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John GRIVAS

PSYCHOLOGY

VCE UNITS 1 AND 2

EIGHTH EDITION



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CONTENTS

<i>Preface</i>	vii
<i>Contents matrix: chapter coverage of the study design</i>	xi
<i>About eBookPLUS</i>	xiv
<i>Acknowledgements</i>	xv

PSYCHOLOGY — INTRODUCTION AND RESEARCH METHODS

CHAPTER 1

Introduction to psychology	3
Defining psychology and its subject matter	4
Scientific nature of psychology	6
Scientific vs non-scientific explanations	7
Classic and contemporary perspectives in psychology	11
Careers and areas of specialisation in psychology	11
Overview of VCE Psychology	15
Course outline.....	15
Assessment.....	15
Chapter summary	17

CHAPTER 2

Research methods in psychology	19
Steps in psychological research	20
Step 1: Identify the research topic.....	21
Step 2: Formulate the research hypothesis.....	22
Step 3: Design the research	22
Step 4: Collect the data	22
Step 5: Analyse the data.....	22
Step 6: Interpret and evaluate the results	22
Step 7: Report the research and findings.....	24
Research methods	25
Sample and population.....	25
Research hypothesis.....	26
Experimental research	28
Advantages and limitations of experimental research.....	52
Cross-sectional studies	56
Case studies	58
Observational studies.....	60
Self-reports.....	65

Types of data	70
Primary and secondary data.....	70
Qualitative and quantitative data	70
Organising, presenting and interpreting data	74
Descriptive statistics.....	74
Inferential statistics	84
Conclusions and generalisations.....	85
Reliability and validity in research.....	86
Ethics in psychological research and reporting	90
National Statement on Ethical Conduct in Human Research	91
Role of ethics committees.....	92
Australian Privacy Principles	92
Role of the experimenter	93
Use of animals in psychological research	96
Reporting conventions	99
Written report.....	100
Poster report	101
Chapter summary	106
Key terms	107
Learning checklist	108
Chapter test	110

Unit 1

HOW ARE BEHAVIOUR AND MENTAL PROCESSES SHAPED?

CHAPTER 3

Role of the brain in mental processes and behaviour	121
Complexity of the brain	122
Approaches over time to understanding the role of the brain	124
Brain versus heart debate	125
Mind-body problem	126
Phrenology	129

First brain experiments	132	Learning checklist	214
Brain ablation experiments.....	132	Chapter test	215
Electrical stimulation of the brain.....	133		
Neuroimaging techniques.....	138	CHAPTER 5	
Nervous system: structure and function	145	The complexity of psychological development	219
Organisation of the nervous system.....	146	Defining development	220
Central nervous system.....	146	Areas of development	221
Peripheral nervous system.....	148	Interaction of different areas of development	222
Role of the neuron	150	How psychological development proceeds	224
Structure of a neuron.....	151	Continuous versus discontinuous development.....	224
Types of neurons.....	152	Sequential nature of development.....	225
Glial cells	154	Quantitative and qualitative changes.....	225
Astrocytes.....	154	Individual differences in development.....	225
Microglia.....	154	Interaction of hereditary and environmental factors in shaping psychological development	228
Oligodendroglia.....	154	Nature versus nurture.....	229
Schwann cells.....	154	Role of maturation in development.....	232
Structure and function of brain areas	155	Sensitive and critical periods in psychological development	237
Hindbrain.....	156	Sensitive periods.....	237
Midbrain.....	157	Critical periods.....	238
Forebrain.....	158	Twin studies and adoption studies	240
Roles of the cerebral cortex	162	Twin studies.....	240
Cerebral hemispheres.....	163	Adoption studies.....	242
Hemispheric specialisation.....	163	Attachment and emotional development	244
Cortical lobes of the cerebral cortex.....	165	Ainsworth and the Strange Situation procedure.....	245
Chapter summary	174	Harlow's experiments on attachment in monkeys.....	253
Key terms	175	Development of cognitive abilities	257
Learning checklist	176	Key principles of Piaget's theory.....	258
Chapter test	178	Piaget's four stages of cognitive development.....	260
		Sensorimotor stage (0–2 years).....	261
CHAPTER 4		Pre-operational stage (2–7 years).....	262
Brain plasticity and brain damage	185	Concrete operational stage (7–12 years).....	266
Brain development in infancy and adolescence	186	Formal operational stage (12+ years).....	267
Development of myelin.....	187	Criticisms of Piaget's theory.....	269
Synaptogenesis and synaptic pruning.....	187	Psychosocial development	270
Frontal lobe development.....	188	Stage 1: Trust versus Mistrust (0 to 12–18 months).....	272
Impact of injury to the cerebral cortex and adaptive plasticity	190	Stage 2: Autonomy versus Shame and doubt (12–18 months to 3 years).....	273
Impact of injury to the cerebral cortex.....	192	Stage 3: Initiative versus Guilt (3–5 years).....	274
Brain plasticity.....	200	Stage 4: Industry versus Inferiority (5–12 years).....	275
Parkinson's disease	205	Stage 5: Identity versus Role confusion (12–18 years).....	276
Symptoms.....	206		
Diagnosis and treatment.....	207		
Use of animal studies and neuroimaging techniques to develop understanding of Parkinson's disease.....	208		
Chapter summary	213		
Key terms	214		

Stage 6: Intimacy versus Isolation (18–25 years)	277	Types of psychotic disorders.....	342
Stage 7: Generativity versus Stagnation (25–65 years)	278	Contributing factors.....	343
Stage 8: Integrity versus Despair (65+ years).....	279	The ‘two-hit’ hypothesis as an explanation for the development of schizophrenia	347
Criticisms of Erikson’s theory.....	280	Treatment.....	348
Chapter summary	282	Chapter summary	353
Key terms	283	Key terms	354
Learning checklist	284	Learning checklist	354
Chapter test	286	Chapter test	357

CHAPTER 6

Atypical psychological development.....

Approaches to describing normality	292
Socio-cultural approach.....	292
Functional approach.....	293
Historical approach.....	293
Medical approach.....	293
Statistical approach.....	293
Situational approach.....	293
Conceptualisation of normality	294
Typical and atypical behaviours.....	294
Adaptive and maladaptive behaviours.....	294
Mental health and mental disorder	296
Mental health as a product of internal and external factors	300
Categories of mental disorders	304
Incidence of mental disorder in Australia.....	305
Labelling someone with a mental disorder	307
Rosenhan’s (1973) research on labelling.....	307
Addiction disorders	310
Types of addiction disorders.....	311
Contributing factors.....	314
Treatment.....	318
Anxiety disorders	320
Types of anxiety disorders.....	321
Contributing factors.....	322
Treatment.....	324
Mood disorders	325
Types of mood disorders.....	326
Contributing factors.....	328
Treatment.....	332
Personality disorders	335
Types of personality disorders.....	335
Contributing factors.....	337
Treatment.....	338
Psychotic disorders	340
Key symptoms.....	340

Unit 2

HOW DO EXTERNAL FACTORS INFLUENCE BEHAVIOUR AND MENTAL PROCESSES?

CHAPTER 7

Sensation and perception.....

Distinction between sensation and perception	364
Reception, processing and interpretation of sensory information	365
Reception and receptive fields.....	365
Transduction.....	366
Transmission.....	366
Interpretation.....	366
Visual perception	368
From eye to brain.....	369
Visual perception principles.....	374
Taste perception	398
From mouth to brain.....	398
Five basic tastes.....	400
Influences on taste perception	401
Age.....	401
Genetics.....	402
Perceptual set – food packaging and appearance.....	403
Culture.....	405
Chapter summary	409
Key terms	410
Learning checklist	411
Chapter test	412

CHAPTER 8

Distortions of perception.....

Visual illusions	419
Müller-Lyer illusion.....	420
Ames room illusion.....	422

Judgment of flavours	425	Learning checklist	484
Perceptual set	425	Chapter test	486
Colour intensity	427		
Texture	428	CHAPTER 10	
Synaesthesia	430	Social influences on behaviour	491
Explanations of synaesthesia	432	Social influence	492
Chapter summary	435	What is a group?	493
Key terms	436	Status and social power within groups	495
Learning checklist	436	Types of social power	495
Chapter test	437	Influence of status and social power	
		within groups	498
CHAPTER 9		Zimbardo's Stanford Prison Experiment	498
Social cognition	441	Obedience	504
Person perception – forming impressions of		Milgram's experiments on obedience	505
other people	443	Factors affecting obedience	507
Impressions from physical appearance	444	Conformity	512
Impressions from non-verbal communication	444	Asch's experiments on conformity	513
Attribution – explaining behaviour	450	Factors affecting conformity	515
The fundamental attribution error	451	Influences on helping behaviour	523
Actor–observer bias	451	Situational factors	524
Self-serving bias	452	Social factors	528
Culture and attribution	452	Personal factors	529
Attitudes	454	Influences on reluctance to help	535
Tri-component model of attitudes	455	Diffusion of responsibility	536
Limitations of the tri-component model	458	Audience inhibition	538
Attitudes and behaviour	460	Cost–benefit analysis	539
Strength of the attitude	460	Bullying	541
Accessibility of the attitude	460	What is bullying?	541
Social context of the attitude	461	Types of bullying	542
Perceived control over the behaviour	461	Effects of bullying on individuals	545
Factors influencing attitude formation	462	Sex differences in bullying	546
Classical conditioning	462	Causes of bullying	547
Operant conditioning	463	Influences of media on behaviour	550
Social learning	464	Patterns of media access and use	551
Repeated exposure	464	Positive and negative influences	555
Stereotypes, prejudice and discrimination	466	Chapter summary	566
Stereotypes	467	Key terms	567
Prejudice	471	Learning checklist	567
Discrimination	472	Chapter test	569
Distinguishing between prejudice and			
discrimination	474	<i>Answers</i>	574
Methods that may reduce prejudice	475	<i>Glossary</i>	575
Chapter summary	483	<i>References</i>	587
Key terms	484	<i>Index</i>	599

PREFACE

The eighth edition of *Psychology for the VCE Student Units 1 and 2* addresses the VCE Psychology Units 1 and 2 content accredited by VCAA for the period 1 January 2016 to 31 December 2020 and specified in the study design (updated June 2017).

This edition is a major revision which incorporates changes reflecting the VCAA Psychology Advice for Teachers (published after the seventh edition), particularly to the mental health and research methods chapters. Updates include the integration of the 4P Factor model, advantages and limitations of all theories and research methods, more neurological content underpinning relevant Unit 3 content, more recent research and data on social media influences on behaviour, strengthening of links with the study design through more explicit referencing, and revision of end-of-chapter tests to better accord with the sample examination for Units 3 & 4 (also published after the seventh edition).

This edition also addresses teacher feedback through the inclusion of the end-of-chapter revision features contained in *VCE Psychology Units 3 and 4 sixth edition*, more variety in learning activities, review of learning activity answers in the eGuide, closer links with relevant Units 3 & 4 content, and the reinstatement of some content from previous editions such as ways of combating prejudice.

Beyond changes to the content, a new design gives the text a distinctive and even more engaging look. Specifically, the learning pathway is improved through more prominent headers, more distinctive sub-headers that are also organised hierarchically, and more distinctive colours for key features.

The new study design incorporates the biopsychosocial approach as an underlying theme in all units and to give greater emphasis to practical work and application of psychological concepts. It contains new content, modified content and relocated content, as well as optional content that can be explored through student-directed investigations. In Units 1 and 2, teachers have far greater choice and flexibility with regard to specific content to be covered, the breadth and depth of coverage, and the number and types of SACs that need to be satisfactorily completed by individual students.

As with all previous editions, the primary goal of this new edition was to ensure all the compulsory key

knowledge and skills specified in the study design are thoroughly covered so that all outcomes can be achieved in accordance with VCAA requirements. In revising the previous edition, I have been mindful of the diverse interests and capabilities of students who undertake Units 1 and 2, most of whom are studying Psychology for the first time and most of whom will also study Units 3 and 4 Psychology.

In particular, I have endeavoured to ensure the text is accessible to all students, regardless of specific needs, interests, abilities and sociocultural backgrounds, but without compromising the required Units 1 and 2 standards. It was also considered important to ensure the links between the content and study design specifications are more explicit than ever before, and that all content is as interesting and engaging as it can possibly be.

All learning activities and chapter tests have been reviewed, revised and enhanced where required. Their answers have also been clarified or updated where required. Digital resources continue to be available through the eBookPLUS (for students) and eGuidePLUS (for teachers) that accompany and interface with the text. All digital resources have been reviewed and included based on a criterion of quality rather than quantity. However, this has not precluded identification of additional digital resources for the eighth edition.

The eighth edition also provides Units 1 and 2 students with knowledge and skills that will thoroughly prepare them to successfully undertake Units 3 and 4 Psychology, particularly research methods, neurological and mental health content. Most of the learning activities have been successfully trialled with year 11 students over many years. Teachers of Psychology continue to make suggestions and these have been included where appropriate. I hope both teachers and students continue to enjoy working with this new edition of the text as they do with previous editions.

Using the book

I have made every effort to ensure this edition continues to be an all-inclusive textbook that is suitable for independent student use and from which students can fulfil all requirements of the study design without needing to refer to other

resources, apart from resources for their self-directed investigations on optional topics, the current *VCE Psychology Study Design* and the relevant assessment memoranda and notices in the *VCAA Bulletin* and at the *VCAA website*.

Research methods and other key science skills

The text systematically and comprehensively addresses all the areas of study, key knowledge and key science skills specified in the study design. It provides a theoretical framework that addresses outcomes, with a diverse range of everyday examples and applications to elucidate theories and concepts. As students work through the text, they will find that it follows the study design very explicitly both in the use of terminology and in the sequencing of material. However, in some instances the order in which information is presented varies from the study design in order to maintain a logical learning framework. This is most apparent in chapter 2, which covers the key science skills. Some of these skills are also covered in chapter 1, which outlines the nature and scope of contemporary psychology.

Although research methods content is primarily organised in a discrete chapter, it is not intended to promote the study of all research methods as a 'block', in isolation from relevant psychological contexts. Best practice teaching and learning suggests that research methods should be 'broken up' and integrated at appropriate points throughout the course. For example, questionnaires and rating scales may be studied in detail in the context of learning about attitudes as these self-report techniques are commonly used by researchers for studies on attitudes.

Key knowledge and skills

Each chapter maintains a similar format, as in the previous editions. Key knowledge and skills are presented in the *central text*, which provides a clear pathway to achieving the relevant outcomes specified in the study design. Additional high-interest information or relevant research punctuates each chapter in the forms of *boxes, tables, cartoons, colour photographs, charts* and other *graphic material*. These features are intended to complement the central text by providing a more detailed elucidation or exploration of aspects of particular topics, and to show the many different and interesting ways in which psychology can affect students' lives.

Learning activities

In addition, the text is rich in suggestions for *learning activities*, which are abundantly and strategically located throughout each chapter. The learning activities support a variety of relevant and worthwhile ways of learning about psychology. They also provide

suitable opportunities to challenge students to apply their understanding of concepts. The popular *chapter summary* based on a graphic organiser has been retained. This is complemented with a list of *key terms* and a *self-assessment checklist* at the end of each chapter that may be completed before and/or after attempting the chapter test.

Chapter tests and answers

Many *chapter tests* have been expanded, particularly with short-answer questions and extended-answer questions where appropriate. These tests are generally like a 'mini VCE exam'. The chapter test for the research methods chapter has been revised to accord with the sample Units 3 and 4 end-of-year exam (published April 2017). The examination no longer includes a Section C, now comprising only two sections (but incorporating section C extended-answer type questions, including one without multiple parts that is worth 10 marks). The text also includes numerous learning activities requiring analysis and evaluation of research and data. These options also enable practice for extended-answer type questions that assess key science skills.

All *answers* for multiple-choice questions are published at the end of the text and user-friendly marking guides for all other questions are published in both the student eBookPLUS and the teacher eGuidePLUS. The questions and marking guides are based on VCAA assessment models.

eBookPLUS and eGuidePLUS icons

As in the previous edition, eBookPLUS and eGuidePLUS icons throughout the text flag a variety of options for additional ideas for learning activities, as well as digital resources that are accessed online at the JacPLUS website. The eGuidePLUS includes new, fully customisable exams and marking guides for Units 1 and 2.

Glossary

The extended *glossary* of key terms, which are identified in bold in the central text, has been retained. This can be used to reinforce students' understanding of key knowledge and to assist in their preparation for tests.

References

The comprehensive list of *references* used in preparing the text is also retained. This provides numerous examples of APA conventions for referencing different types of source materials. Although APA conventions do not have to be used in VCE Psychology, many teachers prefer access to a variety of examples.

John Grivas
July 2017

Overview of VCE Psychology

Course outline

Psychology in the Victorian Certificate of Education is offered as a science study. Consequently, there is an emphasis on key science skills and scientific research methodologies in all units.

VCE Psychology is made up of four units. Each unit deals with specific content (including skills) contained in areas of study and is designed to enable students to achieve the outcomes for that unit. Each outcome is described in terms of key knowledge.

Key science skills have also been specified as a core component of all units and apply across all areas of study. These skills include research methodologies and ethical principles. The science skills may be taught separately and/or integrated in the areas of study.

This textbook aims to cover Victorian Curriculum and Assessment Authority specifications for Units 1 and 2. The areas of study of these two units are:

Unit 1: How are behaviour and mental processes shaped?

1. How does the brain function?
2. What influences psychological development?
3. Student-directed research investigation

Unit 2: How do external factors influence behaviour and mental processes?

1. What influences a person's perception of the world?

2. How are people influenced to behave in particular ways?

3. Student-directed practical investigation

The areas of study in each unit can be taught in any order. Similarly, within each area of study, the content, including key science skills, can be covered in any order.

Assessment

Each unit has a set of outcomes that students are required to achieve in order to satisfactorily complete the unit. Each outcome is described in terms of key knowledge, complemented by key science skills.

Unit 1 and Unit 2 each have three outcomes.

An outcome is a statement of what a student should know and be able to do on completion of a unit. Students complete various learning activities throughout each unit to develop the key knowledge and key science skills to achieve each outcome.

Procedures for the assessment of levels of achievement in Units 1 and 2 are a matter for school decision. Assessment of levels of achievement for these units will not be reported to the VCAA. Schools may choose to report levels of achievement using grades, descriptive statements or other indicators.

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UNIT 1: How are behaviour and mental processes shaped?

Outcomes	Assessment tasks
Outcome 1 Describe how understanding of brain structure and function has changed over time, explain how different areas of the brain coordinate different functions, and explain how brain plasticity and brain damage can change psychological functioning.	Suitable tasks for Outcomes 1 and 2 may be selected from: <ul style="list-style-type: none">• a report of a practical activity involving the collection of primary data• a research investigation involving the collection of secondary data• a brain structure modelling activity• a logbook of practical activities• analysis of data/results including generalisations/conclusions• media analysis/response• problem solving involving psychological concepts, skills and/or issues• a test comprising multiple choice and/or short answer and/or extended response• a reflective learning journal/blog related to selected activities or in response to an issue
Outcome 2 Identify the varying influences of nature and nurture on a person's psychological development, and explain different factors that may lead to typical or atypical psychological development.	
Outcome 3 Investigate and communicate a substantiated response to a question related to brain function and/or development, including reference to at least two contemporary psychological studies and/or research techniques.	Suitable task for Outcome 3: <ul style="list-style-type: none">• a report of an investigation into brain function and/or development that can be presented in various formats, for example digital presentation, oral presentation, or written report.

UNIT 2: How do external factors influence behaviour and mental processes?

Outcomes	Assessment tasks
Outcome 1 Compare the sensations and perceptions of vision and taste, and analyse factors that may lead to the occurrence of perceptual distortions.	Suitable tasks for Outcomes 1 and 2 may be selected from: <ul style="list-style-type: none">• a report of a practical activity involving the collection of primary data• a research investigation involving the collection of secondary data• a logbook of practical activities• analysis of data/results including generalisations/conclusions• media analysis/response• problem solving involving psychological concepts, skills and/or issues• a test comprising multiple choice and/or short answer and/or extended response• a reflective learning journal/blog related to selected activities or in response to an issue
Outcome 2 Identify factors that influence individuals to behave in specific ways, and analyse ways in which others can influence individuals to behave differently.	
Outcome 3 Design and undertake a practical investigation related to external influences on behaviour, and draw conclusions based on evidence from collected data.	Suitable task for Outcome 3: <ul style="list-style-type: none">• a report of an investigation into internal and/or external influences on behaviour that can be presented in various formats, for example digital presentation, oral presentation, scientific poster or written report.

The VCE Psychology Study Design (2016–2021) is available on the VCAA website at www.vcaa.vic.edu.au. Teachers are advised to check the **VCAA Bulletin** for updates.

CONTENTS MATRIX

Chapter coverage of the study design

Units 1 & 2: Key science skills

CHAPTER 1 Introduction to psychology	<i>Develop aims and questions, formulate hypotheses and make predictions</i> <ul style="list-style-type: none">• determine aims, research hypotheses, questions and predictions that can be tested• identify and operationalise independent and dependent variables
CHAPTER 2 Research methods in psychology	<i>Plan and undertake investigations</i> <ul style="list-style-type: none">• determine appropriate type of investigation: experiments (including use of control and experimental groups); case studies; observational studies; self-reports; questionnaires; interviews; rating scales; access secondary data, including data sourced through the internet that would otherwise be difficult to source as raw or primary data through fieldwork, a laboratory or a classroom• use an appropriate experimental research design including independent groups, matched participants, repeated measures and cross-sectional studies• select and use equipment, materials and procedures appropriate to the investigation• minimise confounding and extraneous variables by considering type of sampling procedures, type of experiment, counterbalancing, single and double blind procedures, placebos, and standardised instructions and procedures• select appropriate sampling procedures for selection and allocation of participants including random sampling, stratified sampling, convenience sampling and random allocation of participants to groups <i>Comply with safety and ethical guidelines</i> <ul style="list-style-type: none">• understand the role of ethics committees in approving research• apply ethical principles when undertaking and reporting investigations, including consideration of the role of the experimenter, protection and security of participants' information, confidentiality, voluntary participation, withdrawal rights, informed consent procedures, use of deception in research, debriefing and use of animals in research• apply relevant occupational health and safety guidelines while undertaking practical investigations <i>Conduct investigations to collect and record data</i> <ul style="list-style-type: none">• work independently and collaboratively as appropriate and within identified research constraints• systematically generate, collect, record and summarise both qualitative and quantitative data <i>Analyse and evaluate data, methods and scientific models</i> <ul style="list-style-type: none">• process quantitative data using appropriate mathematical relationships and units• organise, present and interpret data using tables, bar charts, line graphs, percentages, calculations of mean as a measure of central tendency and understanding of standard deviation as a measure of variation around the mean• recognise the difference between statistics that describe a specific sample and the use of statistics to make inferences about the population from which the data were drawn• use basic principles of reliability and validity in evaluating research investigations undertaken• explain the merit of replicating procedures and the effects of sample sizes in obtaining reliable data• evaluate investigative procedures and possible sources of bias, and suggest improvements, with reference to identification of potential extraneous and confounding variables including individual participant differences, nonstandardised instructions and procedures, order effects, experimenter effect and placebo effects• explain how models are used to organise and understand observed phenomena and concepts related to psychology, identifying limitations of the models• distinguish between scientific and non-scientific ideas

Source: © VCAA, VCE Psychology Study Design (June 2017 update).

Units 1 & 2: Key science skills (continued)

<p>CHAPTER 1 Introduction to psychology</p> <p>CHAPTER 2 Research methods in psychology</p>	<p><i>Draw evidence-based conclusions</i></p> <ul style="list-style-type: none"> determine to what extent evidence from an investigation supports the purpose of the investigation, and make recommendations, as appropriate, for modifying or extending the investigation draw conclusions consistent with evidence and relevant to the question under investigation identify, describe and explain the limitations of conclusions, including identification of further evidence required critically evaluate various types of information related to psychology from journal articles, mass media and opinions presented in the public domain discuss the implications of research findings and proposals <p><i>Communicate and explain scientific ideas</i></p> <ul style="list-style-type: none"> use appropriate psychological terminology, representations and conventions for reporting research, including standard abbreviations, graphing conventions and the components of a scientific report with reference to inclusion of an abstract, an introduction and sections for method, results and discussion discuss relevant psychological information, ideas, concepts, theories and models and the connections between them identify and explain formal psychological terminology about investigations and concepts use clear, coherent and concise expression acknowledge sources of information and use standard scientific referencing conventions
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Unit 1: Key knowledge

<p>CHAPTER 3 Role of the brain in mental processes and behaviour</p>	<ul style="list-style-type: none"> the influence of different approaches over time to understanding the role of the brain, including the brain vs heart debate, mind-body problem, phrenology, first brain experiments and neuroimaging techniques the basic structure and function of the central and peripheral nervous systems as communication systems between the body's internal cells and organs and the external world the role of the neuron (dendrites, axon, myelin and axon terminals) as the primary functional unit of the nervous system, including the role of glial cells in supporting neuronal function the basic structure and function of the hindbrain (cerebellum, medulla), midbrain (reticular formation) and forebrain (hypothalamus, thalamus, cerebrum) the role of the cerebral cortex in the processing of complex sensory information, the initiation of voluntary movements, language, symbolic thinking and the regulation of emotion, including localisation of function.
<p>CHAPTER 4 Brain plasticity and brain damage</p>	<ul style="list-style-type: none"> infancy and adolescence as periods of rapid development and changes in brain structure and function, including development of myelin, synaptic pruning and frontal lobe development the impact of injury to the cerebral cortex on a person's biological, psychological and social functioning and the ability of the brain to undergo adaptive plasticity, illustrated by rehabilitation of people with brain injuries the use of animal studies and neuroimaging techniques to develop understanding of human neurological disorders including Parkinson's disease.
<p>CHAPTER 5 The complexity of psychological development</p>	<ul style="list-style-type: none"> the interactive nature of hereditary and environmental factors on a person's psychological development, illustrated through twin and adoption studies the role of critical and sensitive periods in a person's psychological development the importance of attachment on an individual's emotional development: genetics; temperament and early life experiences (with reference to the work of Harlow & Ainsworth) the development of cognitive abilities from concrete to symbolic thinking (with reference to the work of Piaget) psychosocial development across the lifespan as an influence on the development of an individual's personality (with reference to the work of Erikson).
<p>CHAPTER 6 Atypical psychological development</p>	<ul style="list-style-type: none"> the conceptualisation of normality including typical and atypical behaviours; adaptive and maladaptive behaviours; and mental health and mental disorder as a continuum mental health as a product of internal and external factors which assist individuals to cope with change and challenge major categories of psychological disorder: addiction disorders; anxiety disorders; mood disorders; personality disorders; and psychotic disorders the 'two-hit' hypothesis as an explanation for the development of particular psychological disorders, illustrated by schizophrenia.

Source: © VCAA, VCE Psychology Study Design (June 2017 update).

Unit 2: Key knowledge

<p>CHAPTER 7 Sensation and perception</p>	<ul style="list-style-type: none"> • sensation and perception as two complementary but distinct roles in the reception, processing and interpretation of sensory information • taste and vision as two examples of human sensory systems, including the roles of sensory receptors and receptive fields, transmission of sensory information to the brain, and representation of sensory information in the cerebral cortex • the influence of biological, psychological and social factors on visual perception, including depth cues, visual perception principles and perceptual set • the influence of biological, psychological and social factors on gustatory perception, including age, genetics, perceptual set (including food packaging and appearance) and culture.
<p>CHAPTER 8 Distortions of perception</p>	<ul style="list-style-type: none"> • the fallibility of visual and gustatory perception systems, demonstrated by visual illusions and the judgment of flavours (influence of perceptual set, colour intensity and texture) • distortions of perception of taste and vision in healthy, intact brains as providing insight into brain function related to perception, illustrated by synaesthesia.
<p>CHAPTER 9 Social cognition</p>	<ul style="list-style-type: none"> • the role of person perception, attributions, attitudes and stereotypes in interpreting, analysing, remembering and using information about the social world • the applications and limitations of the tri-component model of attitudes • attitudes and stereotypes that may lead to prejudice and discrimination.
<p>CHAPTER 10 Social influences on behaviour</p>	<ul style="list-style-type: none"> • the influence of status and social power within groups, and obedience and conformity on individual behaviour, with reference to theorists including Asch, Milgram and Zimbardo • the influences on helping behaviour (or reluctance to help) including personal, situational and social factors • factors that influence bullying (including cyberbullying) behaviour and the effects of bullying behaviour on an individual's psychological functioning • positive and negative influences of media on individual and group behaviour, illustrated by advertising, television, video games and social media.

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Psychology — introduction and research methods

What is the nature of psychology as a science?

CHAPTER 1 Introduction to psychology

What research methods and key science skills are used in VCE Psychology?

CHAPTER 2 Research methods in psychology



1

INTRODUCTION TO PSYCHOLOGY

CHAPTER CONTENT

Defining psychology and its subject matter	4	Careers and areas of specialisation in psychology	11
Scientific nature of psychology	6	Overview of VCE Psychology	15
Scientific vs non-scientific explanations	7	Course outline	15
Classic and contemporary perspectives in psychology	11	Assessment	15



How do psychologists research topics of interest? What ethical principles do they have to follow? What factors influence how we think, feel and behave? Why are we alike yet so different from one another? What role do genetics and our everyday environment and experiences play? What is the connection between our brain and behaviour? How much of our brain is active when we do something? Which parts of our brains do what? Why do young children view the world in self-centred ways? How does our thinking change over time? How do we make sense of what we see or taste? Why do individuals experience the world differently? What is normal behaviour? What is abnormal behaviour? What thoughts, feelings and behaviours are associated with different types of mental disorder? How can the presence of others influence our behaviour? When are we more likely to help someone in distress? Why do some people bully others? Why do we hold the attitudes we do? Why are some people racially prejudiced? What factors influence how other people perceive us? Questions such as these will form the basis of your study of psychology this year. You will also have the opportunity to ask your own questions and design investigations to seek answers.

DEFINING PSYCHOLOGY AND ITS SUBJECT MATTER

The term psychology originates from two Greek words – *psyche*, meaning mind, and *logos*, which loosely translated means study or knowledge. Psychology was therefore originally defined as the study of the mind. Over time, this definition has broadened to include behaviour.

Psychology is now commonly defined as the scientific study of human thoughts, feelings and behaviour. This is consistent with the definition used in the VCE Psychology study design.

The terms *thoughts* and *feelings* refer to mental processes that cannot be directly observed. What you think about, your choice of words in a conversation, how you interpret incoming sensory information, the attitudes you hold towards asylum seekers, what motivates you to study or party, dreaming, learning, remembering, being in love, and feeling anxious, sad or happy are all examples of mental processes. They are private, internal experiences which cannot be seen by anyone in the way that we can see actions such as smiling, hugging and bike riding. Mental processes, however, underlie most of our behaviours.

The term *behaviour* refers to any externally expressed action made by a living person (or animal) that can be directly observed. It includes activities such as walking, talking, laughing, texting, watching television, interacting with others, and so on. All these involve actions that can be seen as they occur, unlike mental processes that cannot be seen as they take place.

Because mental processes cannot be directly observed, psychologists draw conclusions about them on the basis of observable behaviour. For example, a person who is observed chanting anti-war statements at an anti-war rally may be reasonably assumed to have a negative attitude towards war. Similarly, rapid eye movements observed in a sleeping person indicate that they are likely to be dreaming.

Although psychologists distinguish between behaviour and mental processes, and often study ('investigate') them separately, in reality, behaviour and mental processes are closely interrelated and influence each other continuously. For example, *feeling* angry about the way someone has treated you may affect what you *think* about the person and the way you *behave* towards them when you next meet them. Similarly, *thinking* you have not adequately prepared for an exam may cause you to *feel* anxious which may result in *behaviour* such as a faster heart rate, pacing the corridor and talking quickly.

People are the main subject matter of psychology. However, animals may also be used in psychological research. This is mainly done when suitable people are not available for a study of research interest or when human research participants cannot be used because of the risk of psychological or physical harm.



Figure 1.1 Psychology is the scientific study of human thoughts, feelings and behaviour. For example, what thoughts and feelings underlie this risk-taking behaviour on a train?

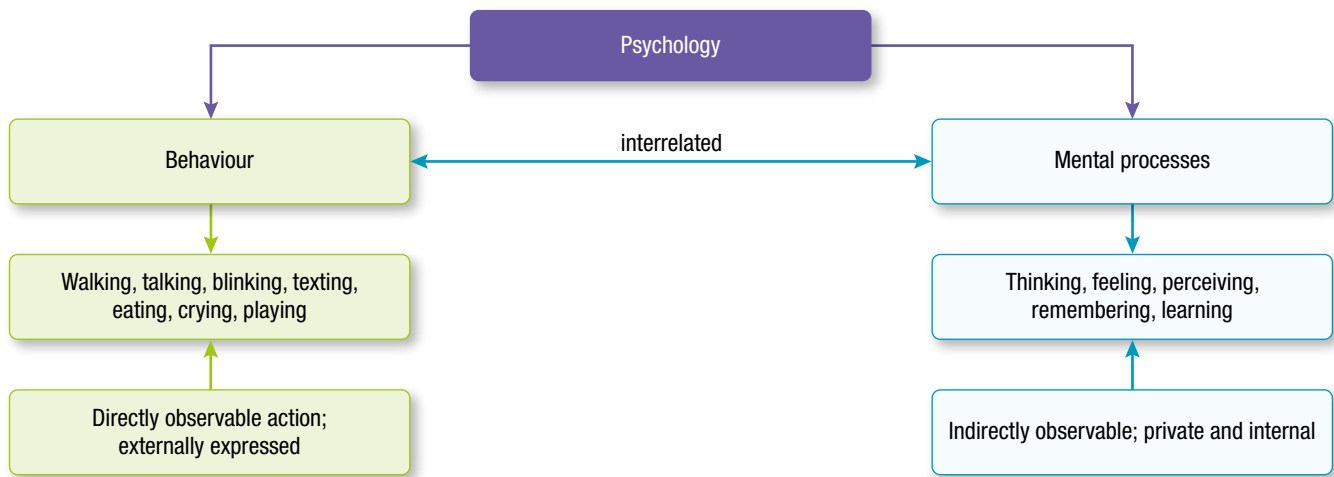


Figure 1.2 Behaviour and mental processes are different but interrelated.

LEARNING ACTIVITY 1.1

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Word copy of table

Distinguishing between behaviour and mental processes

1. Consider each activity listed in the left-hand column in the table. For each activity, tick (✓) the appropriate column to indicate whether you think it is a behaviour or a mental process. Give a reason for each answer.
2. Which of the activities were the most difficult to classify as either a behaviour or a mental process? Explain why.
3. Explain the relationship between behaviour and mental processes with reference to one of the activities in the table.

Activity	Behaviour	Mental process	Reason
whistling aloud			
deciding whether to shoot for a goal or pass to a team mate			
starting to feel excited about going to a party			
looking at yourself in a mirror			
experiencing a toothache			
singing a song 'in your head'			
experiencing a nosebleed			
worrying about giving a speech			
planning an excuse to get out of a date			
watching a movie alone at home			
posting a photo on Facebook			
adding numbers			
experiencing 'butterflies in the stomach'			
scratching an itch			
looking at the time on your watch			

SCIENTIFIC NATURE OF PSYCHOLOGY

Should you change an answer to a question on a multiple-choice test? In answering multiple-choice questions, many people rely on common sense or what they have heard from others about the accuracy of a first answer. Popular belief suggests that 'Your first instinct is usually right'. If you relied on this information, you would never change a test answer, regardless of how certain you were that your first answer was incorrect.

Many students are surprised at the results of scientific research studies which have found that when students change their answers in a test, they are more likely to change an incorrect answer to a correct answer than they are to change a correct answer to an incorrect answer (Kruger, Wirtz & Miller, 2005).

In everyday life we often use common sense in trying to understand our own behaviour and that of others. We draw on our life experiences, particularly our observations of how we and others do things, to develop opinions on matters such as the best way to teach children to read, what causes phobias, why people bully others, how stress affects exam performance, what makes people attractive to others, whether we are born with our personality or intelligence, and why we dream.

'Common sense psychology', whereby people collect information about behaviour informally or non-scientifically, often leads to inaccurate conclusions. There are several possible reasons for this. For example, the source of the information may not be dependable, observations may be incorrectly interpreted and conclusions may be based on faulty

or insufficient 'evidence'. In addition, many people do not critically evaluate their beliefs and change them if conflicting information is presented. Research studies have found evidence that people tend to collect information which supports their beliefs and ignore evidence which suggests that their beliefs may not be true (Nickerson, 1998; Risen & Gilovich, 2007). This is called 'confirmation bias'.

How do psychologists study questions about behaviour and mental processes? Typically they do so in a scientific way. *Scientific research* involves using an appropriate research method to collect data (information) relating to a question or problem of interest, then summarising the data and drawing justifiable conclusions about it. Importantly, the research is based on scientific assumptions, attitudes and procedures, and is planned, conducted and reported in accordance with scientific standards. This overall approach is commonly referred to as the *scientific method*.

If, for example, a psychologist wanted to find out whether it is true that 'you can't judge a book by its cover', or, more specifically, whether or not you can judge someone's personality from their physical appearance, they would conduct scientific research and collect relevant data in order to test the accuracy of this adage ('saying').

They might call for volunteer males and females to be participants in their research study and ask one half to be photographed, then the other half to look at the photos and describe the personality of each person in a photo. The psychologist may then give a personality test to each person who was photographed to generate personality profiles which could then be compared with the descriptions provided by the research participants.

If the descriptions closely matched the profiles and stood up to statistical tests for checking the results, then the psychologist may conclude that the adage is incorrect based on the results obtained from their research. Alternatively, if the descriptions differed considerably from the profiles, the psychologist may conclude that the adage is correct based on the results obtained. Thus, the use of scientific method helps ensure that the data collected are accurate and reliable and that the conclusions drawn from the data are justifiable and can be trusted.

Scientific research, however, is not completely free from error. Like all people, psychologists who conduct research can make



Figure 1.3 You check your answer to a multiple-choice question and think it may be wrong. Should you change the answer?

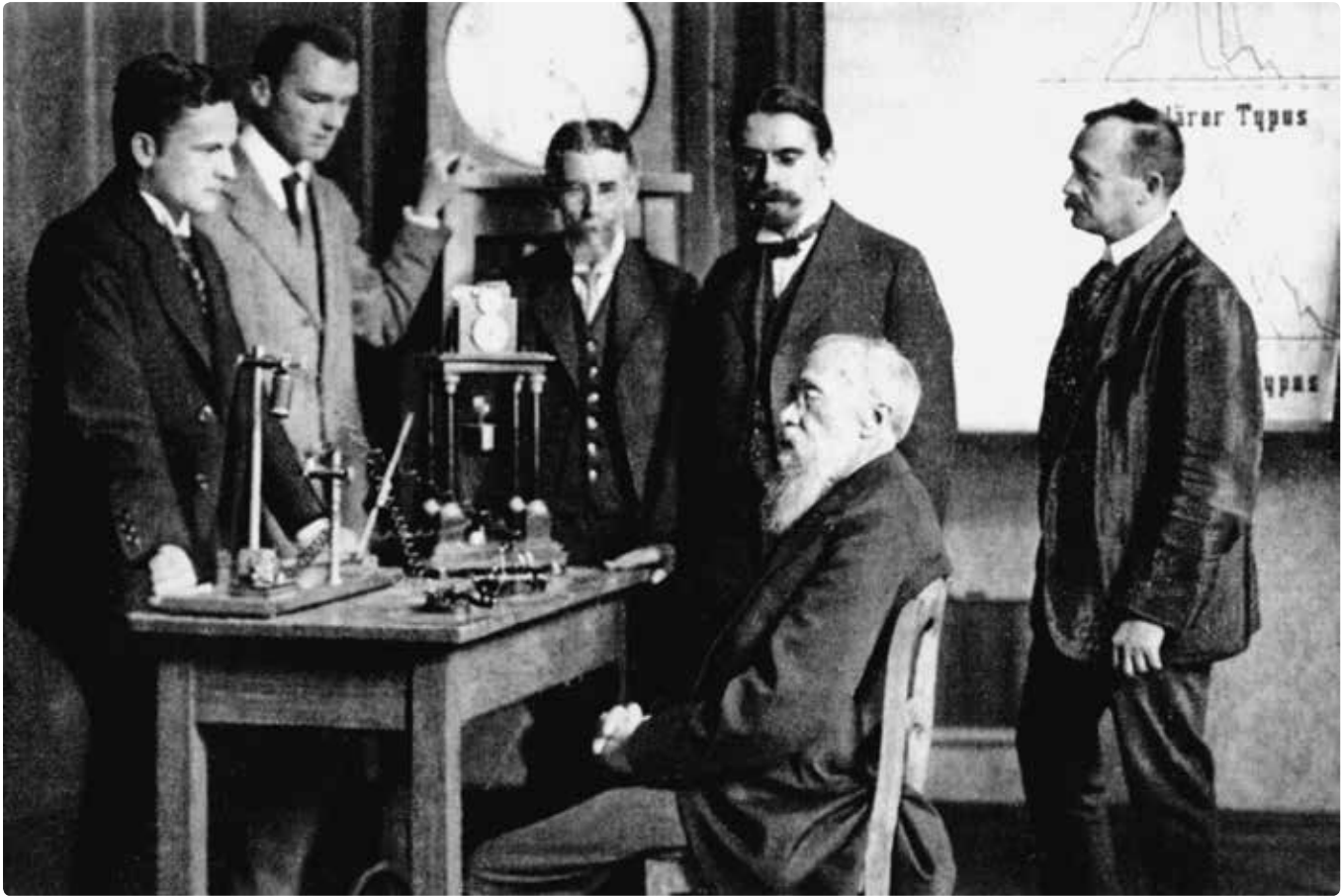


Figure 1.4 The year 1879 marks the beginning of psychology as a science. This is when Wilhelm Wundt established the first psychology research laboratory at the University of Leipzig in Germany. Wundt (seated) is widely regarded as the ‘father of psychology’. He is shown with colleagues and an apparatus used for one of his experiments on perceptual processes. For example, participants were exposed to a stimulus (such as a sound) generated by the apparatus and asked to report their sensations, or their reaction time was recorded to measure the speed of their perception.

mistakes or not properly control all things that can influence the results. It is important therefore in any science that a research study can be repeated to test the results for accuracy or find out if they can be applied to other people and other similar situations.

In relation to research, **replication** involves conducting a study again to establish whether the results obtained can be reproduced and are therefore reliable. A researcher may also replicate a study if the results can be applied to other people across a range of situations and settings. For example, replicating the study on personality and physical appearance using participants and observers from a different age group, cultural background, sex and so on may provide similar results to the original study, thus reinforcing the finding.

Alternatively, if replication of the study using participants with different backgrounds produces markedly different results from those obtained in the original study, the conclusion made about personality and appearance may need to be refined so that it is applied only to the actual participants in the study and the larger group from which they were selected.

SCIENTIFIC VS NON-SCIENTIFIC EXPLANATIONS

There are many ways of explaining human thoughts, feelings and behaviour that are not based on science. Some of these approaches claim to be scientific but are not. Some have scientific-sounding names and use very elaborate systems to explain how we think, feel or behave. Consequently, they seem to be based on science. Among these non-scientific explanations are astrology, numerology, graphology and palmistry.

Astrology describes the belief that the movement and positions of the stars and planets influences a person's personality, moods, behaviour, events in their life and so on.

Numerology involves examining significant numbers in a person's life, such as birth date, house address or phone number, to predict future events or describe influences on their life.

Graphology involves interpreting handwriting to judge a person's personality and identify significant issues in their life.

Palmistry involves examining the lines on the palm of a person's hand and using these to describe aspects of their thoughts, feelings and behaviour, as well as to predict future events in their life.

These kinds of alternative approaches are often called pseudosciences. 'Pseudo' is a prefix used to indicate that something is fake or falsely imitates something else. Consequently, **pseudoscience** means fake or false science.

Psychologists and other scientists generally believe that the methods and results, and, therefore, the claims, of pseudoscientists are often inaccurate as they are

not based on true science. The non-scientist is likely to draw inaccurate conclusions about human thoughts, feelings and behaviours (and other events) because the conclusions are based on faulty or insufficient evidence resulting from unsystematic study (if any). Typically, 'supportive evidence' that may be supplied lacks independent review, especially by scholars with expertise on the topics (called 'peer review'). Psychologists and other scientists also hold a view that common sense, faith or personal beliefs cannot be used as the sole basis of explaining human thoughts, feelings and behaviour, or determining whether or not something is true.



Figure 1.5 Some of the more popular non-scientific approaches to explain human thoughts, feelings and behaviours

BOX 1.1 Scientists versus non-scientists: some key differences

Approach and method	Scientist	Non-scientist
Develops hypotheses ('predictions') that can be tested through empirical research (e.g. a carefully controlled experiment)	✓	✗
Uses research procedures that minimise the influence of personal biases	✓	✗
Relies on systematic data collection	✓	✗
Considers the effects of sample size in obtaining reliable data and making generalisations (e.g. when applying the results from the sample to the bigger group from which it was drawn)	✓	✗
Assesses claims on the basis of supporting evidence or reasons (e.g. does not make exaggerated claims or over-rely on anecdotes)	✓	✗
Openly considers other interpretations of results obtained	✓	✗
Reports to others how ideas were obtained, how they were tested and what the results were	✓	✗
Replicates studies to test results or apply results to different situations	✓	✗
Identifies and defines what is being studied in clear, precise, concrete, testable, measurable terms	✓	✗
Challenges existing beliefs	✓	✗
Does not fully accept a conclusion unless there is supportive evidence	✓	✗
Looks for and considers explanations or evidence that contradict own findings or beliefs	✓	✗
Does not withhold information that does not support the claims made	✓	✗
Seeks criticism from others with expertise in the area (e.g. 'peer review')	✓	✗
Avoids emotional reasoning and relies on logic	✓	✗

BOX 1.2 How scientific is astrology?

Astrology is a system for explaining and predicting how we think, feel and behave on the basis of the positions of the planets and the stars at the time of a person's birth. It uses scientific-looking astronomical charts and technical terms and is often confused with the real science of astronomy.

Astrology has been practised in different cultures for many centuries, with astrological beliefs going back at least 2500 years. In more recent times, particularly given the regular inclusion of horoscopes in the print media, and production of horoscope apps, the public's exposure to astrology and astrological predictions has increased. Astrology and its horoscopes currently enjoy wide appeal and many people read their horoscopes, even if they don't believe them or take them seriously.

Psychologists have conducted numerous scientific research studies to test astrology. These studies have repeatedly found that astrology is non-scientific and lacking in valid evidence to support its claims.

Statements in horoscopes are usually vague (such as 'mistakes could cost you time and money', 'you can only discuss plans or argue points so much' and 'if you're patient you should be able to achieve a great deal') and highly applicable to most people, irrespective of their

birth sign, as evident in the statements in Figure 1.6 on page 10.

Furthermore, systematic procedures used by psychologists to check astrological predictions have repeatedly found that the predictions are usually wrong. The small percentage found to be correct tend to be very general; for example, statements such as 'you will meet someone new in the next 12 months' and 'there will be a political crisis in Australia during this year'. These statements describe events that are more likely to happen than not happen under the ordinary circumstances of everyday life.

Studies have also found that many astrological descriptions of personality and behaviour tend to be made up of desirable, flattering statements. This increases the tendency to accept the description because people are less likely to accept negative and undesirable statements about themselves, such as 'you are insensitive, uncaring, unfriendly and hard to get along with'.

Our willingness to accept the descriptions of ourselves made by astrologers, palm readers, tarot card readers and the like has been called the *Barnum effect*, named after the American circus showman Phineas T. Barnum

(continued)