efficiency of electrical signals travelling through the neurons. Lifelong bilingualism, with constant switching between languages, may promote this process, thus enhancing the integrity and functionality of the white matter.

3 Student answers will vary, but should highlight the differences between long-term potentiation and depression when learning a new language. A sample response is:

Learning a new language involves forming and strengthening new connections between neurons, which is achieved through long-term potentiation. On the other hand, long-term depression, which weakens synaptic connections, could be seen as a way for the brain to forget less useful information or to fine-tune synaptic connections, making the brain's language system more efficient.

DATA DRILL 5

1 **a** 5 per cent

b 11 per cent increase; students must specify that there is an increase.

2 **a** 1.4 per cent

b 16

c 100 per cent increase; students must specify that there is an increase. A 100 per cent increase means that the number of individuals reporting improvement of symptoms following the new therapy had doubled.

INVESTIGATION INSPECTOR 5

1 Student answers will vary, but example limitations include that:

- correlational studies do not confirm whether one variable causes a change in the other variable
- a large amount of data is needed to draw conclusions
- correlation does not necessarily mean causation
- since variables are not manipulated, there could be extraneous variables that could influence the results. This could then result in low internal validity.

2 Student answers will vary, but examples include:

- time and cost: given the long time span over which CTE develops, a controlled experiment design would be very costly and time-consuming
- ethical concerns
- if there is a large volume of existing data, a correlational study would probably be more sensible.

3 Student answers will vary, but should identify a methodology and provide reasoning for why it is preferred over the alternative. A sample response is:

Given the practical and ethical considerations, a correlational study is the most appropriate investigation methodology. It would be unethical to use a controlled experiment because we cannot expose participants to repeated head injuries (independent variable) to observe the development of CTE (dependent variable). Instead, we can observe the natural occurrence of these variables and determine if a relationship exists.

EVALUATING ETHICS 5

1 Non-maleficence: avoiding harm to the participant. Catherine has a pacemaker that is incompatible with the MRI machine; it could potentially stop her heart. Dr Wittens must avoid harm to Catherine, even if MRI is a better option than CT.

2 Student answers will vary, but could mention that the routine inspection of MRI and CT machines would help make sure that the machines are operating properly. This could also help with the identification of faults that could potentially harm Dr Wittens, other researchers or the patients.

RESEARCH REVIEW 5

1 Student answers will vary, but must include an aim, method, results, discussion and conclusion.

Chapter 6

INVESTIGATION INSPECTOR 6.1

Statements	Answers (identify all that apply)
Anisa: "Hey Taylor, I just found this 2021 study by Smith and colleagues about a link between mindfulness meditation and reduced anxiety. Read it yet?"	Evidence
Taylor: "No, not yet, but my uncle meditates every morning and he seems pretty convinced that it helps him stay calm all day. What are your thoughts? You think meditation can help?"	Anecdote (personal story)
Anisa: "Well, last class, Mr. Hanes talked about some theories based on CBT. Remember? They say mindfulness techniques are useful and have really clear therapeutic effects. But personally, I think traditional therapy sessions are more effective. There was something else I came across though: did you know that some people think carrying a lucky charm can keep you calm?"	Cognitive behavioural therapy: scientific idea Anisa's personal preference: opinion (personal preference with no evidence cited) Lucky charms: non-scientific idea (common belief without scientific basis)
Taylor: "Really? I always thought that things like lighting and where you put your furniture – those environmental factors – had a bigger effect on your mood than objects like lucky charms. It reminds me of that older study from 2017 by Rands and Gansemer-Topf on how classroom design affects how engaged students are in class."	Taylor's thoughts on environmental factors and the study by Johnson and Lee: combination of opinion (personal thought) and evidence (citation of a specific study)

DATA DRILL 6.2

1 Student answers will vary, but should give one advantage and one limitation of keeping (a) a physical logbook and (b) a digital logbook. Examples include:

Format of logbook	Advantages	Limitations
Physical	• Don't have to worry about losing data. • Writing things down helps you remember them.	• Can be difficult to search for information within a physical logbook.
Digital	• Can be accessible from anywhere you can log on • No need to make sense of messy handwriting.	• Requires device access • Might be inconvenient or unsafe to record things using a device, e.g. when you are conducting fieldwork.

2 Student answers will vary, but could suggest keeping physical logbooks in a designated location within the classroom, or making sure to save their digital logbook frequently.

3 Student answers will vary, but an example is shown if students select **I** Sources:

Author(s)	Date	URL	Summary of study	Evaluation	Suitability

RESEARCH REVIEW 6.3

1 Student answers will vary, but should outline how to evaluate the repeatability of the research, i.e. would a similar result be expected if the experiment was repeated under the same conditions? A sample response is:

Look for consistent results when the same measure is taken multiple times under the same conditions within the research paper. If variations exist, this may indicate an issue with repeatability. Inconsistency in repeated measurements under the same conditions lowers the validity of the findings.

2 Student answers will vary, but should outline how to evaluate the reproducibility of the research, i.e. would consistent results be obtained if the experiment was repeated under different conditions? A sample response is:

Assess if the study's methods are clearly described and if the study has been replicated with similar results by others or in different conditions. Lack of reproducibility could mean that the findings are specific to certain conditions and can affect validity.

3 Student answers will vary, but should outline how to evaluate bias in the research, i.e. are the claims very one-sided and lean in one direction? Are claims supported by evidence? Is an opinion expressed? A sample response is:

Examine the research paper for signs of selective reporting of positive or significant results. Check the literature review (introduction) and the method section to make sure that the study considers a balanced view of previous findings. Biased selection or reporting of results can misrepresent the true effect, affecting validity.

4 Student answers will vary, but should outline how to evaluate confounding variables in the research. A sample response is:

Review the research design to identify if there are factors other than the independent variable that might have affected the result. This could impact the researcher's ability to draw a cause-and-effect relationship between variables, affecting validity.

Unit 1 practice exam

Multiple choice

1 A	**2** C	**3** B	**4** D	**5** B
6 A	**7** D	**8** C	**9** A	**10** A
11 C	**12** C	**13** A	**14** D	**15** B

Short answer

1 **a** dysgraphia (1 mark)

b There is no cure for dysgraphia, but early intervention (such as specific therapy) can improve outcomes. (1 mark)

c anecdote (1 mark)

2 **a** Wernicke's aphasia (1 mark)

b Enyuan's temporal lobe was damaged since she is experiencing problems with language comprehension (1 mark). Specifically, her left temporal lobe is affected as there is hemispheric specialisation of language to the left hemisphere. (1 mark)

c CT and MRI could have been used to scan Enyuan's brain. (1 mark) Both provide detailed information about the brain's structure, which can be used to identify potential damage or abnormalities. (1 mark)

d Monism. (1 mark) Enyuan's mental processes (comprehending language and forming speech) are related back to physical changes in her brain, which aligns with the view in monism that the mind and brain are one entity. (1 mark)

3 **a** Nature refers to the hereditary (genetic) factors that influence psychological development. (1 mark) On the other hand, nurture refers to the environmental factors. (1 mark) Piaget's theory supports nature over nurture, since he consistently found that conservation was achieved in the concrete operational stage, i.e. as part of natural psychological development. (1 mark)

b Industry versus inferiority. (1 mark) The concrete operational stage is typically during the later childhood years (7 to 12), which overlaps with the industry versus inferiority stage. In this stage, children engage in related play and activities such as building, painting and reading. (1 mark) Encouragement leads to industry and lack of praise leads to inferiority. (1 mark)

c Student answers will vary, but should include any two of the following:

- voluntary participation: as the participants were children, they would not have been able to volunteer to participate; instead, Piaget would have needed to defer this decision to the parents or caregivers. (1 mark)
- withdrawal rights: as the participants were children, they would not have been able to withdraw themselves if they didn't want to participant; instead, Piaget would have needed to defer this decision to the parents or caregivers. (1 mark)
- informed consent: as the participants were children, they would not have been able to consent to take part in the study; instead, Piaget would have needed to obtain consent from the parents or caregivers. (1 mark)

4 **a** within-subjects design (1 mark)

b Student answers will vary, but a sample response is:

A benefit of laboratory-based experiments is the ability to control extraneous variables, which improves repeatability. (1 mark) A limitation is that the setting is artificial, which reduces external validity. (1 mark)

c The identification and control of extraneous variables can help improve the validity of the investigation and reduce uncertainty. (1 mark) McGarrigle and Donaldson identified that children knowing that the objects were deliberately altered was a confounding variable (extraneous variable that was not controlled) and found that their results differed from Piaget's, calling into question the validity of Piaget's tests. (1 mark)

d Piaget's research had low internal validity, since there was a confounding variable – the children watched as the objects were being altered. (1 mark)

His research also had low external validity, since he studied a small population of children. The findings are unlikely to apply to individuals from a different population. (1 mark)

5 **a** chronic traumatic encephalopathy (1 mark)

b Student answers will vary, but should include two of the following:

- short-term memory loss (1 mark)
- confusion (1 mark)
- difficulty paying attention (1 mark)
- impaired judgment. (1 mark)

c Winnie's change in behavioural is best described by the medical approach to normality (1 mark), which defines normality based on a medically healthy person as opposed to a person with a biological or psychological illness. (1 mark)

Unit 2 Word Wizard

A 2	**B** 11	**C** 13	**D** 8	**E** 15
F 12	**G** 1	**H** 3	**I** 4	**J** 5
K 6	**L** 7	**M** 10	**N** 9	**O** 14

Chapter 7

GROUNDWORK 7

1 C **2** B **3** C **4** A **5** C

6 Student answers will vary, but should identify and describe both actor–observer bias and the fundamental attribution error in relation to the scenario. A sample response is:

Mary attributes her own lateness to an external factor (heavy traffic) rather than her disposition. This demonstrates actor–observer bias – the tendency to attribute our actions to external factors while attributing others' actions to their internal traits. When Sarah is late, Mary attributes it to Sarah's internal characteristic of being irresponsible, disregarding any external factors that may have contributed to Sarah's lateness. This reflects the fundamental attribution error, where the focus is on internal traits while neglecting external circumstances.

7 Student answers will vary, but should identify at least one similarity and at least one difference, and outline the significance of these similarities/differences. A sample response is:

Both implicit and explicit attitudes influence our behaviour; however, they differ in their level of conscious awareness. Explicit attitudes are held consciously, while implicit attitudes operate subconsciously. The significance of this difference lies in their impact on behaviour – individuals may act in ways that seem contradictory to their stated beliefs (explicit attitudes) due to underlying implicit attitudes.

8 Student answers will vary, but should identify a difference between prejudice and discrimination. A sample response is:

Prejudice is a negative attitude towards a group of people, whereas discrimination is the act of expressing the prejudiced attitude towards the group of people.

9 Student answers will vary, but should define the affect and availability heuristics, then clearly describe the difference between them. A sample response is:

The affect heuristic involves making quick decisions based on emotional states rather than objective analysis. In contrast, the availability heuristic relies on the ease with which memories or information can be recalled. While the affect heuristic is influenced by emotions, the availability heuristic is influenced by past experiences and the ease of memory retrieval.

10 Student examples will vary, but a sample response is:

The fundamental attribution error is the tendency to attribute the cause of others' behaviours to internal factors while neglecting the role of external factors. For example, if someone behaves aggressively, we might assume that they have an aggressive personality without considering situational factors that may have contributed, such as being provoked.

CASE CRACKER 7

1 Student answers will vary, but should identify direct discrimination and include evidence from the case study. A sample response is:

Michael Barclay experienced direct discrimination. He was explicitly denied service because of his facial tattoo (discrimination). This indicates that Barclay was not judged as a Māori individual expressing cultural pride, but instead was unfavourably judged due to stereotypes associated with bad behaviour and people with tattoos (prejudice).

2 Student answers will vary, but should define the term "cognitive dissonance" and identify the factors relevant to the scenario that could contribute to cognitive dissonance. A sample response is:

Cognitive dissonance refers to the unpleasant psychological tension between conflicting cognitions or between cognition and behaviour. In the scenario, the manager may have experienced cognitive dissonance due to the inconsistency between her belief (the cultural significance of mataora) and her discriminating behaviour (refusal of service).

3 Student answers will vary, but should identify and describe a relevant cognitive bias, then explain how the bias will help to overcome cognitive dissonance. A sample answer is:

The manager might employ false-consensus bias to reduce her cognitive dissonance. This is the tendency to over-estimate the extent to which other people share our beliefs, attitudes or behaviours. By assuming that most patrons or even other staff members share her view on refusing service to individuals with facial tattoos, she could feel justified and less conflicted about her decision.

4 Student answers will vary, but should define what a stereotype is and identify an example from the case study. A sample response is:

A stereotype is a widely held but fixed and over-simplified idea or belief about a particular group of people or things. In the case study, the manager's action of refusing service to Michael Barclay due to his facial tattoo reflects a stereotype about people with such tattoos. The manager likely holds preconceived notions that people with facial tattoos are problematic or undesirable customers.

DATA DRILL 7

1 IV: uniform (wearing or not wearing); DV: perceived academic capability

2 Perceived academic capability was measured on a 10-point Likert scale from 1 to 10, where the higher the rating, the greater the participant's perceived academic capability.

3

	n	M
With uniform	10	7.9
Without uniform	10	5.1

INVESTIGATION INSPECTOR 7

1 **a** Student answers will vary, but should identify a type of bias (e.g. age, ethnicity, gender or education) relevant to Yarmey's study and provide a stance on whether they believe it is representative.

b Student answers will vary, but should identify a confounding variable (e.g. participant ages, "target" ages, all "targets" being white males) and indicate that the confounding variable reduces external validity and the ability to generalise the findings of the study. Students should also draw a link to Yarmey's study. For example, the university students' areas of study, culture, ethnicity, gender, etc. could impact their judgment.

2 **a** Student answers will vary, but should identify that participant variables could provide an alternative explanation for the difference in the dependent variable between groups, and that they reduce internal validity.

b Student answers will vary, but should suggest controlling participant variables by randomly allocating participants into each group.

EVALUATING ETHICS 7

1 Student answers will vary, but a sample response is:

Informed consent	The explanatory statement provides the information necessary for participants to consent to the experiment.
Voluntary participation	The statement says that "participation is voluntary as part of course offering".
Right to withdraw	Participants have the option to withdraw their participation by discontinuing or choosing not to submit their results.
Deception	There is no indication that deception will be used. Given the context of the study, deception is not necessary and is therefore not likely to be an issue.
Debriefing	The statement does not identify whether there will be a debriefing at the end. This is a possible violation.
Confidentiality	The statement identifies that data will be deidentified to maintain confidentiality.

RESEARCH REVIEW 7

1 Student answers will vary, but should consist of a research question that is relevant, clear, specific, complex and phrased as a question.

2 Student answers will vary, but should comprise three different credible sources that have evidence relevant to the research question. These sources should be formatted using an appropriate citation style.

3 **a** Student answers will vary, but should identify the key terms in their research question and provide definitions for them.

b Student answers will vary, but should identify and describe a relevant psychological theory, study or concept relevant to the research question. This can be presented using bullet points.

Chapter 8

GROUNDWORK 8

1 C **2** A **3** A **4** A **5** A **6** D **7** C

8 Student answers will vary, but should define "anticonformity" and "independence", and identify examples that help to illustrate a clear difference between them. A sample response is:

Anticonformity involves deliberately or consciously challenging the majority's views or actions. For example, an anticonformist student might start a petition against a new school uniform policy they disagree with, actively rallying against others. Independence, on the other hand, is the ability to resist the influence of the majority without necessarily challenging it. For instance, a student may disagree with the popularity of a certain social media trend among their peers and choose not to participate in it without openly criticising or challenging the majority's preference.

9 Student answers will vary, but should define "cultural norms" and identify the effect of norms on behaviour. A sample answer is:

Cultural norms are established rules or expectations that guide behaviour within a specific culture. They influence individual behaviour by setting the boundaries for what is considered acceptable behaviour in social interactions, thereby shaping how individuals interact with each other and their environment.

10 Student examples will vary, but a sample response is:

Reward power is the ability to elicit a desired response in exchange for a reward. For example, a teacher may allow students to leave class early if they are well behaved. Coercive power is the ability to elicit a desired response in exchange for preventing punishment. For example, a teacher could hold students back for poor behaviour.

CASE CRACKER 8

1 B

2 Student answers will vary, but should identify and describe referent power, and link it to the scenario. A sample response is:

Referent power was most evident. It arises from the influence one individual has over others due to admiration, respect or feeling that they identify with the individual. Celebrities, due to their public image and popularity, have a considerable amount of referent power. Their involvement legitimised the campaign, compelling fans to participate in the charitable cause.

3 Student answers will vary, but should define "conformity" and link it to the scenario. A sample response is:

Conformity refers to the act of changing one's behaviour in response to social pressure. This pressure could be explicit or implicit. Throwing a bucket of ice over yourself is not normal behaviour; however, when people saw their friends, family or celebrities participating, they felt social pressure to conform to the group norm.

4 Student answers will vary. A sample response is:

Social media platforms, such as Instagram and Facebook, can enhance social connectedness and access to valuable information. In the Ice Bucket Challenge, social media facilitated a positive outcome for the ALS community by increasing awareness and raising funds. Despite good intentions, however, some people may have participated in the challenge without knowing what it was for. Additionally, online engagement doesn't always translate to real-world actions, meaning that people may have participated without donating; and the challenge may still have led to unhealthy social comparisons, such as between fans and celebrities.

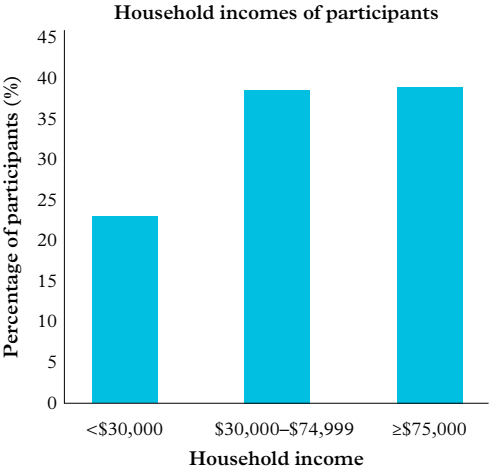
DATA DRILL 8

1 Student answers will vary, but should identify that the graph is a line graph and explain the features of the graph type that have made it the best choice. A sample response is:

Line graph. The independent variable in the study was the level of shock administered by the patients to the fake learner. The voltage increased in discrete 15 V increments. As there were many levels of the independent variable and they followed a sequential sequence, a line graph was the most appropriate graph to present the data.

2 **a** Gender (composition): pie chart; Race/ethnicity (composition): pie chart, Income (distribution): column graph

b



INVESTIGATION INSPECTOR 8

1 Student answers will vary, but should identify two limitations. Examples include that the fake prison experiment lacked ecological validity (it used an artificial environment), the sample was not representative, and the study cannot be replicated or reproduced due to ethical limitations, leading to low reliability. Students should explain each limitation, including how they know that it exists; then they should discuss the consequences of the limitation of the study's reliability and validity.

2 Student answers will vary, but should identify and describe possible modifications that future studies could implement to overcome each limitation.

EVALUATING ETHICS 8

1 Voluntary participation is an individual choice to take part in a study. This decision should be made without coercion, bribery, exploitation or undue influence. In contrast, the right to withdraw is a participant's right to leave the study after they have started it, without facing any repercussions.

2 Student answers will vary, but examples include that participants were unable to really give informed consent (e.g. the prisoners could not have known how dehumanising the experience was truly going to be), the right to withdraw was violated, and participants were harmed due to experiences of psychological distress.

3 Student answers will vary, but examples include withdrawal rights, the use of deception meaning that participants were unable to really give informed consent, and harm due to psychological distress.

RESEARCH REVIEW 8

1 Student answers will vary, but should describe a finding or outcome from the study, then identify an implication in a relevant population or field of study, or on society. Examples include: increasing understanding of how authority figures can influence the behaviour of others (leading to changes in how authority figures conduct themselves), recognising the ethical dilemmas and potential harm that can arise from psychological studies (leading to better guidelines around protecting participants), and understanding the dynamics of bullying in schools (leading to better approaches to tackling bullying).

2 Student answers will vary, but should describe a finding or outcome from the study, then identify an implication in a relevant population or field of study, or on society. Examples include: increasing understanding of how identity influences obedience (leading to better therapeutic approaches for helping people set boundaries), recognising the ethical dilemmas and potential harm that can arise from psychological studies (leading to better guidelines around protecting participants), and understanding how situational factors play a role in individual behaviour (leading to the fostering of empathy in the community).

3 Student answers will vary, but should describe a finding or outcome from the study, then identify an implication in a relevant population or field of study, or on society. Examples include raising awareness of peer pressure (leading to more resilience and confidence), increasing awareness of factors that influence behaviour (leading to individuals making better decisions), and opening up avenues for further research (leading to the expansion of knowledge).

Chapter 9

GROUNDWORK 9

1 A 2 D 3 B 4 B 5 B 6 A 7 C

8

Sense	Stimulus energy	Sensory organ	Sensory receptor
Sight	Light or electromagnetic energy	Eyes	Photoreceptors (rods and cones)
Taste	Chemical	Tongue	Taste receptors

9 Student answers will vary, but should outline the differences between automatic and controlled processes, with examples. A sample response is:

Automatic processes require minimal mental effort and are often tasks we are very familiar with, such as walking, or reading in our first language. Controlled processes, on the other hand, demand higher levels of conscious awareness and mental effort, such as learning a new language or solving a complex mathematical problem.

10 Student answers will vary, but should outline at least one similarity and at least one difference between bottom-up and top-down processing, with examples. A sample response is:

Bottom-up processing and top-down processing are both cognitive approaches to interpreting sensory information. Bottom-up processing is the formation of perceptions based on raw sensory input, without relying on prior knowledge, e.g. identifying an unknown fruit by observing its shape and smell. In contrast, top-down processing relies on perceptual set to make sense of the incoming stimuli, e.g. recognising the fruit as an apple because it matches your existing schema for apples. These processes are often interdependent, as prior experiences and knowledge may influence new sensory data and vice versa. A significance of the difference lies in how efficiently we process information: top-down processing allows for faster – although sometimes less accurate – interpretations based on past experiences and schemata than bottom-up processing.

CASE CRACKER 9

1 Student answers will vary, but should identify top-down processing as the cause of different perceptions of The Dress and provide a reason for this choice. A sample response is:

Biological factors influence sensation, and sensation is governed by bottom-up processing. The scenario identified that biological factors were controlled; therefore, differences are due to psychological factors related to perception, which are largely influenced by top-down processing. The researchers found that changes in light conditions affected interpretation; in other words, brightness/colour constancies, which are a psychological factor.

2 Student answers will vary, but should identify and describe brightness/colour constancy. A sample response is:

Brightness/colour constancy is the ability of our brains to correctly perceive the colour and brightness of objects even if they appear different due to changes in lighting conditions.

3 Rods detect black and white, and allow us to see dim light. Cones sense colour and allow us to see detail in bright light.

DATA DRILL 9

1 **a** 7 **b** 7 **c** 7

2 As the mean, median and mode for the data are the same, there is no one measure that is more appropriate than the other.

3 **a** 3.5 **b** 1.3

INVESTIGATION INSPECTOR 9

1 **a** Student answers will vary, but should identify that this results in incomplete data and explain the impact on certainty in the data. A sample response is:

Incomplete data increases uncertainty in the results because it makes the sample size smaller and potentially less representative. Additionally, the absence of these data points could skew the findings and raises questions about whether the missing data might have changed the outcomes sufficiently to change the conclusion of the study. Uncertainty in the conclusion of a study reduces internal validity.

b Student answers will vary, but should identify that this provides an alternative explanation and explain the impact on certainty in the data. A sample response is:

The complexity of the subject matter is a confounding variable. It offers an alternative explanation as it suggests that the complexity of the subject matter, rather than electronic device usage, might have affected academic performance. If the lectures where devices were allowed were inherently more difficult, it could falsely appear that device usage negatively impacts grades when, in reality, the subject matter is the influencing factor. The presence of a confounding variable increases the uncertainty as it reduces internal validity.

c Student answers will vary, but should identify that this results in contradictory data and explain the impact on certainty in the data. A sample response is:

The contradictory data introduces uncertainty by calling into question the validity of claims. If another study with a similar design yields opposite results, it makes it challenging to establish a clear and consistent relationship between non-academic electronic device usage and academic performance. This also reduces the external validity and ability to generalise results.

2 Student answers will vary, but a sample response is:

When a within-subjects design is used, each participant is exposed to all conditions of the experiment, and results from different conditions can be compared against the same participant. This is particularly useful if the dependent variable – which in this case is academic performance – is not standard across different individuals. Because academic performance can vary greatly among students, it is more effective to examine the effects of divided attention using a within-subjects design rather than a between-subjects design.

EVALUATING ETHICS 9

1 Student answers will vary, but should identify risks, hazards and management strategies.

2 Student answers will vary, but should identify that an informed consent document (including an explanatory statement) and/or briefing is required before the investigation. Consent would need to be obtained from the students and their parents or caregivers, likely in written form.

RESEARCH REVIEW 9

1 Students should underline the terms "you", "proven", "prove", "your", "always" and "we". The following points should also be made:
- "Prove" is never appropriate to use in scientific writing (alternatives are "support", "provide evidence for", etc.) In this case, "proven" also contradicts "not proven", which makes the analysis incorrect.
- Definitive terms such as "always" are rarely appropriate to use in psychology and definitely inappropriate in this example. "Always" also contradicts the term "generally".
- Third-person narrative should be used, so terms such as "I", "we", "you", "your", etc. are not appropriate.

2 **a** Student answers will vary, but should follow the APA guidelines for formatting references.

b Student answers will vary depending on the selected source, but should identify a limitation of the research, such as the sample not being representative, or having low accuracy, precision, repeatability, reproducibility or validity.

c Student answers will vary depending on the selected source, but should identify a strength of the research, such as the sample being representative, or having high accuracy, precision, repeatability, reproducibility or validity.

Chapter 10

GROUNDWORK 10

1 B **2** C **3** B **4** C **5** B **6** B

7 A visual illusion is a figure structured so that perception will consistently differ from objective reality.

8 Vision, taste, smell and touch

9 In a three-dimensional world, we maintain constant perception of the size of a familiar object by considering its distance from us. We mentally make a three-dimensional form of each figure, using familiar objects to do so. This causes the observer to perceive things with error.

10 A supertaster is an individual with an increased sensitivity to certain flavours, often bitter, due to a higher number of taste buds on their tongue. The TAS2R38 gene predisposes them to having more papillae, and therefore, more taste buds, leading to heightened taste perception.

CASE CRACKER 10

1 Occipital lobe

2 Student answers will vary, but should outline at least one similarity and at least one difference between visual agnosia and spatial neglect. A sample response is:

Visual agnosia and spatial neglect are both neurological conditions that affect visual perception. Visual agnosia is the inability to name, recognise or describe an object by looking at it. It is usually linked to damage along neural pathways that connect the occipital lobe to the parietal or temporal lobes. Spatial neglect on the other hand, affects a person's ability to perceive or respond to stimuli on one side (usually the left) of their body, typically due to right parietal lobe damage. The similarity highlights the brain's role in "seeing", while the difference highlights the specialised functions of different brain regions in visual perception.

3 Dr P likely also experienced spatial neglect, at least in the context of visual memory. This was evident when he was asked to recall features of an area he knew well and he only described buildings on his right-hand side. It is unclear from the scenario, however, whether he experienced spatial neglect in real life or only in his memory.

DATA DRILL 10

1 Student answers may vary, but should use at least one of the following terms: discrete, categorical, qualitative, nominal.

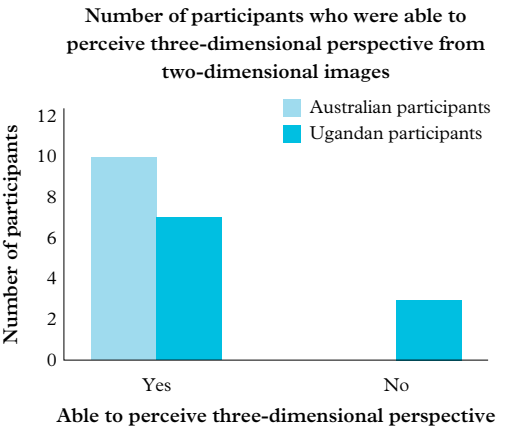
2 Student answers may vary, but tables should include a title, the groups (IV) in the first column and the measured outcomes (DV) in the next columns. "*n*" indicates the number of participants in each group. An example is:

Able to perceive three-dimensional perspective from two-dimensional image?	*n*	Yes	No
Australian participants	10	10	0
Ugandan participants	10	7	3

3 Bar chart, because the aim of the investigation is to compare the outcomes between two groups.

4 Student answers may vary, but graphs should include a title, labelled axes, appropriate scales and a key/legend.

An example is:



INVESTIGATION INSPECTOR 10

1 IV: priming images to influence perceptual set (human faces or animals); DV: perception (rat/animal or man)

2 Student answers will vary, but should identify that a between-subjects design uses different participants for each condition, which was necessary for this study, and should explain why, with reference to priming. A sample response is:

Researchers expected that priming would alter participants' perceptual set. Therefore, once participants had seen and interpreted the ambiguous rat-man image, they were unlikely to change their perception even when primed with different images. If they did alter their perception of the image, then it may be due to a confounding variable rather than perceptual set. Therefore, to measure the effect of perceptual set, they had to use different participants in each group, i.e. a between-subjects design.

3 Qualitative data

EVALUATING ETHICS 10

1 D

2 A

3 Student answers will vary, but should outline at least one similarity and one difference between debriefing and non-maleficence. A sample response is:

Debriefing and non-maleficence are both ethical considerations in psychological research aimed at protecting participants by minimising harm. Debriefing is a specific procedure that takes place after the study has concluded to ensure that participants leave with a correct understanding of the investigation and are provided with psychological support if required. On the other hand, non-maleficence is a broader ethical concept that applies throughout the research process. It informs whether a debriefing is necessary and when it should be conducted.

RESEARCH REVIEW 10

1 D

2 Student answers will vary, but should identify that differences in language sounds (verbal) and non-verbal cues (lip reading) could differ across cultures and, therefore, impact whether the effect occurs and the extent to which it occurs.

3 Student answers will vary, but should identify a modification related to the sample or stimulus. A sample response is:

To make the study more culturally inclusive, it could be adapted to include participants from a range of cultural backgrounds and languages. Researchers could also consider using culturally neutral or universally understood non-verbal cues and facial expressions.

Chapter 11

INVESTIGATION INSPECTOR 11.1

1 Student answers will vary depending on the investigation they have selected, but should identify and describe two limitations.

2 a Student answers will vary, but should identify and describe a change that will improve the accuracy, validity, precision, repeatability or reproducibility of the original investigation.

b Student answers will vary, but should identify the expected outcome and explain how it will result in improved accuracy, validity, precision, repeatability or reproducibility.

3 a Student answers will vary, but should outline what the investigation will set out to do.

b Student answers will vary, but should identify one or more variables that will be manipulated (IV) and one or more variables that will be measured (DV).

c Student answers will vary, but should include a prediction of the relationship between the IV and DV, and a short explanation.

DATA DRILL 11.2

1 a Student answers will vary, but should identify a personal error and use the data as evidence to explain how they identified the error. A sample response is:

Analysis of the table indicates the presence of either an outlier or personal error. On day 3, the sleep duration of participant 9 was recorded as 0.8 hours. This is an outlier both for the participant (comparing between days) and compared to the other participants. This could have been a personal error, such as incorrectly recording or calculating sleep duration, or perhaps the participant was staying up all night, e.g. studying for an exam.

b Student answers will vary, but should suggest an improvement related to the error they described in part **a**. A sample response is:

The researcher could check with the participant to confirm whether they did in fact only sleep 0.8 hours on that day. They could also check that their calculation of sleep duration is correct.

2 a Student answers may vary, but should identify a systematic error and use the data and the description in the question stem as evidence to explain how they identified the error. A sample response is:

People do not tend to fall asleep and wake up abruptly. Therefore, if participants were recording the time a while before actually falling asleep and, similarly, recording the time a while after waking up, their sleep duration would be longer than the true value. This would increase all participants' duration of sleep, making it appear longer than what it really is. This is a type of systematic error.

b Student answers will vary, but should suggest an improvement related to the error they described in part a. A sample response is:

The researcher could use a digital device to more accurately record participants' sleep duration.

RESEARCH REVIEW 11.3

1 a Climate change is a major concern (Johnson, 2020).

b Student answers may vary, depending on how they rewrite the sentence. A sample response is:

In Johnson's 2020 study, it is stated that climate change is a major concern.

c The concern for climate change is major (Johnson, 2020).

2 a Student answers will vary.

b Student answers will vary.

c Student answers will vary.

d Student answers will vary.

Unit 2 practice exam

Multiple choice

1 B	**2** D	**3** B	**4** C	**5** C
6 B	**7** A	**8** D	**9** B	**10** A
11 A	**12** B	**13** A	**14** D	**15** D

Short answer

1 a Both dispositional and situational factors are attributions. (1 mark) However, a dispositional factor is an internal attribution (1 mark) and a situational factor is an external attribution. (1 mark) In this scenario, the dispositional factor was the friend's quietness and the situational factor was that he had a bad day. (1 mark)

b Self-schema is a mental framework that consists of the knowledge and beliefs we hold about ourselves. (1 mark) In this situation, Emily knows that she loves charades. (1 mark) On the other hand, egocentric pattern projection is where self-schema is projected onto others. (1 mark) Emily has projected her love for charades onto the others at the party; she has assumed that they will feel the same way about the game as she does. (1 mark)

2 Social comparison is where individuals assess and evaluate themselves by comparing their traits to those of others. (1 mark) In Mr. Gallaway's study, students using Instagram and TikTok (which present highly curated facets of other individuals), generally reported lower levels of happiness compared to students using Discord and YouTube (which are typically used for a broader range of purposes). (1 mark) Social comparison could play a role here, as students could be comparing themselves to unrealistic portrayals of individuals online, which could cause them to experience reduced self-esteem. (1 mark)

3 a Participants playing the guards were given a higher status than the prisoners. (1 mark) This gave them power and led them to adopt authoritarian roles, and display abusive and degrading behaviour. (1 mark) On the other hand, the prisoners were completely submissive to the guards. (1 mark)

b Group pressure involves a group's influence on an individual, causing them to change their behaviour. (1 mark) In Zimbardo's experiment, the prisoners conformed to their roles with group pressure from the guards. (1 mark) This resulted in a high level of obedience, as the prisoners obeyed the authority of the guards. (1 mark)

c Deindividuation is the loss of individual identifying characteristics in a certain setting. (1 mark) The guards conformed to their authoritarian roles and behaved more severely to the prisoners than they would have in a normal situation. (1 mark)

d Student answers will vary, but may explain non-maleficence, withdrawal rights, debriefing or beneficence. A sample response is: Zimbardo's experiment breached the ethical concept of non-maleficence. (1 mark) His experiment caused significant harm to participants. (1 mark)

4 a A learning disability such as ADHD could decrease the ability for sustained attention. (1 mark)

b Student answers will vary, but should state any three of the following: decreased performance of both tasks decreased understanding of tasks, poorer retention of information from tasks, increase in stress, or mental fatigue. (3 marks)

5 a Perceptual set is the combination of past experiences, knowledge, expectations, motivations, culture, beliefs and emotions unique to an individual, which heavily influences how we perceive stimuli. (1 mark) Mark is likely to perceive a small, dark shape to be a spider, as his perceptual set primes him to react with fear to spiders, which are small, dark shapes. (1 mark)

b Student answers will vary, but a sample response is:

- Colour vision deficiency – Mark could have an eye condition that results in reduced sensitivity to certain wavelengths or "colour blindness". (1 mark)
- Age – Depending on Mark's age, the lenses of his eyes may have lost flexibility over time, making it more difficult to focus (presbyopia). (1 mark)

c Prosopagnosia (1 mark)

Unit 1&2 Practice exam

Multiple choice

1 C	**2** B	**3** C	**4** D	**5** B
6 A	**7** D	**8** C	**9** C	**10** A
11 A	**12** D	**13** B	**14** C	**15** B
16 A	**17** D	**18** A	**19** D	**20** C
21 C	**22** B	**23** A	**24** A	**25** B

Short answer

1 a Controlled experiment (1 mark)

b IV: social media use (1 mark); DV: self-esteem (1 mark)

c Student answers will vary, but example confounding variables include: frequency and duration of social media use, and types of social media platforms. (1 mark)

d i Student answers may vary, but should use at least one of the following terms: quantitative, numerical or ordinal. (1 mark)

ii Surveys could be open to bias if participants are trying to appear in a particular way. (1 mark)

2 a Both sensitive and critical periods are periods in which an individual's development is more responsive to experiences from their environment. (1 mark) However, if an individual is not exposed to a specific learning experience during a critical period, their development will be disrupted or fail to occur. (1 mark) In the scenario, Rahul has likely missed the critical period for language acquisition. (1 mark) On the other hand, his sister is likely still within the critical period for language acquisition and thus picks up the new language more quickly. (1 mark)

b Conservation (1 mark)

c Concrete operational stage of development (1 mark)

d Genetic predisposition (1 mark)

3 a Adaptive behaviours allow individuals to grow and successfully cope in their environment, whereas maladaptive behaviours reduce their personal growth and ability to adapt to their environment. (1 mark) Jason is exhibiting maladaptive behaviour as he is isolating himself from his peers, hindering his ability to build relationships. (1 mark)

b Student answers will vary, but should identify (1 mark) and then describe (1 mark) one of the following approaches to normality: sociocultural, functional, historical, statistical, situational or medical.

c Clinical psychologist (1 mark)

d There is a strong relationship between cognition and behaviour. (1 mark) Cognitive behavioural therapy (CBT) is an approach to treating maladaptive thoughts/behaviours by first identifying them, then replacing them with adaptive thoughts/behaviours. (1 mark) In Jason's case, CBT could help by targeting unhelpful thoughts and easing his anxiety. (1 mark)

4 a Selena suffered damage to her left frontal lobe. (1 mark) Her symptoms, relating speech production, correspond to functions of Broca's area (1 mark). Broca's area is located in the left frontal lobe. (1 mark)

b The doctors could have used an MRI scan, which provides detailed images of the brain's structure. (1 mark) This would have helped identify any potential regions of damage or abnormality in Selena's brain. (1 mark)

c Broca's aphasia (1 mark)

d Student answers will vary, but a strength of case studies is that researchers can conduct detailed studies into experiences that may be unethical or impossible to replicate, or they can lead to new research. (1 mark) A limitation could be a small sample size, a sample that is not representative, or limited generalisability (low external validity). (1 mark)

5 a The cerebrum initiates voluntary movement and is involved in motor planning, whereas the cerebellum fine-tunes the voluntary movement needed for balance and posture. (1 mark)

b Learning a new skill is facilitated by long-term potentiation. (1 mark) This involves the persistent strengthening of a synapse that improves the communication between two neurons. (1 mark)

c Student answers may vary, but should describe one of the following: changes to his relationships, social isolation, changes to his role in the workplace, or communication difficulties. (1 mark)

d Student answers may vary, but should describe a method to improve memory, such as writing information down, asking people to slow down and repeat information, using checklists or keeping a journal. (1 mark)

6 a Affective and behavioural components (1 mark)

b Cognitive dissonance is an unpleasant psychological state of tension or anxiety when two or more cognitions or a cognition and a behaviour are inconsistent with one another. (1 mark) In this case, Castiel is experiencing cognitive dissonance because his strong feelings against people who are racist (cognition) is not consistent with him laughing at his boss' racist joke (behaviour). (1 mark)

c Castiel's behaviour can be explained by conformity. (1 mark) Conformity is the act of changing one's behaviours, thoughts or feelings to match the responses of others in a group. (1 mark) Group pressure could have caused Castiel to change his behaviour to match or conform with the group. (1 mark)

d Status is an individual's position in a group relative to others, whereas power refers to the capacity to influence others and resist attempts of influence by others. (1 mark) Status typically dictates a person's level of power. (1 mark) In the scenario, Castiel has a lower status and less power compared to his boss because of their hierarchy at work. (1 mark)

e Frontal lobe (or prefrontal cortex) (1 mark)

7 **a** Reception: chemicals from the food are detected by sensory receptors in the tongue (taste buds or chemoreceptors). (1 mark)
Transduction: chemical energy from the binding of food particles to chemoreceptors is converted into nerve impulses. (1 mark)
Transmission: nerve impulses are relayed to the primary gustatory cortex in the brain. (1 mark)

b Student answers will vary, but should describe one of the following: packaging and appearance, food colour, education and upbringing, past experiences or mood. (1 mark)

c Both convergence and accommodation are involved in depth perception. (1 mark) Convergence is a binocular cue that does this by sensing the degree of rotation of our eyes inwards, whereas accommodation is a monocular cue that does this by sensing the tension in the muscles that control the lenses in our eyes. (1 mark)

REFERENCES

Ainsworth, M. D., Bell, S. M., & Stayton, D. J. (1971). Individual differences in strange-situation behaviour of one-year-olds. In H. R. Schaffer, *The origins of human social relations*. Academic Press.

Asch, S. E. (1951). Effects of group pressure upon the modification and distortion of judgments. In H. Guetzkow (Ed.), *Groups, leadership and men: Research in human relations* (pp. 177–190). Carnegie Press.

Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological Monographs: General and Applied, 70*(9), 1–70. https://doi.org/10.1037/h0093718

Berkes M., & Bialystok, E. (2022). Bilingualism as a contributor to cognitive reserve: What it can do and what it cannot do. *American Journal of Alzheimer's Disease & Other Dementias, 37*. https://doi.org/10.1177/15333175221091417

Blakemore, C., & Cooper, G. (1970). Development of the brain depends on the visual environment. *Nature, 228*, 477–478. https://doi.org/10.1038/228477a0

Bugelski, B. R., & Alampay, D. A. (1961). The role of frequency in developing perceptual sets. *Canadian Journal of Psychology / Revue canadienne de psychologie, 15*(4), 205–211. https://doi.org/10.1037/h0083443

Carskadon, M. A. (2011). Sleep's effects on cognition and learning in adolescence. *Progress in Brain Research, 190*, 37–143. https://doi.org/10.1016/B978-0-444-53817-8.00008-6

Craik, F. I. M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology: General, 104*(3), 268–294. https://doi.org/10.1037/0096-3445.104.3.268

Deregowski, J. B., Muldrow, E. S., & Muldrow, W. F. (1972). Pictorial recognition in a remote Ethiopian population. *Perception*, *1*(4), 417–425. https://doi.org/10.1068/p010417

Dominus, S. (2015, July 11). Identical sets of twins are the mixed-up brothers of Bogota. *The Sydney Morning Herald*.

Erikson, E. H. (1964). *Childhood and society* (2nd ed.). W. W. Norton.

French, J. R. P., Jr., & Raven, B. (1959). The bases of social power. In D. Cartwright (Ed.), *Studies in social power* (pp. 150–167). University of Michigan.

Gadsby, H. (2022). *Ten steps to Nanette: A memoir situation*. Allen & Unwin.

Gazzaniga, M. S. (1967). The split brain in man. *Scientific American*, *217*(2), 24–29.

Glass, A. L., & Kang, M. (2019). Dividing attention in the classroom reduces exam performance. *Educational Psychology, 39*(3), 395–408. https://doi.org/10.1080/01443410.2018.1489046

Gordon, M., & Beachley, L. (2009). *Layne Beachley: Beneath the waves*. Penguin Books.

Haney, C., Banks, C., & Zimbardo, P. (1973). Interpersonal dynamics in a simulated prison. *International Journal of Criminology & Penology*, *1*(1), 69–97.

Harlow, H. F., & Zimmermann, R. R. (1958). The development of affectional responses in infant monkeys. *Proceedings of the American Philosophical Society, 102*, 501–509.

Harter, S. (2012). *Self-perception profile for adolescents (SPPA)* [Database record]. APA PsycTests. https://doi.org/10.1037/t05703-000

Hubel, D. H., & Wiesel, T. N. (1962). Receptive fields, binocular interaction and functional architecture in the cat's visual cortex. *The Journal of physiology*, *160*(1), 106–154. https://doi.org/10.1113/jphysiol.1962.sp006837

Lafer-Sousa, R., Hermann, K. L., & Conway, B. R. (2015). Striking individual differences in color perception uncovered by the dress photograph. *Current Biology: CB*, *25*(13), 545–546. https://doi.org/10.1016/j.cub.2015.04.053.

Narr. Allison Langdon. (2023, September 12). Maori veteran says he was kicked out of Perth pub for face tattoo. *A Current Affair*. Channel 9 [Video file].

Liu, H., & Wu, L. (2021). Lifelong bilingualism functions as an alternative intervention for cognitive reserve against Alzheimer's disease. *Frontiers in Psychiatry, 12*(696015). https://doi.org/10.3389/fpsyt.2021.696015

Maguire, E. A., Woollett, K., & Spiers, H. J. (2006). London taxi drivers and bus drivers: A structural MRI and neuropsychological analysis. *Hippocampus*, *16*(12), 1091–1101. https://doi.org/10.1002/hipo.20233

McGarrigle, J., & Donaldson, M. (1974). Conservation accidents. *Cognition: International Journal of Cognitive Psychology, 3*(4), 341–350. https://doi.org/10.1016/0010-0277(74)90003-1

McGurk, H., & MacDonald, J. (1976). Hearing lips and seeing voices. *Nature, 264*(5588), 746–748. https://doi.org/10.1038/264746a0

Mechelli, A., Crinion, J. T., Noppeney, U., O'Doherty, J., Ashburner, J., Frackowiak, R. S., & Price, C. J. (2004). Structural plasticity in the bilingual brain: Proficiency in a second language and age at acquisition affect grey-matter density. *Nature, 431*(7010), 757. https://doi.org/10.1038/431757a

Milgram, S. (1963). Behavioral study of obedience. *The Journal of Abnormal and Social Psychology, 67*(4), 371–378. https://doi.org/10.1037/h0040525

Morris, R. G. M. (1981). Spatial localization does not require the presence of local cues. *Learning and Motivation, 12*(2), 239–260. https://doi.org/10.1016/0023-9690(81)90020-5

National Health and Medical Research Council. (2013). *Australian code for the care and use of animals for scientific purposes* (8th ed.). NHMRC.

Piaget, J. (1971). The theory of stages in cognitive development. In D. R. Green, M. P. Ford, & G. B. Flamer, *Measurement and Piaget*. McGraw-Hill.

Primack, B. A., Shensa, A., Sidani, J. E., Whaite, E. O., Lin, L. Y., Rosen, D., Colditz, J. B., Radovic, A., & Miller, E. (2017). Social media use and perceived social isolation among young adults in the U.S. *American Journal of Preventive Medicine, 53*(1), 18. https://doi.org/10.1016/j.amepre.2017.01.010

Raine, A., Buchsbaum, M., & LaCasse, L. (1997). Brain abnormalities in murderers indicated by positron emission tomography. *Biological Psychiatry, 42*(6), 495–508. https://doi.org/10.1016/S0006-3223(96)00362-9

Rands, M. L., & Gansemer-Topf, A. M. (2017). The room itself is active: How classroom design impacts student engagement. *Journal of Learning Spaces, 6*(1), 2633.

Sacks, O. (1985). *The man who mistook his wife for a hat and other clinical tales*. Summit Books.

Shimizu, T., Abe, T., Akasaki, Y., & Kamiishi, H. (2020). Unilateral spatial neglect. *BMJ Case Reports, 13*(11), e239770. https://doi.org/10.1136/bcr-2020-239770

Smith, J. L., Allen, J. W., Haack, C., Wehrmeyer, K., Alden, K., Lund, M. B., & Mascaro, J. S. (2021). The impact of app-delivered mindfulness meditation on functional connectivity and self-reported mindfulness among health profession trainees. *Mindfulness, 12*(1), 92–106. https://doi.org/10.1007/s12671-020-01502-7

Sperry, R. W. (1968). Hemisphere deconnection and unity in conscious awareness. *American Psychologist, 23*(10), 723–733. https://doi.org/10.1037/h0026839

Yarmey, A. D. (1993). Stereotypes and recognition memory for faces and voices of good guys and bad guys. *Applied Cognitive Psychology, 7*(5), 419–431. https://doi.org/10.1002/acp.2350070505.

Zhuang, X., Bennett, L., Nandy, R., Cordes, D., Bernick, C., & Ritter, A. (2022). Longitudinal changes in cognitive functioning and brain structure in professional boxers and mixed martial artists after they stop fighting. *Neurology, 99*(20), e2275–e2284. https://doi.org/10.1212/WNL.0000000000201158

ACKNOWLEDGEMENTS

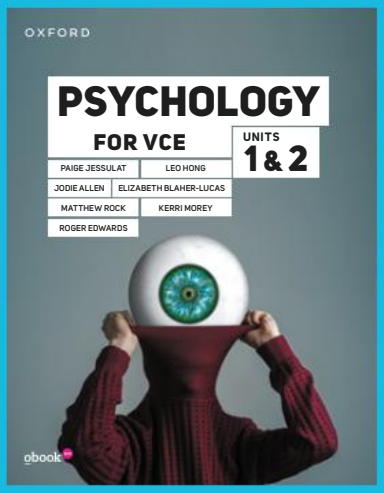
The author and the publisher wish to thank the following copyright holders for reproduction of their material.

Cover: Francesco Carta fotografo / Getty Images. **Table of contents**: maradaisy/Shutterstock.

Chapter 1: SewCreamStudio/Shutterstock, p.2; Antonio Guillem/Shutterstock, p.5 fig 3; GaudiLab/Shutterstock, p.7 fig 1; Akaberka/Shutterstock, p.9 fig 2; Donjoy_2004/Shutterstock, p.15 fig 1; JuliusKielaitis/Shutterstock, p.17 fig 1; jannoon028/Shutterstock, p.10 bottom; Lysenko Andrii/Shutterstock, p.16 fig 2; Kotomiti Okuma/Shutterstock, p.19 fig 4; Thx4Stock team/Shutterstock, p.18 fig 2; sebra/Shutterstock, p.11 fig 3. **U1 opener:** Klaus Vedfelt/Getty Images, p.20 fig 1. **Chapter 2:** Black Salmon/Shutterstock, p.22 fig 1; Buzz Pictures/Alamy Stock Photo, p.26 fig 2; Ground Picture/Shutterstock, p.27 fig 3; Pumidol/Shutterstock, p.29 fig 5; Photographed by Natalio Cosoy, sourced from BBC News at bbc.co.uk/news, p.30 fig 6; George Filyagin/Shutterstock, p.24 fig 1; Hyejin Kang/Shutterstock, p.28 fig 4. **Chapter 3:** Vitalii Vodolazskyi/Shutterstock, p.31; Everett Collection Inc/Alamy Stock Photo, p.35 fig 3; Gorodenkoff/Shutterstock, p.37 fig 5; Pladaphoto/Shutterstock, p.39 fig 7; Sue McDonald/Shutterstock, p.33 fig 1; mariakray/Shutterstock, p.34 fig 2; 3rdtimeluckystudio/Shutterstock, p.38 fig 6. **Chapter 4:** ALFRED PASIEKA/SCIENCE PHOTO LIBRARY/Getty Images, p.40; Michael William/Shutterstock, p.46 fig 3; PA Images/Alamy Stock Photo, p.47 fig 4; mmzgombic/Shutterstock, p.42 fig 1; wadstock/Shutterstock, p.45 fig 2. **Chapter 5:** Sadoglu Media/Shutterstock, p.49; 9nong/Shutterstock, p.53 fig 3; Nicholas Rjabow/Shutterstock, p.55 fig 4; MaartenGR/Shutterstock, p.57 fig 5; Lightspring/Shutterstock, p.50 fig 1; Oksana Kuzmina/Shutterstock, p.52 fig 2. **Chapter 6:** Olena Yakobchuk/Shutterstock, p.61 fig 3; Amy Johansson/Shutterstock, p.58; bump23/Shutterstock, p.59 fig 1; Kamil Zajaczkowski/Shutterstock, p.60 fig 2a; PeopleImages.com - Yuri A/Shutterstock, p.60 fig 2b; fizkes/Shutterstock, p.64 fig 4. **U2 opener:** Pixel-Shot/Shutterstock, p.72 fig 1. **Chapter 7:** Jacob Lund/Shutterstock, p.74; Reddavebatcave/Shutterstock, p.81 fig 3; Ka Iki/Shutterstock, p.76 fig 1. **Chapter 8:** Veja/Shutterstock, p.89 fig 2; LightField Studios/Shutterstock, p.93 fig 4; Danielle Balderas/Shutterstock, p.94 fig 5; CRS PHOTO/Shutterstock, p.85; New Africa/Shutterstock, p.88 fig 1. **Chapter 9:** Sheila Fitzgerald/Shutterstock, p.95; © Cecilia Bleasdale, p.98 fig 2; kazoka/Shutterstock, p.99 fig 3a; REDPIXEL.PL/Shutterstock, p.99 fig 3b; kaband/Shutterstock, p.96 fig 1. **Chapter 10:** R.M. Nunes/Shutterstock, p.104; LightField Studios/Shutterstock, p.110 fig 3; Prostock-studio/Shutterstock, p.111 fig 4; roberaten/Shutterstock, p.105 fig 1. **Chapter 11:** Inspiration GP/Shutterstock, p.112; Roman Samborskyi/Shutterstock, p.115 fig 1. Chapter 11B: © Australian Institute of Health and Welfare 2023, p.126 fig 1. **Investigations:** Nixx Photography/Shutterstock, p.141 fig 1; Caters Media Group, p.143 fig 1; Zamrznuti tonovi/Shutterstock, p.148 fig 1; Shutterstock/Slatan, p.154 fig 1; sasirin pamai/Shutterstock, p.154 fig 2; Hannamariah/Shutterstock, p.154 fig 3; asobov/Shutterstock, p.154 fig 4; Picture Store/Shutterstock, p.154 fig 5; Matt Benzero/Shutterstock, p.154 fig 6; siam.pukkato/Shutterstock, p.154 fig 7; Olekon/Shutterstock, p.154 fig 8; Giedrius Akelis/Shutterstock, p.156 fig 1; photosync/Shutterstock, p.158 fig 1; © Hayley Dixon/Telegraph Media Group Limited 2013, p.142; RSplaneta/Shutterstock, p.134 fig 1; jinnawat tawong/Shutterstock, p.144 fig 1; Vorobyeva/Shutterstock, p.133 fig 1.

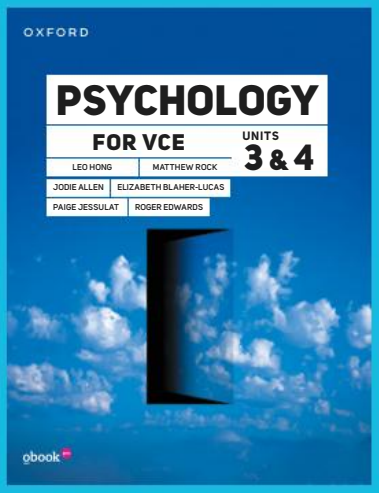
Selected extracts from the VCE Psychology Study Design (2023-2027), are reproduced by permission, © VCAA. VCE® is a registered trademark of the VCAA. The VCAA does not endorse or make any warranties regarding this study resource. Past VCE exams and related content can be accessed directly at www.vcaa.vic.edu.au

UNITS 1 & 2

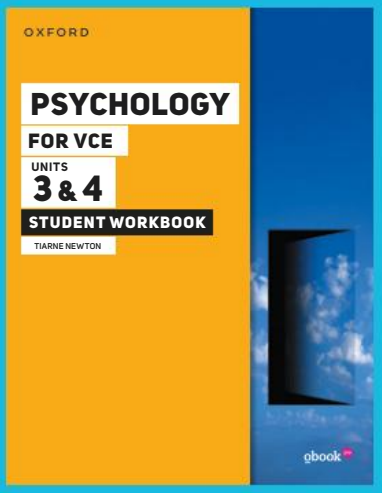


Psychology for VCE
Units 1 & 2
Student Book
ISBN 9780190338015

UNITS 3 & 4



Psychology for VCE
Units 3 & 4
Student Book
ISBN 9780190338091



Psychology for VCE
Units 3 & 4
Student Workbook
ISBN 9780190338107

OXFORD UNIVERSITY PRESS

visit us at **oup.com.au** or
contact customer support at **oup.com.au/help**