



Psychology

for the IB Diploma Programme

3rd Edition



Pearson

DR CHRISTIAN BRYAN
PETER GIDDENS
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Dr Christian Bryan, Peter Giddens and Dr Ellen Heyting

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Authors' introduction

Welcome to the IB Diploma Program (DP) in Psychology.

Psychology is the scientific study of human and animal cognition and behavior. Psychology researchers attempt to describe, explain, predict and change behavior. They do this by forming hypotheses and theories regarding behavior and testing them empirically. Therefore, in general terms, psychology asks fundamental questions about why people think, feel and behave the way they do with the goal of solving problems and increasing the quality of life for individuals and their communities.

Psychology is a compelling field that combines scientific inquiry with a focus on human experience, seeking to explain why individuals behave as they do by focusing on how various factors influence our actions, thoughts and feelings. You will explore the dynamic interaction between biological, cognitive and sociocultural perspectives on a wide range of human behaviors, and develop skills to analyze and interpret research as well as applying psychological ideas to real-life situations.



In DP Psychology, you will engage with key concepts. These are listed by the IB as bias, causality, change, measurement, perspective and responsibility. They will provide a foundation for understanding how psychology is applied across various contexts and content. Therefore, the course places a strong emphasis on critical thinking, encouraging you to go beyond memorizing facts to consider the broader implications of theories and research. You will gain experience with research methodologies and become skilled at evaluating evidence, understanding how psychological knowledge is built through rigorous investigation. This conceptual understanding will be complemented by class practicals, where you will put theory into practice, analyze data, and evaluate psychological research.

The course is structured around the integration of concepts, content and context. These three elements work together to deepen your understanding of how psychological knowledge is applied to real-world issues. You will examine four major contexts—health and well-being, human development, human relationships, and learning and cognition. Through this approach, you will learn how to connect theoretical knowledge with practical application, preparing you to think

critically about how psychological insights can be used to understand and improve people's lives.



This book is structured into the following sections:

Concepts: An introduction to key notions: bias, causality, change, measurement, perspective and responsibility, and the impact of these concepts on psychological knowledge. Concepts are also interwoven through the entire book while concept sections are also provided at the end of each chapter where appropriate. This is to ensure you have comprehensive knowledge of how the concepts impact each area of the psychology course.

Content: An exploration of the Biological, Cognitive, and Sociocultural Approaches and a comprehensive discussion of Research Methodology.

Contexts: An exploration of the specific Context areas of Health and Well-being, Human Development, Human Relationships, Learning and Cognition.

Assessment: Guidance on answering questions for Paper 1, Paper 2 and Paper 3 (HL Only).

Internal Assessment (IA): Comprehensive instructions on researching and presenting a research proposal.

Extended Essay (EE): Guidance on researching and writing an EE in Psychology.

Theory of Knowledge (TOK): A discussion of the implications of knowledge production and acquisition in psychology research.

At the Standard Level (SL), you will develop a solid foundation in psychological principles, while at the Higher Level (HL), you will have the chance to explore additional perspectives on culture, motivation and technology, examining how these factors influence human behavior. The HL extensions provide a deeper layer of inquiry into the roles of cultural context and technological advances in shaping human

experiences, allowing you to gain a more nuanced understanding of psychological phenomena. Additionally, HL students will engage in further data analysis and interpretation, furthering your ability to critically assess and apply research findings.

The DP Psychology course is not designed to produce psychologists, but rather to develop psychological literacy—a skill set that includes understanding the principles of psychology, analyzing human behavior, and applying psychological knowledge ethically and responsibly. Psychological literacy promotes personal insight and cultural awareness, which will enhance your ability to think critically and empathize with others in an ever changing, globalized world. Through the study of psychological theories and models, you will gain tools to examine complex human behaviors, from cognitive processes to social interactions, and learn how psychological science contributes to our understanding of issues like mental health, human relationships and learning.



The course also links closely with the core components of the IB DP, including TOK, Creativity, Activity, Service (CAS) and the EE. In TOK, psychology serves as an example of how human sciences approach knowledge production, connecting psychological inquiry to broader questions about how we know what we know. The subject also offers valuable insights into the ethical dimensions of knowledge and challenges you to think about the responsibility that comes with understanding and researching human behavior. Through CAS, you may find opportunities to apply psychological knowledge in service projects, such as those that support mental health awareness or community engagement. For students interested in conducting extended research, the EE in Psychology allows a deep dive into topics of personal interest, applying psychological frameworks to real-world questions and developing advanced research skills.

By the end of the course, you will be equipped to evaluate psychological theories, consider multiple perspectives on behavior, and think critically about the research processes that create knowledge. DP Psychology fosters a lifelong interest in understanding human nature and an appreciation for the diversity of human experience. We hope that your exploration of psychology will enrich and inspire you to apply this knowledge to create positive change in yourself and the world around you.

How to use this book

This book includes lots of useful features to help your understanding. You will find the purpose of each box explained below:

Learning objective

These boxes appear at the start of each main section, outlining the key areas of study and highlighting what you can expect to learn.

Key study

Key study boxes provide a clear breakdown of psychological research papers, summarizing their aims, methods, results, and conclusions.



Conceptual question

In Conceptual questions boxes, you will find questions which relate to the main concepts of Psychology and help you to see connections across concepts, contents and contexts.



Interesting fact boxes provide engaging extra information to spark your curiosity and deepen your understanding of the topic as a whole. They may offer detailed explanations of experiments, highlight cultural or historical contexts, or reveal surprising connections.

Activity

You will be prompted to actively engage in answering questions and conducting your own research into key areas with the help of Activity boxes.



Important points for you to remember are summarized in Key Fact boxes.

Critical thinking

Critical thinking boxes encourage you to analyze and evaluate the ideas and studies presented by posing questions that challenge their assumptions and key aspect

You are now ready to begin. Good luck with your studies!
Dr Christian Bryan, Peter Giddens, Dr Ellen Heyting

TOK

TOK is a core component of the IB DP. TOK boxes ask you to think about the nature of knowledge in psychology; and ask you to reflect on your knowledge and how you acquired it.



Connections boxes show how some themes might appear in more than one concept, content or context area. Some connection boxes also contain information for further exploration.



Hint boxes provide tips on how to approach concepts, topics and theories, especially with regard to your IB assessments.



These boxes explain new terms and concepts you might not have come across before.



CONCEPTS

Learning objective

You should be able to understand and coherently and accurately synthesize the DP's six concepts across the course's contexts and content:

- Bias
- Causality
- Change
- Measurement
- Perspective
- Responsibility

Introduction to concepts

In psychology, a **concept** refers to an abstract idea that helps to organize and understand **behavior**. For example, "memory" is a concept that encompasses processes such as encoding, storing and retrieving, all of which are essential in understanding how people remember and forget information. "Personality" is a concept that encapsulates the thoughts, feelings and behaviors that define a person's individuality and affect how that person reacts to other people and the world.

Concepts are useful tools for describing, explaining and predicting human behavior. They allow psychologists to understand human behavior.

To what extent does language limit our **conceptual understanding**? Are concepts inherently too simplistic? For example, concepts are useful tools for describing, explaining and predicting human behavior, but they reduce our understanding of individuals and their personal nuances.

TOK



Bias



Conceptual question

To what extent is *bias* in psychology research and clinical practice an inevitable result of **schemas** and evolutionary adaptations? To what extent should bias be consciously recognized and actively mitigated through cognitive processes?

Bias is a cognitive limitation that affects objectivity and decision-making by influencing people's perceptions and interpretations of information. Shaped by personal experiences, cultural backgrounds and preferences, biases tend to make people interpret evidence in ways that align with their existing beliefs. For example, **confirmation bias** may lead people to seek out research that supports their own views on a topic (such as adolescent depression) while disregarding contradictory information.

Biases act as heuristics or mental shortcuts, speeding up decision-making and minimizing cognitive effort. This suggests that they may be evolutionary behaviors. However, biases often result in misinterpretations, errors in judgment and the perpetuation of stereotypes and prejudices. By recognizing biases, people can improve the objectivity, and therefore the accuracy, of their thinking and decision-making processes.

Activity 1

Bias is not limited to psychological research; it affects all our decision-making processes and is a common feature of the world around us. Pick two current event media articles on the same topic from two different sources. They won't be the same. Where can you find evidence of bias influencing the way the event has been reported?

Concept-related terms

Researcher bias

Researcher bias is the intentional or unintentional influence and distortion that researchers may impose on their research because of their beliefs or expectations. Researcher bias occurs when researchers allow their own biases to affect the



You will learn more about confirmation bias on pages 58–59.



The 2008 Global Financial Crisis was triggered by the overconfidence bias and the availability heuristic because bankers assumed the current trend of increasing house prices would continue. This shortcut in thinking (heuristic) meant bankers underestimated the risk of subprime mortgages, which contributed to the banking and insurance collapse and triggered the Global Financial Crisis.

research, including the choice of the research topic and its aim, design and data collection and data analysis methods. For example, a researcher who strongly believes in the effectiveness of **cognitive behavioral therapy (CBT)** may unconsciously design a study in a way that favors outcomes supporting that belief. Ambiguous data may be interpreted in a way that supports the researcher's preconceptions, resulting in a biased conclusion. Therefore, it is important for researchers to use rigorous methodological practices to eliminate the effects of researcher bias and so ensure the integrity of their research.

Participant bias

Participant bias occurs when research participants behave differently than they would if they were not research participants, perhaps because they want to fit in with other participants, they want to be seen in a better light than they usually are, or they want to help or hinder the researcher. Participant bias may be conscious or unconscious. For example, in a study investigating racism, participants may respond in the way they believe society expects them to respond, rather than giving their actual opinions. Participant bias can render research results invalid, therefore, researchers must ensure participants know their responses are anonymous and confidential.

Reliability

Reliability refers to a study's ability to be repeated and achieve the same or similar results. Reliability increases a study's accuracy, **validity** and **credibility**. A study with high reliability generates consistent results when conducted repeatedly under the same conditions by the same or different researchers. *Bias* compromises reliability by consistently distorting research results, creating a false impression of reliability. Uncontrolled **variables**, inconsistent participant selection procedures and inconsistent data collection and measurement methods reduce a study's reliability (Figure 1.1).

Participant bias is sometimes called the Hawthorne effect. In the 1920–30s, researchers at the Hawthorne Works studied how different lighting affected employee productivity and found that productivity increased not only when the lighting was better, but also when it was worse. The effect was attributed to the workers knowing they were being observed, which motivated them to work faster despite the changes in lighting.

Figure 1.1 A study testing the effect of a new method for teaching reading will have low reliability if the study has a small sample size, lacks random participant selection, does not control extraneous variables or uses subjective measurement tools or analysis methods.



To improve a study's reliability, researchers must apply rigorous methodological practices to ensure the procedure's consistency and replicability.

Inter-rater reliability

Inter-rater reliability bias refers to differences in raters' or observers' judgments that weaken the reliability of research conclusions. It indicates the extent to which observers of participant behavior agree. A high level of agreement is needed to ensure consistent measurements. When there is high inter-rater reliability, the raters are likely to reach the same conclusions, which improves a study's reliability. Subjective biases due to different personal perspectives, experiences and expectations weaken inter-rater reliability, and this leads to different interpretations of a study's measurement criteria. For example, if several researchers observe children's playground behavior but interpret aggressive behavior differently based on personal perceptions of aggression, inter-rater reliability will be reduced.

This bias can be eliminated by clearly defining and operationalizing (putting into use) the behavior being observed and rated, and by implementing thorough researcher training that emphasizes the need for standardization of measurements. Standardizing the raters' interpretations of participant behavior reduces inter-rater differences and so increases the study's inter-rater reliability, which strengthens the study's overall reliability.

Reflexivity

Reflexivity refers to researchers' conscious and continuous acknowledgment of their own biases and how these affect their research. It involves researchers reflecting on their backgrounds, experiences, attitudes and perceptions to be alert for biases that may affect their research – including the choice of topic and the study's aim, the research design, participant selection, procedure and interpretation of results.

Reflexive researchers eliminate the influence of their biases from the research process and so improve their study's reliability and validity. For example, a researcher investigating alcohol use would consider their own attitudes, beliefs and experiences of alcohol use and think about how these might affect their decisions, such as selecting participants who match their preconceptions of alcohol users, or interpreting study results or reaching conclusions that reflect or support their own preconceptions.

By being reflective, researchers can eliminate biases and so generate objective, impartial and credible research results.

Publication bias

Publication bias is the tendency of researchers, authors and academic journal editors to prefer research into new, popular or politically advantageous topics, or to prefer positive or statistically significant findings. Researchers want to have their research published, so they are likely to select topics or behaviors that journal editors will prefer. Editors are most likely to favor research topics that are trending (currently popular), or which contribute to current public discussions.

Publication bias leads to the academic community and the public developing a biased perception of some behaviors because of the disproportionate emphasis on only positive results or popular topics. For example, consider a study testing the effectiveness of a treatment for cigarette smoking by teenagers. If the study shows the treatment achieves a significant reduction in teenagers' cigarette use, it is more



Rosenhan (1973), on pseudo-patients in psychiatric hospitals, is a good example of inter-rater reliability issues. Clinicians' diagnoses differed even when the pseudo-patients behaved normally, highlighting inconsistencies in diagnoses. Rosenhan (1973) can be used in exam answers on reliability, diagnosis and ethical considerations, showing how one study can apply to multiple exam topics.

likely to be published; if it finds the treatment achieves no significant change in behavior, it is less likely to be published. As a result, literature searches would not show the results of this study, and researchers would not know that the treatment is ineffective. Therefore, by correcting publication bias, researchers and academic journal editors can promote more comprehensive and balanced knowledge in academic literature.

Gender bias

Gender bias refers to favoring or discriminating against people on the basis of their gender. Deep-rooted social norms about gender roles can affect researchers' perceptions of behavior and their interpretation of data, resulting in biases in the choice of research topics, research design, participant selection, data interpretation and conclusions. Research has typically been conducted by men on male participants. This perpetuates biases in favor of male experiences, which are then generalized to both male and female behavior. For example, in a study on business management, researchers may recruit mostly male participants, leading to results associated with masculinity. The study may not capture management behaviors associated with femininity and so would perpetuate gender stereotypes.

Similarly, research on parenting in adoptions typically focuses on the mother's behavior, not the experiences of adoptive fathers (Figure 1.2). This can perpetuate stereotypes and affect policies and support services that neglect the needs of male adoptive parents. Therefore, gender bias results in incorrect outcomes when research-related decisions are based on people's gender when gender is not a significant criterion for the decision.



Figure 1.2 Can you think of roles for which some people hold gender stereotypes?

Cultural bias

Cultural bias is the inclination to discriminate against or in favor of people's **cultures**, leading to conclusions based on cultural backgrounds. Cultural bias can be explained by **social identity theory**, which proposes that people favor others they identify with (those from their **ingroups**) and discriminate against people from their **outgroups**. For example, a standardized science test from the UK may disadvantage students from a Fijian background, because the Fijian students may struggle to understand British cultural references or language used in the tests. Cultural bias can also occur in research, for example, if French researchers studying responses to stress among French participants, some of

Do not confuse culture with ethnicity and nationality. Culture refers to shared values, beliefs and behaviors within a group. Culture can be shared by people of different ethnicities and nationalities. Remember too that people from the same ethnic background or country can have diverse cultural experiences and perspectives.



whom are Moroccan immigrants, design a study using only French cultural norms and assumptions. If the researchers expect all participants to freely share their experiences of stress, they will overlook the fact that, in Moroccan culture, expressing emotions in formal settings is less common. The research findings would understate the stress levels of Moroccan participants, leading to biased conclusions. Cultural bias can result in inappropriate outcomes for some people when a decision is based on a person's culture when culture is not a significant criterion for the decision.

Activity 2

Discuss the following with both your peers and people you live with.

- To what extent globalization has affected or even eliminated cultural aspects of daily life/behavior in your family/school/region/country (for example, has fast food such as burgers replaced traditional national or local dishes?)
- What differences are there in teaching methods and behavior in schools in different places and at different times? Does education now include more variety like field trips, independent work and guest speakers as opposed to students copying and making notes? What impact does this have?
- In what ways have traditional and family events like weddings and festivals been affected by globalization and other cultures?
- Does globalization make culture more or less important as an area of research?

Cognitive biases

Cognitive biases are errors in thinking and decision-making processes. They occur because people use irrational or subjective information, rather than objective logic, to make their decisions. Cognitive biases arise from mental shortcuts (heuristics), which simplify and speed up information processing and so require less cognitive effort.

Confirmation bias is one example of many cognitive biases. It occurs when people seek out and accept information that aligns with their existing beliefs and dismiss contradictory information. For example, a person who is strongly aligned with socialist ideology may exclusively access socialist news sources and ignore alternative ideologies. Cognitive biases lead to flawed opinions and decisions.

Sampling bias

Sampling is the process of selecting a subset of a population for a study to represent a larger population (Figure 1.3). **Sampling bias** occurs when the selected participants are not representative of the population to which the study's conclusion is applied. This bias occurs when certain subgroups are either over-represented or under-represented in the sample, due to the method of selection. For example, if a study investigating high school students' opinions on learning foreign languages takes its sample from an international school, the participants in the study are likely to be multi-lingual and not typical of all high school students. Therefore, the study's conclusions will be biased toward the opinions of people who are already multi-lingual.

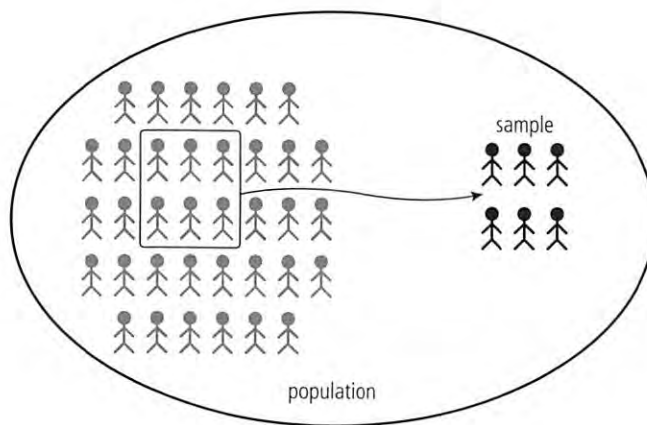


Figure 1.3 Taking a sample.

Can a sample ever be truly “randomly selected”?

TOK

In **random sampling**, each member of the target population has an equal probability of being selected for the study. Random sampling can be biased if the selected participants differ from the target population. For example, if a researcher conducts a study on smartphone usage among teenagers but the sample includes participants of all ages, the results will include smartphone usage by non-teenagers.

If every action has a cause, can we ever identify an original cause, or are we bound to an infinite regress of causes?

TOK

In **stratified sampling** (when random samples are drawn from subgroups of the population), the research can be biased if some subgroups are over- or under-represented. For example, the results of a study of academic achievement and socioeconomic status that does not include many low-income participants will be skewed.

Opportunity sampling is a non-random sampling technique in which participants are selected because they are easily accessible to the researchers – for example, if they are all students at the researcher’s university. Opportunity sampling can lead to bias because the participants are unlikely to represent the target population. The study would be biased because university students are not representative of the wider population.

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Determinism

Determinism is a philosophical **approach** which proposes that all behavior is the result of external influences such as **genetic inheritance** and environmental conditions. Biological determinism assumes that human behavior, including **cognitive processes** and personality traits, is caused by genetic predispositions and physiological mechanisms. Environmental determinism assumes that behavior is caused by factors such as family upbringing, cultural influences and life experiences. For example, exposure to biased information within the family environment or adherence to rigid cultural norms can contribute to the formation of stereotypes, leading to biased perceptions.

Psychological determinism proposes that events occur in a predictable manner and that behavior is caused by specific variables – genes, culture, the physical environment, past experiences, etc. When researchers believe in determinism, they tend to assume that certain variables inevitably result in certain behaviors (Figure 1.4).

The “butterfly effect” shows how tiny causes can ripple into major and far away events. Imagine a butterfly in the Amazon rainforest flapping its wings, creating a slight disturbance in the air. This tips one drop of water to the ground, which evaporates into the atmosphere, affecting clouds that form into a hurricane that moves up the coast and develops into a tornado that hits a town in Midwest USA. The tornado damages a shop and someone takes the opportunity to loot a flatscreen television. The police catch the looter, and eventually the judge asks the looter what caused the crime. “Your Honor, there was a butterfly...”



Figure 1.4 According to behaviorist principles, people do not choose of their own free will to be afraid of dogs; the fear is determined by previous unpleasant experiences of dogs.

In relation to bias, determinist beliefs can affect how researchers interpret data, and this can lead them to overstate or understate certain causes. For example, a researcher with a strong preference for biological determinism might focus too much on genes to explain anxiety disorders and not enough on social or environmental explanations. This creates bias in research because the complexity of behavior is reduced to single variables, leading to incomplete or skewed research results.

Determinism in research can result in confirmation bias if deterministic researchers only look for evidence that supports their deterministic belief and not for evidence that could result in a more nuanced understanding of the behavior being studied.

Positivism

Positivism is a research approach that aims to establish universal explanations of behavior through objective and replicable **quantitative research** methods that generate **empirical evidence**. Positivist research generates **empirical data** through systematic observation and aims to show patterns and relationships that can be generalized to broader or target populations. For example, a study on adolescent depression conducted from the positivist approach would likely use quantitative methods such as experiments to determine causal factors. *Bias* can affect positivist research if the researchers' assumptions distort the selection of variables or the interpretation of data, leading to distorted results and conclusions.

Researchers may study **correlations** between variables (such as socioeconomic status, family structure, diet, physical activity, alcohol and tobacco use, and depression levels in adolescents) to generate empirical evidence that demonstrates cause-and-effect relationships. Positivism emphasizes the use of objective **research methods** to generate empirical evidence and establish universal explanations of behavior.

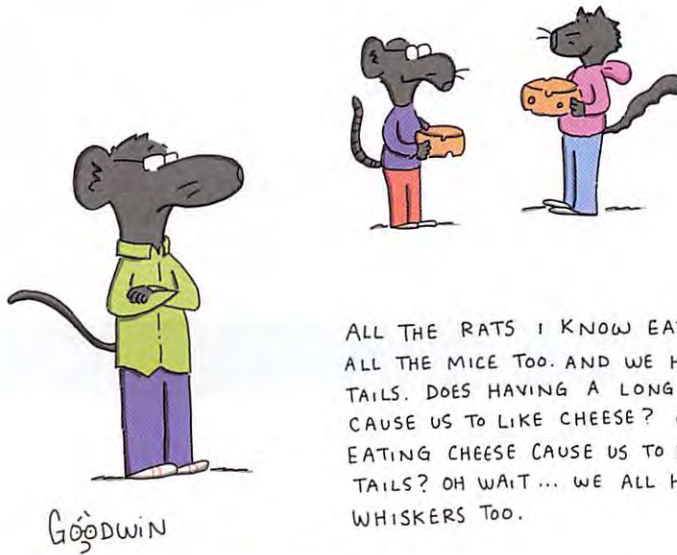
TOK

Holism

TOK

A close-up of a human hand holding a glowing, semi-transparent digital interface. The interface features a central icon of a family (two adults and two children) surrounded by eight circular icons connected by lines, forming a ring. The icons represent various medical and healthcare concepts: a heart with a pulse line, a brain, a heart with a pulse line, a first aid kit, a person running, a syringe, a stethoscope, and an ambulance. The background is dark and blurred, emphasizing the glowing interface.

Causality



ALL THE RATS I KNOW EAT CHEESE
ALL THE MICE TOO. AND WE HAVE LONG
TAILS. DOES HAVING A LONG TAIL
CAUSE US TO LIKE CHEESE? OR DOES
EATING CHEESE CAUSE US TO HAVE LONG
TAILS? OH WAIT... WE ALL HAVE
WHISKERS TOO.



Conceptual question

How can we know the *causes* of human behavior?

Causality refers to how one variable affects another variable – that is, how changes in one variable result in changes to another variable. Psychologists aim to establish such cause-and-effect relationships through research. A variable is any factor, characteristic or condition that can change in an experiment. A variable can be manipulated, controlled or measured. For example, in an experiment studying the effects of caffeine on memory, the quantity of caffeine consumed and participants' memory performance are both variables.

An **independent variable** is the variable that the researcher manipulates or controls (for example, the quantity of caffeine) to observe its effects on the dependent variable (the memory performance). The independent variable is the “cause” in the cause-and-effect relationship.

A **dependent variable** is the variable that is measured or observed when the independent variable is changed. It is the “effect” in the cause-and-effect relationship. For example, in the caffeine-memory experiment above, memory performance is the dependent variable.

Human behavior, though, is complex, and causality can involve many variables interacting simultaneously.

Activity 3

In groups of 3–4, create a list of all the variables you can think of that could have an effect on a student's performance in school. How would you proceed with research to determine which variables really do affect performance?

Activity 4

Causality is central to the way we learn new things as humans. Young children are often called “little scientists” as they explore how the world around them works. Have you ever watched a young child open and shut a door on a toy hundreds of times, or put blocks into a container only to take them out again over and over again? What do you do when you encounter a new piece of technology? Do you explore its features to see how it works? Next time you download a new app on your phone or use a tablet in school, consider how you explore its uses and features. Think about the input from your fingers on the screen and the output from the app – that is causality in action!

Concept-related terms

Reciprocal determinism

Reciprocal determinism is the idea that people both affect and are affected by their environment. It suggests a dynamic interaction between a person's behavior, their internal cognitive processes and their environment. An example of reciprocal determinism can be seen in the relationship between a student and their academic performance. The student's study habits and **motivation** can affect their academic success, while receiving positive feedback from teachers or accessing educational materials (environmental factors) can affect the student's motivation and study habits.

Reciprocal determinism emphasizes the bidirectional nature of influence between people and their environment; it suggests that behavior is not only determined by internal factors such as cognitive processes and personality, or external factors such as environmental conditions and societal norms, but rather by their continuous interaction. Therefore, reciprocal determinism refers to the dynamic relationship between people and their environment, with each affecting the other (Figure 1.5). It emphasizes the complexity of human behavior and the importance of considering the interplay between internal and external factors in understanding behavior.

Bidirectional ambiguity

Bidirectional ambiguity refers to the uncertainty of the direction of causality between two variables – for example, if two variables are found to be related, but it is unclear if one variable causes the other to change; if the relationship is the opposite; or if a third variable may be involved. For example, a study that establishes a correlation between poor sleep quality and high anxiety levels may generate bidirectional ambiguity because it is not clear whether high anxiety causes poor sleep quality, poor sleep quality causes high anxiety, or if both are caused by a third variable such as poor diet. Bidirectional ambiguity makes definitive conclusions about causality difficult.

Reductionism

Reductionism is the philosophical approach that tries to break down complex phenomena to make them easier to understand. Reductionism tries to explain cause-and-effect relationships by reducing them to interactions between basic elements. For example, the reductionist approach might try to explain behavior only in terms

of biological phenomena such as **neurotransmission** or genetics. This approach would ignore the influence of social, cultural and environmental factors on behavior. Reductionism can offer valuable insights by isolating specific variables and understanding their individual contributions to a phenomenon, but it risks oversimplifying complex phenomena by overlooking the intricate interactions between various factors that may influence causality. Therefore, reductionism in causality involves simplifying complex phenomena by focusing on individual components or variables. While reductionist approaches provide useful insights, they tend to oversimplify explanations of behavior.

Validity

Validity refers to the extent to which research accurately measures the concept it claims to measure. It indicates the degree to which a study's results are trustworthy and believable. For example, the validity of a study that aims to measure the effectiveness of a new teaching method would depend on how accurately the chosen measures (for example, test scores) reflect the impact of the teaching method on student learning.

Internal validity indicates the extent to which observed effects within a study can be attributed to the manipulated independent variable rather than confounding variables. Internal validity ensures that a study's results accurately indicate the causal relationship between the independent and dependent variables. **External validity** refers to the extent to which a study's findings can be generalized to other populations. **Mundane realism** indicates the degree to which a study's setting and procedures are similar to real-life situations.

In summary, validity ensures that a study's results accurately reflect the phenomenon being studied. Internal validity ensures that observed effects result from the manipulated variables. External validity ensures that the study's findings can be generalized to other populations. Mundane realism ensures that research findings can be applied to real-world situations.

Example of internal validity

Dinges et al. (1997) investigated the effects of sleep deprivation on cognitive performance. Conducted in a controlled laboratory setting, the study shows high internal validity because the researchers manipulate sleep by dividing participants into two groups: one that sleeps for eight hours and one that sleeps for four hours. Both groups complete cognitive tasks, such as reaction-time tests and simple recall tests, under identical conditions. By controlling **extraneous variables** such as air temperature, the difficulty of the tests, and the time of day, the researchers can be sure that the observed differences in behavior can be directly attributed to the manipulated variable (sleep duration) and no other variables. The results show that the sleep-deprived participants performed significantly worse, confirming that cognitive degradation is caused by lack of sleep. The study's internal validity is high because the effects can confidently be attributed to sleep deprivation, because other factors were controlled.

Example of external validity

Latané and Darley (1968) investigated bystander intervention by testing the likelihood of people helping in emergency situations based on the number of other bystanders at the scene. Participants were seated in a laboratory where they heard someone

in distress, and their responses were recorded. The study found that when more bystanders were present, the participants were less likely to help. This study has high external validity because its results were supported by real-world observations of similar behavior, so the results were generalizable beyond the laboratory.

Controls

Experimental controls are incorporated into the design of research studies to exclude the influence of extraneous variables. They increase a study's validity. Extraneous variables are variables other than the independent variable that may affect the dependent variable and confound the study's results. Controls help researchers isolate the independent variable's effect on the dependent variable and minimize the possibility of alternative explanations for the observed results. For example, in a study testing the efficacy of a new medication on reducing depression, controls may include giving some participants a **placebo** (an inert pseudo-medication) to rule out the placebo effect (a participant believing they are receiving treatment even though they are not).

Randomly allocating participants to the study's experimental and control groups helps to ensure that extraneous participant variables, such as different personalities, are evenly distributed between the groups. **Double-blind design** keeps both participants and researchers unaware of which participants receive the treatment and which are in the control group. For example, an experimental study that has some participants taking a medication and some taking a placebo is considered a double-blind study if both the participants and the researchers do not know which participants are taking the medication and which are taking the placebo. Therefore, controls are essential research requirements that ensure the validity and reliability of results. By minimizing the effects of extraneous variables and using control procedures such as placebos and double-blind techniques, researchers can strengthen a study and draw more accurate conclusions.

Significance

Significance refers to the statistical probability of an observed relationship between variables occurring by chance. It indicates the probability that the observed effect is genuine and not the result of a random variation in the data. For example, in a study investigating the relationship between exercise and mood, researchers find a statistically significant correlation between exercise frequency and self-reported mood levels. This indicates that the observed relationship between exercise and mood is unlikely to have occurred by chance.

Statistical significance is determined using hypothesis testing; researchers compare the observed data to what they would expect to see if there were no relationship between the variables (the null hypothesis). If the probability of seeing the observed result under the null hypothesis is low (usually less than 0.05p), the result is considered statistically significant. Therefore, significance testing plays an important role in ensuring the strength and reliability of cause-and-effect relationships between variables.

Complexity

Complexity refers to the multifaceted nature of relationships between variables. It acknowledges that behavior in a real-world setting often involves many interacting

factors that make it challenging to attribute causality to one variable. For example, in a study investigating the variables influencing academic achievement in students, researchers may identify numerous variables that could potentially affect academic performance, including socioeconomic status, parental involvement, teacher quality and student motivation. Understanding the causal relationships among these variables involves considering their interconnections and how they collectively contribute to academic performance.

Complexity highlights the dynamic interactions and feedback loops that exist in behavior. Therefore, complexity challenges establishing causal relationships between variables and requires researchers to adopt holistic and **systems-oriented approaches** to evaluate the interconnectedness of factors. By appreciating complexity, researchers can generate more detailed explanations of the underlying mechanisms driving phenomena and so develop more accurate models of causality.

Influence and interaction

Influence and interaction describe how variables relate to each other. Influence refers to the effect of one variable on another; interaction refers to the combined effect of more than one variable on an outcome. For example, in a study investigating behavior during studying and academic performance, behavior during studying may be shown to directly affect academic performance (influence). Yet, if the behavior during studying's effect on academic performance varies depending on the time spent sleeping and the time spent doing physical exercise, there is an interaction between behavior during studying, sleep and exercise.

Influence refers to a one-way relationship between variables, where changes in one (independent) variable lead to changes in another (dependent) variable. Interaction is the combined effect of more than one variable, which may increase or decrease the effects of each separate variable. Interactions show the complexity of cause-and-effect relationships. Therefore, influence and interaction are necessary for understanding causality. Influence describes direct one-to-one relationships between variables. Interaction describes the combined effects of more than one variable and emphasizes the complexity of cause-and-effect.

Agency and motivation

Agency refers to a person's ability to make decisions and take action to achieve outcomes. It is the sense of autonomy that people feel over their decisions and actions. Motivation refers to the internal and external factors that make behavior happen, influencing the intensity and endurance of behavior (Figure 1.5).

Agency and motivation are related to causality because they affect initiation and maintenance of behavior; together, they determine the decisions people make to achieve outcomes. Agency is a person's sense of control and ability to create change. Motivation is the person's internal enthusiasm for achieving that goal. Therefore, agency and motivation are fundamental factors in causality because they directly affect people's behavior.



Figure 1.5 Having set a goal of improving academic grades, a student's agency is seen in their ability to behave toward achieving an outcome such as writing a study plan, approaching teachers for help, attending all lessons and being focused in those lessons. The student's motivation determines their willingness and determination to spend time and effort to achieve the goal.

Change



Conceptual question

How do psychologists identify *change* in behavior?

Change refers to the modification of behavior, including thoughts and emotions. It can be slow (for example, in terms of human development) or relatively fast (for example, mood changes). Change can be caused by deliberate and conscious human action or by biological variables. Psychologists study change, and consider factors such as free will and determinism, to offer effective treatments. They consider behaviors such as managing stress, while recognizing people's inherent unwillingness to change. By evaluating treatments and interventions, psychologists try to create significant, lasting changes in people's behavior.

Activity 5

List five behaviors that you have changed over the last few years. For each, explain why the change occurred. To what extent did the change occur because of your motivation?

Concept-related terms

Barriers to change

Barriers to change are factors that hinder people's ability to change. These include resistance to behaving differently, lack of motivation, fear, and entrenched habits or beliefs. Barriers to change may originate in cultural practices, socioeconomic status, attitudes towards technology, etc. Psychologists study barriers to change in order to understand why people do not make changes that would benefit them or others.

By identifying and treating barriers to change, psychologists try to encourage more effective responses to help bring about positive changes to improve people's lives. Barriers to change are challenges in research and clinical practice: they hinder people's efforts to behave in better ways or to increase the quality of their lives.

Prevalence

Prevalence refers to the proportion of people from a population who behave in a certain way or exhibit certain characteristics or conditions. For example, the prevalence of depression is the percentage of people in the population who meet diagnostic criteria for depression. Prevalence rates are used to determine the extent of a behavior or condition within a population. They are useful for understanding the scope and effect of mental health issues, and so they inform planning for treatment. Prevalence rates show the extent to which change occurs in a behavior. Therefore, prevalence is a basic metric in both research and clinical practice, giving information about the distribution and magnitude of conditions and behaviors.

TOK

Prevalence raises TOK questions about certainty and accuracy. How might psychologists determine to any degree of accuracy the prevalence rate of a behavior in a population?



Prevalence connects to the context of Health and well-being.

Longitudinal and repeated measures designs

Longitudinal and repeated measures designs are research methods used to study changes in individuals or groups. In **longitudinal design**, data is collected about the same participants at different times. **Repeated measures design** measures the same variables within participants but across different conditions or at different times. For example, in a longitudinal study of the effects of mobile phone use on academic achievement, researchers would assess the same group of school students at different stages of their time in school. In a repeated measures design on the same topic, researchers might examine students' academic achievement before and after they use mobile phones in school.

Longitudinal and repeated measures designs allow researchers to investigate changes in behavior over time. By collecting information about people's behavior at different times, researchers can identify patterns of behavior, identify causal factors and assess the effectiveness of treatments. Therefore, longitudinal and repeated measures designs are useful tools in research and clinical practice for observing and understanding change, including human development. Both designs give insights into psychological phenomena and so can inform intervention and treatment strategies.

Intervention, prevention and promotion strategies

Intervention, prevention and promotion strategies can address behavioral issues, enhance people's quality of life and prevent the development of mental health issues. For example, an intervention strategy might include CBT for people with anxiety to reduce their symptoms and improve their coping skills. Prevention strategies might include establishing a school-based program to teach stress-management techniques and resilience-building. Promotion strategies might include promoting positive mental health and well-being in community-wide campaigns, encouraging prevention, care and peer-support strategies. Therefore, intervention, prevention and promotion strategies play a critical role in psychology research and clinical practice by offering a range of approaches to addressing mental health concerns and promoting well-being to reduce the effects of mental illness, so improving the quality of life for people and their communities.

TOK

To what extent should governments engage in strategies to change a population's behavior, such as stopping cigarette smoking, limiting unhealthy eating behavior or promoting participation in sports and physical activity?

Effectiveness of treatment

The effectiveness of treatment refers to the extent to which a therapeutic intervention leads to a desired outcome – that is, to what extent the treatment reduces or eliminates psychological issues, symptoms and disorders. For example, researchers could assess whether participants who received CBT showed reductions in anxiety symptoms compared with those in a control group. Psychologists use many research methods, including randomized controlled trials and longitudinal studies, to determine the effectiveness of treatments. Outcome measures can include changes in the severity of symptoms, improvements in the person's functioning and the person's own opinion of the intervention's effectiveness. Therefore, determining the effectiveness of treatment interventions can determine the effect of therapy on psychological issues and the promotion of well-being. By identifying effective treatments, psychologists can make evidence-based decisions for people needing mental health support.

Development and maturation

Development and **maturation** refer to the growth, change and improvement that people experience during their lives, including cognitive, emotional, social and physical development.



In infancy, development and maturation involve stages or milestones such as learning to crawl, walk and communicate. During adolescence, development includes cognitive changes such as the ability to think abstractly, to reason, to create a unique identity and to feel intense emotions.

Psychologists study development and maturation to understand the common behaviors that all people experience during their lives, as well as the variables that affect growth and change. They investigate and try to explain how biological, cognitive, emotional and environmental factors interact to shape people's developmental paths. Therefore, development and maturation are basic psychological concepts that describe the growth processes that people experience.

Determinism

Determinism is the belief that all behavior is the consequence of underlying factors, either biological or environmental, that can be understood. For example, biological determinism assumes that genetic predispositions and physiological processes

affect a person's behavior and characteristics. Environmental determinism assume that environmental factors such as a person's upbringing, social interactions and cultural influences cause their behavior. For example, determinists believe that academic achievement can be explained by physiological factors such as genetics or by environmental factors such as the school culture and the encouragement of teachers. Biological determinism emphasizes physiological factors environmental determinism emphasizes the effects of external factors such as an individual's socioeconomic status and cultural background. Therefore, determinism explains behavior as the product of biological or environmental rather than other factors. Understanding the interaction between biology and environment can explain the reasons for behavior and changes in behavior.

Activity 6

Humans are resistant to change. It is much harder to change something once it is embedded than it is to introduce something new. Think about your favorite brand of cola, for example. What would it take for you to start buying a new brand? Alternatively, when a new type of soft drink comes out, it is easier to think positively about it without it changing your existing preferences. Perhaps you also have a favorite type of sparkling water, sports drink or kombucha, while still having your favorite cola. Can you think of other areas of life where this applies? Think of some situations where it is easier to like something new if it doesn't "compete" with something you already like. For instance, you join a youth club and make a new "best friend". Would this person have been your best friend if you had met them in school alongside your older friends?

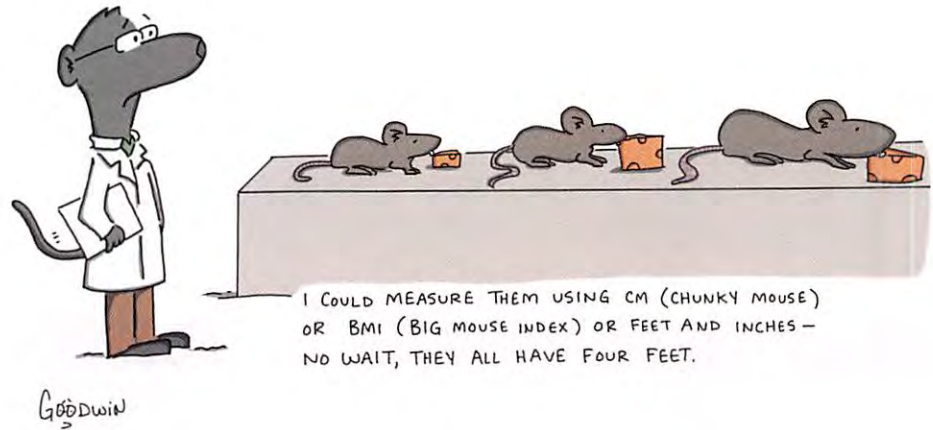
Agency and motivation

Agency refers to a person's ability to make choices and take action to achieve desired goals. Motivation refers to the cognitive processes that generate behavior toward specific outcomes. For example, a high school student with strong agency may seek out situations for improving their grades such as asking for extra homework, attending enrichment classes and setting high goals. Those with low agency might wait for opportunities for improvement to present themselves. Those with high motivation would devote considerable energy to attending classes, actively participating in lessons, creating comprehensive study notes and completing practice/homework activities, while those with low motivation would be unlikely to do any of these. Agency and motivation are significant factors in generating change. Agency seems to be an attitude, while motivation seems to be a cognitive process. They both empower people to initiate and then sustain effort toward achieving outcomes.

Activity 7 (CAS)

Describe how your knowledge of agency and motivation can help you and your classmates in your individual CAS journeys. Design a persuasive poster/wallchart that makes use of your knowledge of agency and motivation to drive a small, simple change in behavior in your school, perhaps relating to playground or corridor behavior, behavior in a cafeteria, or behavior on school buses.

Measurement



Conceptual question

To what extent does being able to *measure* a behavior or a variable define its validity in psychology research? Can phenomena that cannot be measured contribute to research into human behavior?

Different types of methodologies raise TOK questions about accuracy and certainty. They also raise questions about to what extent the methods used to gain knowledge in the human sciences can be considered "scientific" and whether a scientific approach is the best way to investigate human behavior.

TOK

Measurement in psychology means quantifying behavior. **Surveys**, observations and physiological measurements can be used to gather data. By operationalizing variables and using objective measuring techniques, researchers can obtain valid and reliable measurements. **Triangulation**, which means using several types of measurement, improves the credibility of research (Figure 1.6).

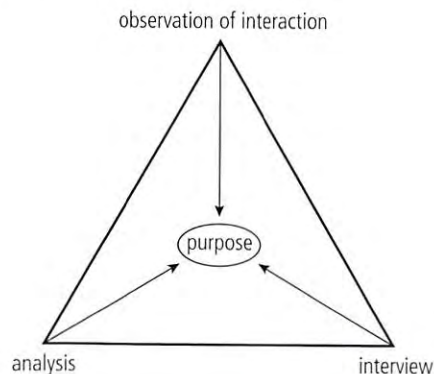


Figure 1.6 An example of triangulation in research.

Concept-related terms

Evidence

Evidence is the term used to describe the data or information gathered by researchers and clinicians to assess changes related to behavior. Evidence can be in several forms, such as anecdotal reports, empirical studies or **self-reported data**. Data may

be quantitative, which means it involves numerical measurements, or qualitative, meaning it focuses on subjective descriptions and interpretations of behavior. Understanding the strengths, weaknesses and limitations of different types of evidence and how they can be measured is important for valid and reliable measurements.

Techniques to measure variables

Measurement involves using a range of techniques to gather data. These techniques include direct methods such as questionnaires and indirect approaches such as brain imaging. Both direct and indirect methods allow researchers to gather data to analyze statistically or to infer relationships between variables. Understanding the strengths and limitations of the methods is crucial for accurate assessment and interpretation of psychological phenomena.

Activity 8

Can emotions such as happiness, sadness or fear be measured/quantified? If so, how? Discuss your thoughts with your classmates.

Choice of research method

The choice of research method means selecting the best approaches and techniques to collect data and measure behavior-related variables. Each research method gathers data in different ways, and each has strengths and limitations.

- **Experimental method:** The experimental method involves manipulating one variable and observing the effect that has on another variable (the behavior). For example, a researcher might conduct an experiment to determine the effect of background music on memory recall by randomly assigning participants to either a quiet room or one with background music and then measuring the effect on memory recall.
- **Observational method:** The observational method involves systematically observing and recording behavior in non-laboratory/real-life settings. For example, a researcher might conduct an observation to study adolescents' mobile phone use to understand the extent to which phones distract students in lessons.
- **Survey method:** Surveys involve gathering self-reported data from participants using questionnaires. For example, a survey might be created to assess levels of stress among high school students.
- **Correlational method:** Correlational studies (**correlational research**) examine the relationship between two or more variables but without manipulating them. For example, a researcher might use this method to determine if there is an association between social media use and feelings of loneliness among adolescent students.
- **Interviews:** These can be **structured** using a set of questions, **semi-structured** or in a **focus group** where participants react to one another.

Constructs and variables and the operationalization of variables

Constructs are abstract concepts that researchers try to study, such as intelligence, personality traits and depression. Variables are measured aspects or dimensions

TOK

The different forms of evidence raise questions about how they help or hinder understanding of human behavior. For example, how does the use of numbers, statistics, **graphs** and other quantitative instruments affect the way knowledge in the human sciences is valued? To what extent can the human sciences use mathematical techniques to make accurate predictions?

of constructs that can be quantified. **Operationalization** includes defining and specifying how constructs and variables will be measured in a study, allowing abstract concepts to be translated into observable and measurable indicators. For example, if a study investigates the construct of anxiety, it may be operationalized by measuring variables such as heart rate, blood pressure, self-reported feelings of nervousness, or performance in an anxiety-provoking activity. These variables generate observable and measurable quantities of the anxiety construct.

Operationalization ensures that constructs are accurately measured and that research results are valid and reliable. It involves describing a study's procedures, the instruments used to measure variables, and the criteria for quantifying data. Operationalization enables researchers to ensure consistent measurements in different studies and improve the replicability of findings. Constructs and variables are basic psychology concepts that require operationalization for measurement to translate abstract constructs into objective, measurable variables, allowing the systematic study of behavior.

Activity 9

Can we measure psychological constructs like love, depression or aggression? How do we go about doing this when we all have such differing experiences of these constructs? One approach is to build a scale or progression. It might sound unfeeling to place things you love on a progression, but it can be a helpful exercise. For example, if somebody loves chocolate, loves Rome after visiting it on a holiday and loves their mother, these three things can all be true, and the individual's amount of love for these three things could be placed on a scale. Can you think of five things that you love and then place them on a scale indicating how much you love them? What about a progression – can you write a sentence for each that explains why you have assessed your love for that thing at the level you have placed it?

Types of data (self-reported, anecdotal, empirical)

Self-reported data is collected directly from people through questionnaires, surveys or interviews. For example, a researcher could use a self-reported questionnaire to investigate perceptions of exam anxiety in a sample of high school students.

Anecdotal data arise from personal accounts or observations of experiences. For example, a researcher might gather anecdotal data from high school students to understand their personal, subjective perspectives of exam stress.

Empirical data are obtained through controlled experiments or observations based on objective evidence. For example, a researcher might use an observation to study parent–adolescent interactions in a laboratory setting, to collect empirical data on attachment.

Self-reported data generate insights into people's subjective personal experiences and perceptions but can be distorted by biases or inaccuracies. Anecdotal data offer detailed information but lack objectivity and **generalizability**. Empirical data offer a high level of objectivity and reliability.

Statistical significance

Statistical significance is the probability that an observed change, difference or relationship between variables is not simply due to random chance.

Anecdotal data arise from personal accounts or observations of experiences. In psychology, these can come from the researcher's own experience. This raises questions regarding to what extent it is legitimate for a researcher to draw on their own experiences as evidence in their investigations in the human sciences.

TOK

Statistical significance is determined by statistical tests, for example, ANOVAs (analysis of variance) or **t-tests**. These tests calculate the probability of generating a study's results if the null hypothesis were true.

Type I and II errors

A **type I error** occurs if the researcher incorrectly rejects the null hypothesis when it is actually true. An example of a type I error is concluding that a treatment to reduce anxiety is effective when it has no effect on anxiety. A **type II error** occurs when a researcher does not reject the null hypothesis when it is false. A type II error would occur if a treatment is considered ineffective when it really is effective. An example of a type II error is a researcher failing to find a significant difference between a new and an old teaching method when in reality the new method is less effective. This type II error could occur if the sample size is too small or if the researcher applied a statistical test that did not detect the true difference.

Type I errors are sometimes called false positives; the researcher concludes that there is an effect when there is not. Type II errors are sometimes called false negatives; the researcher does not conclude that a real effect was observed.

Brain imaging techniques

Brain imaging techniques see and measure the brain's structure and function. It allows researchers to observe neural activity and changes in brain regions.

- **PET (positron emission tomography):** During PET scans, a radioactive tracer is injected into the bloodstream. Positrons are emitted and detected by the scanner. PET scans can measure blood flow, glucose metabolism and neurotransmitter activity. For example, PET scans can be used to observe, measure and study cerebral activity during periods of anxiety or depression.
- **CAT (computerized axial tomography):** CAT scans use X-rays to create cross-section images of the brain to detect structural abnormalities such as brain injuries. For example, CAT scans are used to diagnose traumatic brain injury or stroke.
- **MRI (magnetic resonance imaging):** MRI uses powerful magnets and radio waves to generate high-resolution images of brain tissue to present detailed information about brain anatomy. For example, MRI scans are used to visualize changes in brain structure due to neurodevelopmental disorders such as autism.
- **fMRI (functional magnetic resonance imaging):** fMRI measures changes in blood oxygen levels, which indicates neural activity. fMRI scans allow researchers to identify brain regions associated with cognitive tasks. For example, fMRI studies are used to investigate correlations associated with thinking, decision-making and emotions.

Visualizing brain structures and neural activity allows researchers to study how psychological processes occur in the brain and to identify biological indicators of various mental health conditions. PET and CAT scans, MRI and fMRI are valuable, objective tools for studying brain function and structure in psychology.

Interpretive approaches (content analysis)

Interpretive approaches involve analysing qualitative data to reveal underlying meanings and themes in text or visual content. **Content analysis** is an interpretive

TOK

There are often disagreements regarding the definition of research methods and data collection methods. Can scans/images be considered research methods, or are they data collection methods? The distinction often depends on how the tool is used. If scans or images are employed as a means to directly gather raw data for analysis, they are typically considered data collection methods. However, if they are part of a broader framework that includes the rationale and procedures for how the data will be collected, analyzed and interpreted, they could be seen as components of a research method. Ultimately, the context of their use often dictates how they are classified.

Interpretive approaches involve analysing qualitative data to reveal underlying meanings and themes in text or visual content. However, they can be considered more open to researcher influence and therefore raise questions about whether more standardized methods such as observations and experiments should be the only two ways in which human scientists produce knowledge.

TOK

method for examining written, verbal or visual content. Instead of quantifying variables, interpretive approaches try to understand subjective experiences and perspectives embedded in the data. For example, researchers could investigate interview and focus group transcripts or social media posts to identify themes or discourses on a topic, such as attitudes toward anxiety disorders. By investigating the data's language, symbols and context, researchers can gain insights into people's beliefs, attitudes and culture.

Interpretive approaches give researchers a deeper understanding of complex behavior that cannot be understood with quantitative approaches. Interpretive approaches such as content analysis complement quantitative methods to give researchers a more nuanced insight into behavior.

Prospective vs. retrospective approaches; longitudinal vs. cross-sectional research designs

Prospective and retrospective research, and longitudinal and **cross-sectional research designs**, are used to study changes in variables over time. Prospective approaches collect participants' data in a future period; retrospective approaches gather data from past records or individuals' recollections.

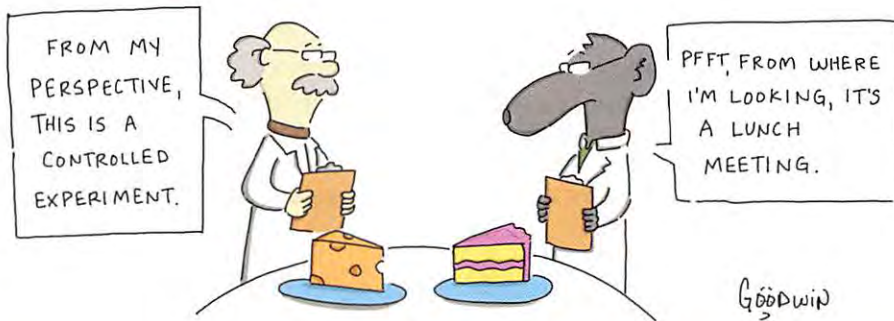
Longitudinal research studies the same participants over a long period of time, while cross-sectional designs compare different groups of participants at one time. For example, a prospective longitudinal study might monitor cognitive development in children from infancy through to adolescence by assessing cognitive abilities at regular intervals over the research period. A retrospective cross-sectional study would examine the relationship between variables, for example, childhood experiences and adult mental health, by comparing participants' retrospective reports of adult mental health with and without childhood trauma.

Prospective approaches let researchers observe changes in variables over time to provide insight into development and causal relationships. Retrospective approaches allow researchers to study behavior that cannot be observed prospectively (example, childhood experiences). Prospective and retrospective approaches, as well as longitudinal and cross-sectional research designs, are complementary methods for measuring change.

Issues of reliability are often considered in the human sciences as they lead to questions regarding accuracy and certainty. To what extent can interviews about childhood experiences be considered reliable, as well as producing accurate knowledge?

TOK

Perspective



Conceptual question

If different *perspectives* provide unique lenses on human behavior, to what extent can we objectively consider one perspective as more valid than another? Can someone's perspective be considered invalid, incorrect or wrong?

Perspective refers to the viewpoint from which behavior is understood, and encompasses theoretical approaches that influence how psychologists interpret phenomena. Different perspectives offer different lenses for studying and understanding behavior. These include the biological, cognitive and sociocultural approaches, each of which emphasizes different aspects of the human experience. For example:

- the biological approach emphasizes physiological factors such as genetics and hormones
- the cognitive approach emphasizes mental processes such as thinking and decision-making
- the sociocultural approach emphasizes the influences of family, community and culture on behavior.

Psychology utilizes several different perspectives to explain behavior.

Activity 10 (CAS)

Create a one-page graphical image in your notebook that displays the three perspectives described above with regards to one behavior, for example, anxiety, depression or memory. Can you think of other perspectives from which to consider or explain behaviors?

Concept-related terms

Psychological theories and models

Psychological theories and models are abstract frameworks used to explain and understand aspects of behavior. A **theory** is a proposed and testable explanation, and a **model** is a suggested description of a structure or process. Theories and models give psychologists organized concepts to guide research and clinical practice. When studying behavioral phenomena (for example, memory), psychologists use theoretical perspectives to try to understand and explain underlying structures and processes (for example, those involved in encoding, storing and retrieving memories).

For example, reconstructive memory is a theory that attempts to explain how memories are recalled – instead of a “replay” of an event, the theory of reconstructive memory proposes that fragments of recalled events are reconstructed into a larger memory. The Levels of Processing model (Craik and Lockhart, 1972) is a model that emphasizes the significance of depth of processing in memory formation. According to the model, information is more readily recalled when it has been processed deeply and semantically, rather than superficially or structurally.

To illustrate this, consider a three-tier wedding cake (Figure 1.7). Each tier represents a different level of processing.

The top level of the cake looks pretty and extravagant; it is all about appearance, which might be considered “shallow”.

At the middle level of processing (the middle tier), the cake might be described (its physical characteristics, its ingredients and flavors, its construction) using written or spoken language – a phonetic representation of the cake.

At the deepest level of understanding (the bottom tier), the cake might be described in terms of the lasting impression it makes, the emotional feelings of satisfaction it creates, and of the occasion that the cake represents – the lasting memory of the experience. This is a person’s deepest meaning of the cake.



Figure 1.7 A three-tier cake representing the Craik and Lockhart study.

Activity 11

Imagine you are at a party and you have just been introduced to someone called Anthony Farmer. You start chatting with Anthony and then one of your friends comes up to you. It is polite to then introduce your friend to your new acquaintance . . . but can you remember his name? It was probably in your short-term memory for a while, but processed at a very shallow level, but then the new information you were chatting about interfered with your memory system remembering his name. Now imagine you were introduced to A. Farmer . . . your mind instantly builds a picture of someone dressed in a particular way, perhaps riding a tractor while ploughing a field. A vivid mental image such as this is easier to recall when you need to remember your new acquaintance’s name because such images are processed at much deeper levels. Turning “A. Farmer” into “a farmer” is an effective sure way to increase the level of processing of new information and your likelihood of being able to recall new information.

Psychological theories and models are tools used to simplify and clarify complex phenomena such as memory. Through theoretical frameworks, such as the theory of reconstructive memory and the Levels of Processing model, psychologists can investigate and understand the processes underlying memory formation, retention and recall.

Deductive and inductive research

Deductive and inductive research methodologies are contrasting approaches used to generate new knowledge and conclusions. Deductive research moves from general principles to specific hypotheses and predictions. It starts with a theoretical model or theory and tests hypotheses through empirical observation. Inductive research moves from specific observations to general principles or theories based on those observations.

Activity 12

Academics use the notion of robustness as a way to measure how strong a theory is. Research a psychology theory that is considered robust and compare it to a theory that is considered less robust. Which variables influenced the perception of the robustness of the theories? On what basis are they considered robust and not robust?

A deductive researcher would first create a hypothesis based on an existing theory or model. For example, a deductive researcher interested in the effects of social media on adolescent well-being might begin with a hypothesis such as: "excessive social media use is associated with higher levels of anxiety and depression among teenagers". They would then test that hypothesis through observation.

An inductive researcher would start with observations and data and then try to identify patterns or trends within the data. For example, through interviews with adolescents, the researcher might identify patterns of social media use and their effect on teenagers' mental health, which could lead to new and unexpected insights.

A deductive researcher would start with an existing theory or model and design a research study to test hypotheses related to it. For example, a researcher could begin with a theory about the effect of sleep on cognition and then conduct an experiment to test if participants who sleep less perform worse in memory-related activities and so generate evidence that supports or refutes the theory.

Activity 13

There is a theory that high attendance in a class will result in a high final grade for that class. How might you use inductive or deductive reasoning to test this theory?

Identify at least two theories of behaviors that demand to be tested inductively, and at least two others that demand to be tested deductively.

Emic and etic perspectives/approaches

Emic and etic perspectives are complementary approaches to studying and understanding cultural aspects of behavior. The **emic perspective/approach** examines behavior from within a culture, using an insider's perspective. The **etic perspective/approach** analyzes behavior from an outsider's viewpoint, applying universal, cross-cultural principles and concepts to identify similarities and differences in behavior. A psychologist adopting an emic approach to studying depression within a cultural group would conduct interviews and observations within that culture to understand how people within the community experience depression. The emic approach emphasizes cultural beliefs and practices that affect the depression experienced within that culture. A psychologist using the etic approach to investigate the prevalence of depression across different cultures would likely administer standardized measures and compare the results across cultural groups. The etic approach tries to identify cross-cultural elements of depression while acknowledging that depression can manifest differently in different cultures.

Emic and etic perspectives should be seen as complementary rather than alternative approaches. The emic approach creates an understanding of a cultural phenomenon by investigating behavior in its specific cultural context, while the etic approach generates a comparative study of behavior across cultures. Emic and etic perspectives

are valuable to research in psychology because they offer different lenses through which to understand behavior in its cultural context. The emic approach emphasizes insider perspectives; the etic approach emphasizes cross-cultural comparisons. By using both perspectives, researchers develop a more comprehensive understanding of the interplay between culture and behavior.

Perspectives of Indigenous societies

The perspectives of **Indigenous societies** refers to the unique cultural, spiritual and historical viewpoints they hold. These perspectives acknowledge diverse understandings of behavior shaped by Indigenous knowledge systems, traditions and experiences. Recognizing and valuing Indigenous perspectives creates culturally responsive and ethical research, clinical practice and treatments that respect Indigenous people's views of the world and promotes Indigenous self-determination and empowerment. For example, Indigenous perspectives in psychology may involve collaborating with Indigenous people to develop research strategies or clinical treatments that are consistent with Indigenous communities' values and beliefs. This could incorporate traditional healthcare practices (Figure 1.8), storytelling and community-based approaches to mental health support for Indigenous populations.

By respecting Indigenous perspectives, psychologists can benefit from Indigenous knowledge and healthcare practices to address the unique mental health needs of Indigenous peoples.

Indigenous perspectives offer insight into behavior supported by a long history of Indigenous knowledge and experience. These perspectives often emphasize an interconnectedness with nature and other people, stressing a holistic approach to health that encompasses physical, mental and emotional dimensions. Acknowledging and respecting Indigenous perspectives promotes cultural humility, equity and social justice.

Alternative explanations and interpretations

Psychology is open to alternative hypotheses or perspectives that may offer different ways of understanding behavior. Being open-minded toward alternative explanations is necessary for scientific inquiry and **critical thinking** because it prompts researchers to investigate different perspectives and hypotheses before making conclusions. For example, when investigating the links between social media use and mental health, researchers may hypothesize that high levels of social media use creates greater feelings of loneliness. However, alternative explanations could include reverse causality (lonely people may use social media more than people who are not lonely) or third variables (for example, personality traits may affect both loneliness and social media use).

Investigating alternative explanations of behavior helps researchers to test the robustness of their findings and identify confounding variables. It promotes skepticism and intellectual rigor because, by considering different perspectives and variables, researchers can strengthen the validity and reliability of their research and avoid oversimplifications. Acknowledging alternative interpretations promotes humility and open-mindedness and encourages researchers to be open to new evidence and to refining existing theories.



Figure 1.8 A man selling natural medicines from his stall in Lima's Mercado Central, Peru.

Do researchers have an inherent right, or even an obligation, to study the behavior of Indigenous people?

TOK

To what extent would you be willing to participate in research conducted by someone from an Indigenous group, using methods unique to their culture?

How do we balance respecting cultural perspectives with scientific rigor in interpreting behavior? For example, in Haitian Vodou, behaviors like possession and trances are understood as spiritual connections, but scientific psychology would interpret them as altered states of consciousness.

TOK

Responsibility



Conceptual question

In collectivist cultures, in which the well-being of society, including future generations, is very highly valued, does the potential social benefit justify harming individual research participants? Does the principle of “do no harm” hinder the aim of developing knowledge that could benefit society?

Responsibility refers to the moral obligation to carry out research with integrity and with consideration and compassion for all stakeholders' well-being. This requires adhering to ethical guidelines, ensuring research validity and eliminating the risk of harm. Psychologists conduct research with human and animal participants, emphasizing respect and ethical treatment, and prioritizing informed consent, confidentiality, anonymity and voluntary participation in human research. For example, in a study that investigates the effects of social media on adolescents, researchers would gain informed consent and ensure confidentiality and anonymity. In **animal models**/research, considerable effort is made to eliminate the risk of harm, by using fewer animals, for example, or using alternatives such as computer modeling whenever possible. In animal research into addiction, researchers use techniques that minimize harm, such as non-invasive procedures. Psychologists conduct ethical research by promoting integrity and compassion and by prioritizing respect and minimizing harm, which contributes to responsible scientific inquiry.

Concept-related terms

Ethical principles

Ethical principles are frameworks that guide the priorities and decisions of psychologists and researchers. Their aim is to prioritize participants' welfare while maximizing benefits to the psychology community. Ethical principles shape research practices by influencing the choice of research topic and the design and procedure of studies. Ethical principles apply to all aspects of research including informed consent, participant

TOK

Why do some communities of psychologists impose ethical constraints on their work, while others do not? To what extent are the methods used in the human sciences limited by the ethical considerations involved in studying human beings?

TOK

Are codes of ethical conduct for researchers required in countries that have robust and effective legal systems? For example, do researchers have different ethical responsibilities when they are working with human subjects compared to when they are working with animals?

rights, confidentiality and anonymity. In a study examining the effect of alcohol consumption on aggression for example, researchers would obtain informed consent from participants, ensuring they understand the study's purpose and procedures and any risks. The right to withdraw is made available to participants, minimizing the risk of coercion. Anonymity in data collection protects participants' privacy and allows for frank and honest responses that increase the data's reliability and validity.

Ethical principles safeguard participants' rights and well-being by ensuring beneficence, nonmaleficence, autonomy and justice, while fostering trust and accountability within the psychology community. Therefore, ethical principles serve as foundational guidelines for psychologists and researchers in psychology, shaping their conduct and decision-making processes in their research practices.

Ethical considerations

Ethical considerations evolve in response to society's changing norms and values. Psychologists recognize their responsibility to conduct research ethically, which includes applying research findings responsibly. This means safeguarding stakeholders such as participants, researchers and users of published research. For example, in a study investigating the effectiveness of a new intervention for reducing anxiety symptoms, psychologists would prioritize transparency by communicating the limitations and uncertainties associated with the intervention's outcomes.

Ethical researchers advocate for government and organizational policies that prioritize mental health support using empirical evidence. Ethical considerations include responsibility for social advocacy and awareness-building because psychologists understand that they have influence in shaping public perceptions of behavior and can play a proactive role in promoting justice and equity through ethical action. Ethical considerations in psychology reflect ongoing efforts to uphold principles of integrity, respect and justice in research. Psychologists have ethical obligations to apply research findings ethically and to advocate for change informed by empirical evidence.

Ethical standards

Ethical standards in research ensure that the rights and well-being of stakeholders are protected. They apply to many research considerations, including the use of deception, obtaining informed consent, conducting **cost-benefit analyses** and harm-benefit analyses, ensuring anonymity, providing debriefing, respecting participants' right to withdraw and mitigating potential harm. For example, in a study investigating the effects of obedience, researchers apply ethical standards by obtaining participants' informed consent, ensuring the participants understand the study's purpose and procedure, and any risks associated with participation. To ensure anonymity, participants are assigned identification numbers to protect their privacy. Ethical standards give researchers a framework to conduct studies responsibly, prioritizing the well-being and rights of all stakeholders, including participants, researchers and users of the research's conclusion.

Use of animals

Using non-human animals in research requires ethical standards because it is accepted that non-human animals feel pain and so can experience harm. Therefore, researchers are expected to protect animals from harm by ensuring their welfare and safety.

Ethical considerations evolve in response to society's changing norms and values, and they may be seen as helping or hindering how psychology researchers collect data. To what extent are the methods used in the human sciences limited by the ethical considerations involved in studying human beings?

TOK

Activity 14

Conduct a debate, with one side arguing in favor of an outright ban on the use of animals and the other side arguing that the benefits of animal use in research outweighs the costs. Discuss whether *any* animal research can be considered ethical, given that the animals are housed in artificial/unnatural conditions.



Research using child participants

Psychologists often want to conduct research with child participants, for example, to study development, learning and social interaction. The main difficulty associated with child participants is that they are not sufficiently mature to give fully informed consent, so this must be obtained from a parent/guardian. For example, if children are to be participants in a study relating to mobile phone use, the children's parents must give consent on their children's behalf and be made aware of all ethical considerations.

Research in public spaces, including observation-only research

Research in public spaces, including observation-only studies, refers to the systematic gathering of data in environments that are accessible to the general populace. Typically, participants' informed consent is not obtained in such research because if they knew they were being observed, they would likely behave differently. For example, a researcher might conduct observation-only research in a recreation park to study social interactions between different age groups by **covert observation** of behaviors, conversations and interactions without interacting with the participants. Using this method, researchers can observe naturally occurring behavior in its typical setting, providing insight into human behavior beyond a controlled setting (Figure 1.9).



◀ **Figure 1.9** There are significant ethical issues associated with observation-only research in public spaces, including the invasion of privacy. Researchers must ensure that participants' identities and personal information remain confidential.

Activity 15

Conducting observational research in public spaces is a widely used method in psychological research. Imagine you were setting up a study to observe the different communication styles used by elementary school students in the playground. What are some of your responsibilities as a researcher when conducting a study like this?

In summary, ethical considerations in psychological research are varied and complex. Researchers must navigate these complexities with sensitivity and diligence, prioritizing the welfare and rights of all individuals involved. By adhering to ethical guidelines, psychologists uphold the integrity of their research and contribute to the advancement of knowledge in an ethical and responsible manner.

Activity 16 (CAS)

If animal and child research are considered unethical because animals and children cannot give fully informed consent, should covert observations also be considered unethical? Discuss with your classmates.

Can Indigenous people, for example, give fully informed consent?

Socially sensitive issues: stigma, publication of findings and advocacy

Psychology research is often conducted on socially sensitive issues, including those prone to stigma, discrimination and strong emotional responses. **Stigma** is a negative stereotype that society attaches to a characteristic or behavior, sometimes resulting in discrimination. For example, many societies stigmatize those who misuse illegal drugs. Socially sensitive topics, such as religion or mental health, can differ in different cultures.

Responsible researchers and journal editors publish the results of socially sensitive research with great care ensuring that participants' anonymity is protected and that all of the data remain confidential. Engaging with socially sensitive issues requires eliminating the risk of harm. This includes carefully considering how findings are published to prevent stigmatization and using results to advocate for meaningful change.

Advocacy means actively supporting the people who are the subject of the research, with the aim of influencing policies and social attitudes, and acting for positive change toward social justice. An example of advocacy in research is a study on the effects of homelessness on mental health during which the researchers actively collaborate with homeless communities to collect data on their everyday experiences, such as access to mental health treatment. After the research is completed, the researchers advocate for change by presenting the study's findings to a local government, requesting that it make mental health services more accessible to the homeless community, thereby working to improve the well-being of homeless people.

An abstract graphic design featuring a solid yellow background. Scattered across the scene are approximately 15 green, semi-transparent spheres of varying sizes. Some spheres are clustered together, while others are isolated. At the bottom of the image, a white horizontal band represents a surface, with soft, out-of-focus shadows of the spheres cast upon it. On the right side, a thin white circle is partially visible, framing the word 'CONTENT'.

CONTENT

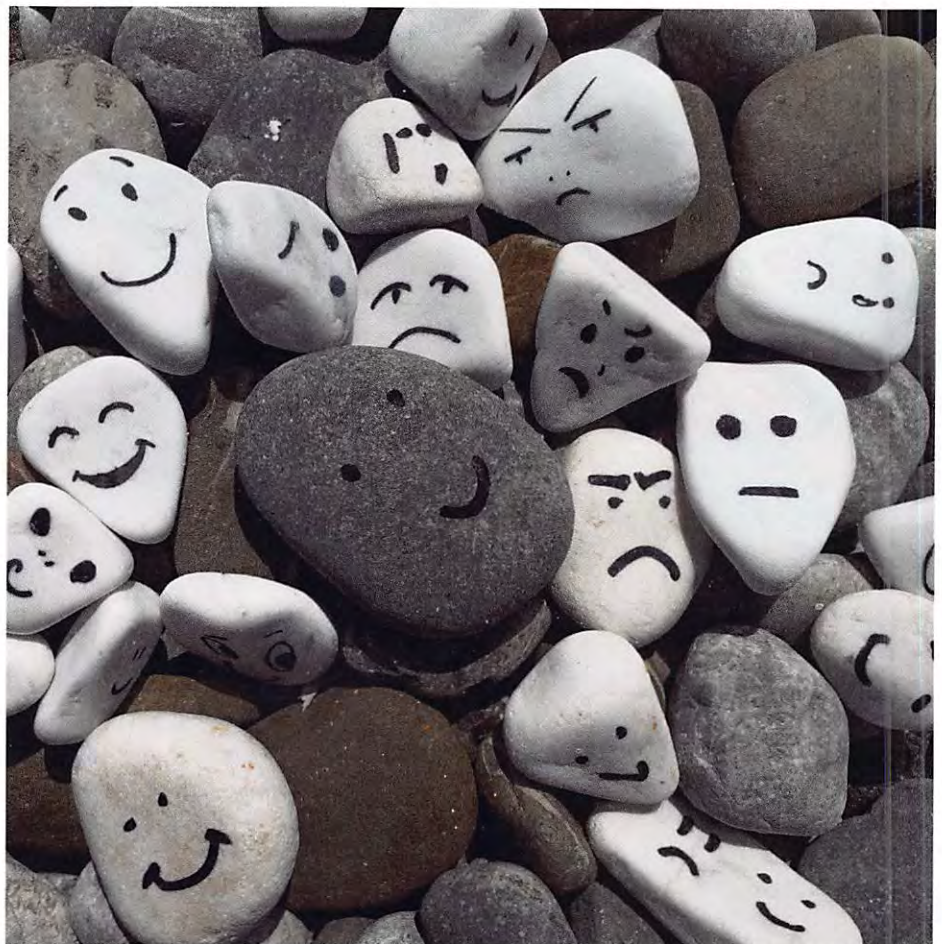
Learning objective

You should be able to understand how psychological terminology and theories related to biological, cognitive and sociocultural approaches assist to understand human behavior, while using a variety of research methodology.

- Biological approach
- Cognitive approach
- Sociocultural approach
- Research methodology

Introduction to content

The DP Psychology course explores the biological, cognitive and sociocultural approaches, along with the research methods used to understand human behavior. While these approaches are often studied individually, you are encouraged to recognize the overlaps and interactions between them. Examples include genetic predispositions influenced by environmental factors, cognitive biases shaped by sociocultural experiences, and epigenetic changes caused by environmental influences. This section covers four main areas: the biological, cognitive, and sociocultural approaches, as well as the research methods used to study human behavior.



Biological approach

Psychological terminology	Learning objective
Animal research/animal models	The value of animal research in the study of human behavior and the ethical considerations in the use of animals in research.
Biological reductionism	The strengths and limitations of a reductionist approach to the study of behavior.
Brain imaging techniques	The value of using one or more brain imaging techniques in investigating human behavior.
Chemical messengers	The role of one or more chemical messengers in human behavior.
Diathesis-stress model	The interaction of environment factors and genetics in human behavior.
Genetic inheritance	The extent to which human behavior may be inherited.
Localization of function	The role of localization of function in explaining human behavior and cognition, and the limitations of the argument that behavior is localized.
Neuroplasticity	The process of neuroplasticity and the role of environmental factors on brain development.
Neurotransmission	The process of neurotransmission and how an understanding of the process of neurotransmission allows psychologists to improve health and wellness.



Table 2.1 Biological approach learning objectives from Subject Guide, page 24.

Introduction to the biological approach

The biological approach to understanding human behavior has developed from early medical practices to contemporary neuroscience. As early as the sixth century BCE, neurosurgery aimed at alleviating pain by removing brain tumors and fluids, laying foundational concepts for the biological study of human behavior. The nineteenth century witnessed the emergence of phrenology (Figure 2.1), a discipline that, despite later being discredited, emphasized the importance of brain function **localization**. This concept gained empirical support through subsequent research, especially in relation to language, in the late nineteenth and early twentieth centuries.

The technological advancements of recent decades, particularly in brain imaging, have revolutionized the biological approach, enabling non-invasive exploration of brain structure and activity. These advances have deepened the understanding of **neuroplasticity**, the brain's ability to form and reorganize synaptic connections,

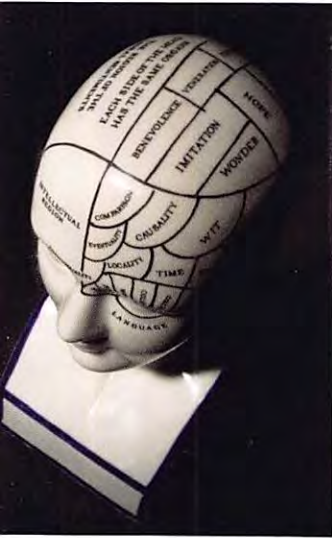


Figure 2.1 A phrenological model skull.

especially in response to learning or experience, as well as gene–environment interactions, particularly through the lens of **epigenetics**, which shows how environmental factors can influence gene expression without altering the DNA sequence itself. Furthermore, the use of animal models, including rodents and primates, has been instrumental in our understanding of the links between neurological structures and behavior, offering valuable insights into human cognition and behavioral patterns. Through these models, researchers can observe the direct consequences of neurological alterations on behavior, providing a more nuanced understanding of the biological underpinnings of human action.



In your assessments, you will be asked to explain or describe a psychological idea or a theory and be expected to provide an example. Make sure you cite a specific behavior and state clearly how it illustrates the idea or theory.

Animal research/animal models

An animal model is a living, non-human, often genetically-engineered animal used during the research and investigation of human behavior. The use of animal models in research eliminates the risk of harming a human being.



The value of animal models



Conceptual question

Animal models allow ease of access to animals' brains and bodies both before and after sacrifice. Do researchers have different ethical *responsibilities* when they are working with human subjects compared to when they are working with animals? If so, on what basis, and which cultural norms should influence ethical standards?

Animal models are used in psychology research on the assumption that the discoveries made will provide insight into the workings of human beings. The value of animal models in research can be seen when they allow for the following.

- The isolation, manipulation and *measurement* of variables, which means there are high levels of internal validity. Therefore, tentative *cause-and-effect* can be shown.
- Ease of access to their brains and bodies both before and after sacrifice. There are ethical and practical restrictions on the use of human bodies in research.
- A relatively quick breeding cycle that allows researchers to study the effects of heredity and environmental factors on behavior.

The use of animal models works on the following assumptions.

- There are similarities between humans and animals because humans are mammals and have been subjected to the same processes of evolution. Therefore, it can be assumed that similar traits have similar adaptive functions in humans and certain animals.
- Animals are an objective research platform to test hypotheses in living tissue. However, animals are also thinking and feeling organisms and respond in subtle and complex ways to their environment and their use in research. For example, Sorge et al. (2014) found that male researchers may cause greater quantities of the stress hormone corticosterone to be released in the mice they handle. The presence of a T-shirt placed with the animals also confirmed the findings, as the animals showed elevated levels of stress if the T-shirt had been worn by a man rather than a woman. The results show how the gender of the person handling the animals can have a significant effect on the biology and the psychology of the animal in the study.

Ethical considerations

Certain underlying ethical assumptions have evolved regarding the treatment of animals.

- It is acceptable to use animals for human ends. However, there must be a clear knowledge benefit.
- The use of animals should be minimized wherever possible.
- Pain and distress should be minimized wherever possible.

The British Society of Animal Science created a set of ethical guidelines for the use of animals in research (known as the “3Rs”).

- **Refinement:** Any animal science research undertaken should be as focused as possible and have realistic and achievable aims. Researchers should avoid causing pain wherever possible.
- **Replacement:** Researchers must consider all available options to replace animals with other techniques that will fulfil the research objectives.
- **Reduction:** Researchers should calculate how few animals are required to ensure that meaningful results can be obtained.

Activity 17 (CAS)

Design a research proposal for a hypothetical animal science study. Ensure that it adheres to ethical guidelines by considering your strengths and limitations in terms of refinement (focused, realistic aims and minimizing pain), replacement (exploring alternative methods to using animals) and reduction (using the minimum number of animals necessary to obtain meaningful results). Discuss how you would implement these principles in your proposal.

TOK

Ethical considerations provide researchers with restraints on what they are allowed and not allowed to research, as well as restraints on the ways in which they conduct research. To what extent are the methods used in the human sciences limited by the ethical considerations involved in studying human beings?

Biological reductionism

Reductionism is an academic approach that breaks down complex behavioral and mental processes into simpler components, often at the level of biological or physiological processes.

The reductionist approach suggests that to understand complex psychological phenomena, researchers should focus on the smallest, most basic elements that contribute to these phenomena, such as genetic makeup, neurotransmitter systems or brain structures.

The strengths and limitations of a reductionist approach

The reductionist approach to the study of behavior has many strengths.

Scientific rigor and precision

Reductionism allows for detailed and precise scientific investigation into the biological bases of behavior and mental processes. It allows for the isolation, manipulation and *measurement* of key variables that can be researched, often singularly, to pinpoint possible mechanisms of cause-and-effect. Therefore, reductionism has implications for *causality*. For example, Davidson et al. (2001) examined the effectiveness of drugs such as sertraline in preventing post-traumatic stress disorder (PTSD) relapse. They knew the variable of serotonin (a neurotransmitter) was important and wanted to see what happened when they manipulated the length of time it would remain active in the brain of PTSD and non-PTSD sufferers. They did this by using selective serotonin reuptake inhibitors (SSRIs), which work by increasing the amount of time serotonin can have an effect in the brain.

Development of treatments

Understanding the biological underpinnings of psychological disorders has led to the development of effective treatments, including pharmacological interventions. By targeting specific biological processes, such treatments can alleviate symptoms of mental health conditions. For example, serotonin is linked to mood and anxiety, therefore medication that acts on the neurotransmitter serotonin can be used to treat mood and anxiety disorders.

Objective measurement

Reductionist approaches often rely on objective, quantifiable *measurement* of biological processes, such as brain imaging or blood tests. This objectivity can enhance the reliability and validity of research findings in the biological approach.

Activity 18

Explore reductionism by breaking down complex behaviors into smaller components across different psychological approaches. Start by selecting a behavior, like anxiety or addiction. Then, in groups, create a diagram with three sections: biological, cognitive and sociocultural. For each section, break the behavior down into specific elements, for example, neurotransmitters for biological, thought patterns for cognitive, and cultural influences for sociocultural. Label which parts of your diagram are reductionist explanations. Finally, discuss whether breaking the behavior down in this way limits your understanding of the behavior as a whole.

You will learn more about this study later in this section (page 49).



Integration with neuroscience

Reductionism has facilitated the integration of psychology with disciplines such as neuroscience and genetics, leading to a more comprehensive understanding of the brain and behavior. This interdisciplinary approach has expanded the knowledge of how biological factors influence psychological processes.



Conceptual question

Reductionism offers a focused *perspective* on biological processes, but what are the strengths and limitations of using this approach to understand complex human behavior?

However, the reductionist approach to the study of behavior also has limitations.

Oversimplification

Reductionism oversimplifies complex psychological phenomena by reducing them to their biological components. Human behavior and mental processes are influenced by a wide range of factors, including environmental, social and cultural factors, which may be overlooked by a purely reductionist approach. Therefore, caution should be used when assuming that complex human behavior can be explained by singular biological variables.

Neglect of context and subjectivity

Reductionism may fail to account for the context in which behavior occurs and the subjective experiences of individuals. Psychological phenomena can be deeply influenced by personal and situational factors that are not easily reduced to biological mechanisms. For example, not all individuals who take SSRIs achieve positive outcomes, which suggests that not all behaviors can be reduced to simple biological mechanisms.

Philosophical concerns

Reductionism raises questions about free will, *responsibility* and the essence of human nature. By attributing behavior and mental states solely to biological factors, reductionism may neglect the role of conscious choice and moral responsibility. It may encourage people to view themselves as being dictated to by biological forces they have little control over, and this may impair treatment or lead to negative behavioral outcomes.

Brain imaging techniques

Brain imaging techniques are non-invasive methods used to visualize the structure and function of the brain, aiding in the investigation of how biological processes influence human behavior.

There are many ways that brain imaging techniques add value in investigating human behavior. For example, PET is a functional imaging technique that produces a multi-colored image showing which parts of the brain are most active during a specific task (Figure 2.2). The color of each dot shows the intensity of the energy signal. PET scans use radioactive substances known as radiotracers to visualize and *measure* changes in metabolic processes and blood flow. PET scanners work by detecting the radiation given off by the radiotracers that have been injected into the body (usually the arm).



See stage theories on page 190 for how this relates to Health and well-being.



Reductionism may neglect the role of conscious choice and moral responsibility in explaining why humans behave the way they do. What are the other main difficulties that human scientists encounter when trying to provide explanations for human behavior?



Conceptual question

Brain imaging techniques allow us to visualize brain activity, but how can we use these methods to accurately *measure* complex psychological constructs such as memory or emotion?

In most PET scans, a radiotracer called fluorodeoxyglucose (FDG) is used. FDG is similar to naturally occurring glucose (a type of sugar), so the body treats it in a similar way by using it for metabolism. The radiotracer collects into areas of the body that have higher levels of metabolic or biochemical activity. When more glucose is used, the radiotracer is detected by the PET scanner. This can be used to show how different areas of the brain are responsible for different behaviors (localization of function).

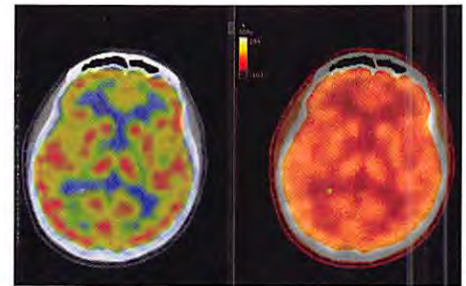


Figure 2.2 A PET scanner and scans.

The value of PET scans is that they allow researchers to study the distribution and density of neurotransmitter systems in the brain, offering insights into the neurochemical basis of behaviors and psychological conditions. By highlighting areas of the brain that consume more glucose, PET scans can identify regions of heightened activity during specific cognitive or emotional tasks, helping to map functions to brain structures. However, it should be noted that brain imaging techniques have limitations. For example, unwanted errors in the images can arise from movement, scanner malfunction or other external factors. These are known as **artifacts**. Artifacts can distort the accuracy of the images, making it difficult to interpret the data reliably. Additionally, brain imaging methods like fMRI and PET scans only provide indirect measurements of brain activity, which means the data needs to be carefully analyzed to ensure valid conclusions. Furthermore, these techniques can be expensive and require specialized equipment, limiting accessibility in some clinical and research settings.

Activity 19

Explore how different brain imaging techniques help in studying human behavior by researching three methods, such as MRI, PET and fMRI. Then, create a diagram comparing these techniques based on their purpose – whether they are used to examine brain structure or function – how they operate, and their respective strengths and limitations. Next, select a specific behavior, such as memory or emotion, and identify which brain imaging technique would be most appropriate for studying it. Finally, discuss how brain imaging provides valuable insights into the biological basis of behavior, while also considering the limitations of interpreting data from these techniques.

Maguire et al. (1997) used 11 right-handed male London taxi drivers to explore the role of the right hippocampus in spatial memory. Using a **quasi-experimental** design, the study measured hippocampal activity through PET scans while participants recalled complex routes and landmarks in London. The results indicated that the right hippocampus was activated during the recall of complex routes but not when recalling landmarks outside participants' spatial knowledge. Maguire et al. concluded that the right hippocampus plays a crucial role in spatial memory, evidenced by its activation in tasks requiring navigation and memory of complex spatial routes. This study shows a further clear value of PET scans: they allow for the brain to be scanned while the participants are engaged in an activity. For example, Maguire et al. were able to ask participants to recall complex routes around London and then *measure* the response of key brain areas. This means a clear correlation between the task and the brain region can be established.

TOK

Brain imaging techniques may provide a valid way to measure behaviors such as memory. However, they raise questions about whether human behavior can be objectively measured.

Chemical messengers

Chemical messengers are substances in the body that transmit signals from one cell to another, facilitating communication between cells and organs to regulate physiological processes and behavior.

Chemical messengers play crucial roles in numerous bodily functions, including growth, metabolism, mood regulation and the immune response. One example of chemical messengers are neurotransmitters (Figure 2.3). These are released by neurons to transmit signals across synapses to other neurons. When an electrical impulse (known as an action potential) travels down the neural cell body (an axon) of the neuron, it releases neurotransmitters that then cross the gap between two neurons (the synapse). Neurons working together can produce a large variety of effects, resulting in a complex range of behaviors. As a result, any claim of cause-and-effect should be treated with caution.

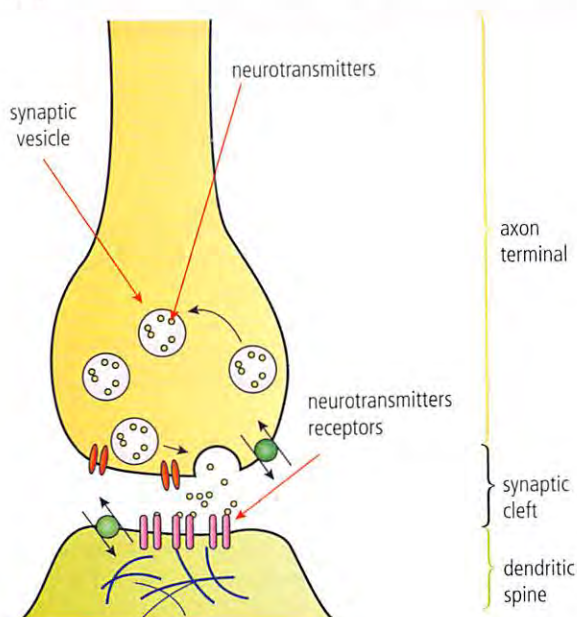


Figure 2.3 Neurotransmitters in action.

Agonists and **antagonists** are substances that influence the effect of the neurotransmitter.

- Agonists increase the activation of a synaptic receptor by binding to synaptic receptors and increase the effect of the neurotransmitter.
- Antagonists decrease the activation of a synaptic receptor by binding and blocking neurotransmitters from binding, or by decreasing the amount of time neurotransmitters are in the synaptic cleft.

For example, Martinez and Kesner (1991) explored the impact of the neurotransmitter acetylcholine (ACh) on learning and memory in rats, using an ACh agonist and antagonist and a control treatment to manipulate ACh levels. Rats injected with scopolamine, an ACh antagonist, showed impaired memory, taking longer to navigate a maze, while those treated with physostigmine, an ACh agonist, completed the maze quicker, indicating enhanced memory. Control rats had intermediate maze completion times. The study concluded that ACh plays a crucial role in memory formation, with increased synaptic ACh levels improving memory performance. Those with decreased activation of a synaptic receptor underscored the importance of ACh in learning processes.

You will learn more about the role of ACh on pages 292–294.



An interesting fact about the discovery of chemical messengers, particularly neurotransmitters, involves Otto Loewi's "dream experiment". In 1921 Loewi dreamed an experiment to prove chemical signalling between nerve cells. He woke up, went to his lab and conducted an experiment with two frog hearts. By stimulating the vagus nerve of the first heart, he slowed its heartbeat and collected the surrounding fluid. When this fluid was applied to the second heart, it also slowed, proving chemical transmission (ACh). This experiment provided the first clear evidence of neurotransmitters and earned Loewi the Nobel Prize in 1936.

Activity 20

There are many great animations and videos online that demonstrate the process of neurotransmission in action. Can you find one and share it with your class?

Diathesis-stress model

The **diathesis-stress model**, also known as the vulnerability-stress model, is a psychological theory that attempts to explain a disorder, or its course, as the result of an interaction between a predispositional vulnerability (known as the diathesis) and stress caused by life experiences.

A diathesis can take the form of genetic, psychological, biological or situational factors, and a large range of differences exists among individuals' vulnerabilities to the development of a disorder (Ingram and Luxton, 2005).

Stressors are the environmental factors or life events that trigger the manifestation of a psychological disorder in a person who is already vulnerable (Figure 2.4).

Therefore, the diathesis-stress model assumes that psychological disorders arise due to the interaction between an individual's vulnerability and stressful environmental factors (Figure 2.5).

Neither diathesis nor stress alone is sufficient to cause a disorder; it is the combination of both that leads to the development of mental health issues. For example, research has identified certain genetic markers that may predispose individuals to depression, indicating a biological vulnerability or diathesis. For instance, variations in the serotonin transporter gene (5-HTTLPR) have been associated with an increased risk of



Models provide a research framework to understand human behavior. What role do models play in the acquisition of knowledge in the human sciences? How might they help and hinder the understanding of human behavior?

developing depression, especially in the presence of stressful life events. Environmental factors – such as experiencing a significant loss, chronic stress, trauma or interpersonal difficulties – act as stressors that can trigger the onset of depressive episodes in those who are genetically predisposed.

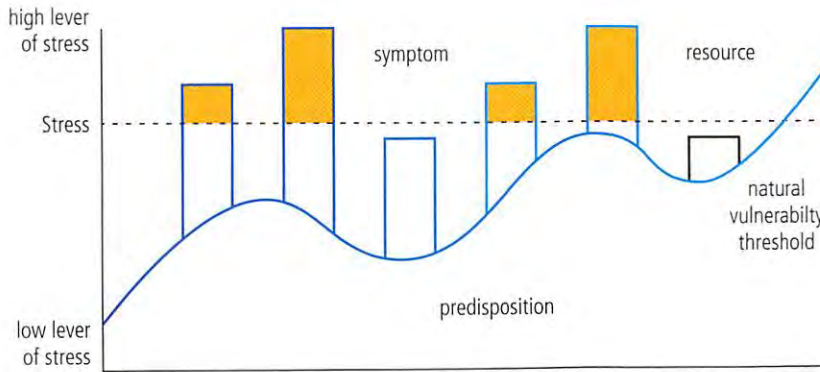


Figure 2.5 The diathesis-stress model assumes that psychological disorders arise due to the interaction between an individual's vulnerability and stressful environmental factors.

The interaction between this genetic vulnerability and environmental stressors can lead to the development of depression. For example, Caspi et al. (2003) found that individuals with one or two copies of the short allele of the 5-HTTLPR gene exhibited more depressive symptoms, diagnosable depression and suicidality in response to stressful life events than those with two long alleles.

Activity 21

Make a list of possible life stressors that an individual might encounter, and a list of possible protective factors an individual may be able to access in their environment to "buffer" or protect them from these stressors.

Genetic inheritance

Genes are made up of DNA, which provides the blueprint for the structure and function of the human body and influences thoughts, feelings and behavior to some extent. Animals, including humans, are born with **innate** behaviors to allow them to react instinctively to some environmental stimuli in a way that enhances their prospects for survival.

When considering genetic inheritance, it is important to note that not all genes are "active", and whether they are "switched on" or "switched off" will depend on several factors. Therefore, the assumption that genes influence behavior in a linear cause-and-effect relationship can be challenged. For example, gene regulation includes internal signals such as hormones or other genes, as well as the external environment, which can also affect gene regulation and subsequent expression of observable traits.

Examples of behaviors that are influenced by genes are personality disorders. These are mental health conditions that affect how someone thinks, perceives, feels or relates to others. Antisocial personality disorder (ASPD) is characterized by impulsive, aggressive, irresponsible and sometimes criminal behavior (Figure 2.6).



Figure 2.4 Stressors can include traumatic events, significant life changes, relationship problems or chronic stress conditions.



Alleles are any of two or more genes that can appear at the same site on a chromosome. The combination of alleles in an organism determine its genotype.



Genotype refers to the genetic constitution of an individual organism, while phenotype refers to the set of observable characteristics of an individual that is a result of the interaction between the genotype and its own environment.



Figure 2.6 Someone with ASPD will typically be manipulative, deceitful and reckless, and will not care for other people's feelings.



Conceptual question

Given that much research on genetic inheritance is conducted in controlled environments, how might our knowledge of human behavior be *biased* by these limitations in studying genes in real-world, dynamic environments?

Is it possible to discover laws of human behavior in the same way that the natural sciences discover laws of nature?

TOK

Plomin and Deary (2015) proposed three “laws” of genetics for complex behavioral traits that can be used to summarize the debate over genetic versus environmental influence.

- All traits show significant genetic influence.
- No traits are 100 percent heritable.
- Heritability is caused by many genes of small effect.

These highlight the nuanced relationship between genetics and determinism, suggesting that while genetics significantly influence traits, they do not fully determine outcomes.

This aligns with the concept of *causality*, where multiple factors, both genetic and environmental, interact to shape behavior rather than there being a single deterministic cause.

There is evidence that the MAOA gene has links to ASPD. The MAOA gene is involved in encoding an enzyme responsible for metabolizing amine neurotransmitters such as dopamine, serotonin and noradrenaline, which are thought to be involved in shaping personality.

For example, Caspi et al. (2002) conducted a longitudinal study in Dunedin, New Zealand, tracking 1037 children from birth to adulthood to explore how the MAOA gene influences the development of ASPD in maltreated children. The research assessed adolescent conduct disorder, convictions for violent crimes, personality dispositions toward violence at age 26 and ASPD symptoms. Findings revealed that variations in the MAOA gene, which affects monoamine oxidase A enzyme levels, moderated the impact of maltreatment. Children with genotypes leading to higher MAOA expression showed reduced antisocial behaviors, which suggests that inherited genetic factors can mitigate the adverse effects of childhood maltreatment.

Activity 22 (CAS)

Using a **t-chart**, list the advantages and disadvantages of reporting academic research into genetics. Think back to the concepts that we explored earlier in the book to examine the impacts on wider society if academic research on genes is routinely widely reported. How might determinism relate to this issue? And ethics?

In groups, research a list of behaviors that may be considered controversial when they are linked to genetic determinants.

Localization

Localization refers to the notion that specific areas of the brain are responsible for specific behaviors. However, while some parts of the brain do play specific roles in specific behavior, rarely does a single part of the brain work in complete isolation from other areas.

One example of localization of function is the relationship between the mid-temporal area which contains structures such as the hippocampus and its involvement in spatial and visual memory. The main functions of the hippocampus involve human learning and memory. The hippocampus helps humans process and retrieve two types of memory, declarative memories and spatial relationships.

Declarative memories are those related to facts and events. Examples can include learning how to memorize speeches or lines in a play.

Spatial relationship memories involve pathways or routes. For example, when a cab driver learns a route through a city, they use spatial memory. Spatial relationship memories appear to be stored in the right hippocampus.

For example, Maguire et al. (2006) investigated the relationship between different parts of the hippocampus and spatial memory by comparing London taxi drivers,

who navigate varied routes, with bus drivers, who follow fixed routes. In this quasi-experiment, 35 male volunteers, including 18 taxi drivers and 17 bus drivers, underwent structural MRI scans to assess hippocampal volume. The study found that taxi drivers had a larger volume in the mid-posterior hippocampi and yet smaller volume in the anterior hippocampi, suggesting brain adaptation to extensive navigational experience. Furthermore, increased navigational experience was positively correlated with right posterior hippocampal volume in taxi drivers. This indicates that spatial knowledge can be localized to the hippocampus as navigational experience significantly influences hippocampal structure, independent of stress or driving duration.

However, the idea that specific brain areas are dedicated to specific behaviors or cognitive functions, has several limitations. For example, the brain exhibits a significant degree of plasticity, meaning it can adapt and reorganize itself. The study by Maguire et al. (2006) shows that the hippocampi of London taxi drivers adapt over time to their navigational experience, indicating that brain structures are not completely fixed but can change in response to environmental demands and experiences. Furthermore, behaviors and cognitive functions often involve multiple brain regions working together, rather than being isolated to a single area. Finally, studies investigating brain-behavior relationships often rely on specific methodologies (e.g. MRI in Maguire et al., 2006) that can have their own limitations, including resolution constraints and the challenge of correlating structural changes with specific behaviors conclusively.

Neuroplasticity

Neuroplasticity refers to the ability of the brain to form and reorganize synaptic connections between neurons, especially in response to experience or following injury.

One example of neuroplasticity is **neural pruning**, which refers to the process of removing neurons that are no longer used or useful in the brain. When unused synapses are pruned, the effectiveness of more commonly used neural circuits is increased. This is how synaptic pruning helps the formation and connections of other more commonly used neural networks.

One example of neuroplasticity/pruning is the changes that take place in the mid-temporal area (which contains structures such as the hippocampus) as a result of being involved in prolonged activities that use spatial and visual memory. For example, Maguire et al. (2006) investigated the relationship between different parts of the hippocampus and spatial memory by comparing London taxi drivers, who navigate varied routes, with bus drivers, who follow fixed routes. They found that taxi drivers had a larger volume in the mid-posterior hippocampi but a smaller volume in the anterior hippocampi. This suggests that the brain adapts to extensive navigational experience.

However, the researchers then tested for functional differences between the groups in terms of their ability to acquire new visuo-spatial information after a 30-minute delay. They did this by asking participants to draw an image of the Rey–Osterrieth complex figure (ROCF) (Figure 2.7). The ROCF is one of the most widely used tests of spatial memory in neuropsychology.

They found that taxi drivers were actually less successful in recalling this figure (which was new to them) even though they were more capable of recalling routes around London that they were familiar with. Maguire et al. (2006) speculated that maintaining a complex spatial representation of a complex object (such as London's

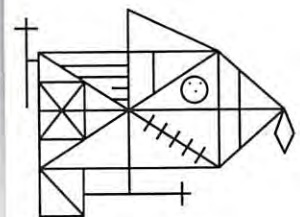


Figure 2.7 The Rey–Osterrieth complex figure.

What assumptions underlie the methods used in the human sciences? For example,

TOK

Maguire may have assumed that brain areas can be linked to specific behaviors such as spatial memory abilities. However, she admits in her research that causal relationships are difficult to establish because of her use of a quasi-experiment.

To what extent is knowledge limited by the philosophical limitations of methodologies?

road network) might need a cognitive trade-off with a decreased ability to form new spatial memories of new complex objects (such as the ROCF). Therefore, the taxi drivers' ability to navigate a familiar complex pattern can be associated with greater posterior hippocampal gray matter volume, while their lesser ability to form new spatial memories can be correlated with decreased matter volume in the anterior hippocampus – showing the effect of possible neural pruning that decreases their ability to remember unfamiliar complex figures.



Conceptual question

As neuroplasticity allows the brain to *change* over time, how can we tell whether behavioral changes are due to natural maturation or the result of an intentional intervention?

Neurotransmission

Neurotransmission refers to the way neurons communicate with each other across synapses, the small gaps between neurons. Neurotransmitters are released by neurons to transmit signals across synapses to other neurons. When an electrical impulse (an action potential) travels down the neural cell body (an axon) of the neuron, it releases neurotransmitters which then cross the gap between two neurons (the synapse).

The understanding of neurotransmission provides psychologists with insights into the biological underpinnings of mental health conditions, enabling the development of targeted interventions to improve health and wellness. For example, the neurotransmitter serotonin is linked to mood and anxiety; therefore, medication that acts on the serotonin can be used to treat mood and anxiety disorders. An example of a biological treatment is SSRIs, which are a common treatment for patients with PTSD and depression. They are usually used alongside psychological therapies and allow individuals to access these therapies more effectively as they reduce symptoms associated with anxiety.

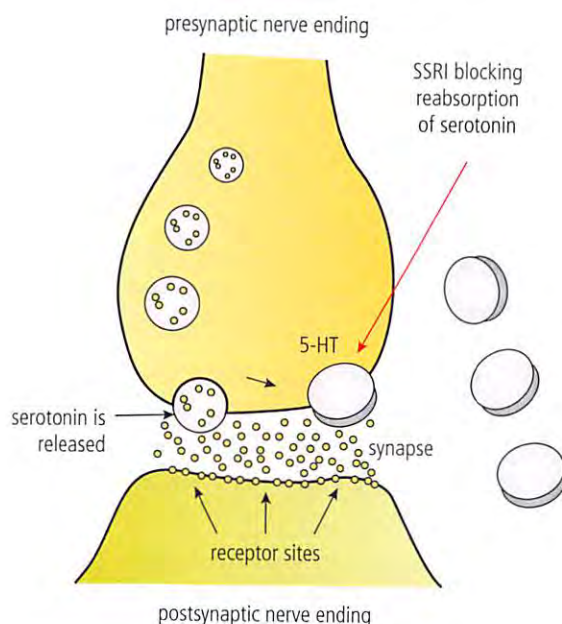


Figure 2.8 How SSRIs work.

SSRIs work in the following way (Figure 2.8).

- The presynaptic cell sends information via a synapse (gap between cells) as neurotransmitters such as serotonin are released into the gap.
- The receptors on the surface of the postsynaptic cell recognize these neurotransmitters and pass on the signal.
- 90 percent of neurotransmitters are released from the receiving receptors and taken up again by the sending cell (known as reuptake).
- SSRIs inhibit the reuptake of serotonin, meaning it stays in the synaptic gap longer.
- This can lead to repeated stimulation of the receptors on the postsynaptic nerve.

Therefore, SSRIs work by increasing the amount of time serotonin spends in the synapse, thereby increasing the effect of serotonin on receptors. However, it should be noted that SSRIs do not increase the level of serotonin.

For example, Davidson et al. (2001) examined the effectiveness of sertraline, an SSRI, in preventing PTSD relapse, comparing it to a placebo in a double-blind field experiment involving 96 North American patients. The participants, who had been diagnosed with PTSD, were randomly assigned to receive sertraline or a placebo for 28 weeks, with assessments every second week using standardized PTSD scales. The study found that sertraline significantly reduced relapse rates compared to the placebo (5 percent vs. 26 percent), concluding that sertraline effectively maintains improvements in PTSD symptoms and offers relapse protection.

Therefore, Davidson et al. (2001) suggest that PTSD can be treated with biological measures such as SSRIs. As the participants were randomly allocated to receive the SSRI (or not), this helped to minimize any effects of individual differences that may have influenced PTSD severity. This in turn suggests that the process of neurotransmission can be targeted to successfully treat PTSD and improve health and wellness.

Activity 23 (CAS)

Either draw a flow diagram showing the entire process of neurotransmission or use stop motion photography to design a film that can educate a younger audience about the process of neurotransmission.

Investigating psychological concepts in the biological approach

Bias: In what way may our knowledge of human behavior be biased?

Our knowledge of human behavior may be biased by the limitations of animal models in research. Animal models are commonly used under the assumption that findings in animals can be generalized to humans. However, there are significant differences between humans and animals, both biologically and psychologically. For example, Sorge et al. (2014) demonstrated how male researchers caused higher levels of the stress hormone corticosterone in mice compared to female researchers. The study showed that even subtle factors, such as the gender of the researcher, can influence

animal behavior. This suggests that animals may respond differently to humans based on environmental cues that are irrelevant to human psychology. Furthermore, since animals lack the complex cultural, social and cognitive dimensions that affect human behavior, it becomes difficult to fully extrapolate findings from animals to humans without introducing bias. Thus, relying too heavily on animal models may lead to biased interpretations of human behavior. The findings may not always hold true when tested in human populations, as the unique aspects of human experience are not accounted for in animal studies.

Activity 24

Research another study that uses animal models. Identify potential biases that could limit the generalization of the results to human behavior, and suggest how these biases could be addressed.

Causality: How can we know the cause(s) of observed behavior?

One way to know the causes of observed behavior is to standardize and control variables in research. For example, Maguire et al. (2006) investigated the relationship between different parts of the hippocampus and spatial memory by comparing taxi drivers in London, who navigate varied routes, with bus drivers, who follow fixed routes. She found that taxi drivers had a larger volume in the mid-posterior hippocampi but a smaller volume in the anterior hippocampi, suggesting that brain adaptation to extensive navigational experience and spatial knowledge can be localized to the hippocampus. The quasi-experimental nature of the design means there was no direct manipulation of the independent variable, so caution should be used when assuming a causal relationship between the variables. However, Maguire standardized her design and put controls in place. For example, the taxi drivers and bus drivers were matched for driving experience and levels of stress, differing only in that they needed different navigational skills. Therefore, this increases confidence in the validity of the research and allows tentative **causation** to be assumed.

Activity 25

Choose a quasi-experimental study and critique it for how well it controls for variables. Analyze whether the study's conclusions about causality are justified. Suggest additional controls or steps that could have been taken to improve the strength of the causal inferences.

Change: How can we know if a behavior is a result of natural maturation or purposeful intervention?

Distinguishing between behaviors caused by natural maturation and those resulting from purposeful intervention requires well-designed experiments with control and intervention groups. By comparing changes in behavior between these groups, researchers can assess whether observed differences are due to the intervention or simply natural growth. For example, Martinez and Kesner (1991) studied the role of ACh in memory by manipulating ACh levels in rats. The researchers used an agonist

Use relevant technical terminology in your answers. Create vocabulary lists to help you memorize the key terms. At the end of your answer, provide a summary sentence that links the explanation to the example and to the question.



(which increased ACh levels), an antagonist (which decreased ACh levels) and a control group. The rats with enhanced ACh performed better in a maze task, while those with reduced ACh performed worse. The control group showed intermediate performance, demonstrating that the differences in memory were due to the intervention (ACh manipulation) rather than natural maturation. This design allowed the researchers to isolate the effects of ACh on memory by comparing treated rats to untreated rats, ruling out the possibility that changes in behavior were simply due to the rats' natural cognitive development.

Activity 26

Find another study involving the manipulation of neurotransmitters or brain activity. Compare the intervention group with the control group and identify how the researchers distinguished between natural maturation and the effects of the intervention. Create a flowchart that illustrates how the researchers differentiated between changes due to natural maturation and those caused by an intervention.

Measurement: How can we express complex psychological constructs in terms of observable measurable behavior?

Complex psychological constructs like memory, anxiety or stress are often expressed in terms of measurable behaviors or biological markers. For example, Davidson et al. (2001) examined the effectiveness of SSRIs in preventing PTSD relapse by using standardized scales to measure PTSD symptoms. The study utilized the PTSD checklist, which provides a quantifiable measure of the severity and frequency of PTSD symptoms. By assigning numerical values to symptoms such as nightmares, flashbacks and avoidance behaviors, the researchers could observe reductions in these behaviors in patients treated with SSRIs compared to those given a placebo. The measurable decrease in symptoms allowed the researchers to conclude that SSRIs were effective in maintaining improvements in PTSD patients. Thus, by translating complex emotional and psychological states into observable symptoms and behaviors, psychologists can create standardized measures that allow for objective comparisons across individuals and treatments. This process not only makes the constructs scientifically testable but also enhances the reliability of the findings.

Activity 27

In small groups, research how a specific psychological construct (such as anxiety or stress) has been operationalized in a study. Explain to your peers the observable behaviors or biological markers used to measure this construct, and discuss how these methods enhance the reliability of the findings.

Perspective: What are the strengths and limitations of a reductionist approach to studying behavior?

Reductionism, which breaks down complex psychological phenomena into simpler biological components, has several strengths, such as precision and the ability to isolate variables. For example, Davidson et al. (2001) explored the role of serotonin

in PTSD by using SSRIs to manipulate serotonin levels in the brain. This reductionist approach allowed the researchers to pinpoint serotonin's role in reducing PTSD symptoms and provided evidence for a biological treatment. The strength of this approach lies in its scientific rigor; by isolating one variable, serotonin, the researchers could make specific inferences about its role in PTSD. However, a significant limitation of reductionism is that it oversimplifies complex phenomena. PTSD is influenced by environmental, social and psychological factors, none of which were addressed in the study. As a result, not all individuals benefited from SSRI treatment, suggesting that focusing solely on biological mechanisms may overlook other contributing factors. This highlights the importance of complementing reductionist research with more holistic approaches that consider the broader context of human behavior.

Activity 28

Pick a different reductionist study and outline how it isolates a specific biological factor. Then, identify one environmental or psychological factor that the study may have overlooked, and discuss how considering this factor could provide a more comprehensive understanding of the behavior.

Responsibility: Can potential benefits of research justify partial relaxation of ethical standards?

In some cases, the potential benefits of research may justify a partial relaxation of ethical standards, particularly when the research could significantly advance our understanding of human health. For example, Martinez and Kesner (1991) conducted research on rats to investigate the role of ACh in memory formation. This study involved manipulating ACh levels using agonists and antagonists, which required invasive procedures. Although the use of animals raises ethical concerns, the findings provided valuable insights into the biological mechanisms underlying memory, contributing to the development of treatments for memory-related disorders in humans. The ethical debate often revolves around balancing the scientific value of the research with the well-being of the animal subjects. Ethical guidelines, such as the 3Rs (Replacement, Reduction and Refinement), help to ensure that animal research is conducted responsibly, minimizing harm while allowing important discoveries to be made. Therefore, while ethical standards should not be ignored, the potential benefits of research can, in some cases, justify ethical compromises when the scientific and medical gains outweigh the ethical costs.

Activity 29

Imagine you are part of a Research Ethics Committee evaluating a reductionist study that focuses on a biological factor influencing behavior. Discuss any ethical concerns that arise from simplifying complex human behaviors. Discuss whether the potential benefits of the research outweighed the ethical concerns, and how the researchers balanced these considerations.

Cognitive approach

Psychological terminology	Learning objective
Anchoring bias	The role of anchoring bias in decision-making.
Classical conditioning	The process of classical conditioning and its role in behavior.
Cognitive load theory	The role of cognitive load theory in understanding human cognition.
Cognitive models	The role of one or more cognitive models in understanding a cognitive process or behaviors.
Confirmation bias	The role of confirmation bias in decision-making.
Dual processing theory	The role of the dual processing theory in understanding decision-making.
Operant conditioning	The process of operant conditioning and its role in behavior.
Schema theory	The role of schema theory in understanding a cognitive process.



Table 2.2 Cognitive approach learning objectives from Subject Guide, page 25.

Introduction to the cognitive approach

The cognitive approach to understanding human behavior arose in opposition to behaviorism during the early to mid-twentieth century. Behaviorism had introduced concepts such as **classical conditioning**, illustrating the formation of associations between stimuli and responses, and **operant conditioning**, which revealed how behavior is shaped through rewards and penalties. These principles are still utilized in contemporary educational methods, including personalized learning strategies that employ individual rewards and feedback to promote desired behaviors and encourage student motivation.

However, the cognitive approach emphasizes the significance of internal mental processes in the analysis of observable behavior. It assumes that the mind is an information processing system that mediates between stimulus input and behavioral output. The study of how humans process sensory information constitutes the essence of cognitive psychology and has led to the development of **cognitive models** such as the computer model for information processing, memory models and theories of language development.

Interest initially focused on the accuracy of human cognitive functions and their variation due to individual, social and cultural experiences, as well as the impact of language on the expression of ideas. Early 20th-century psychology researchers explored the organization and interpretation of information via mental structures or schemas, which influence human perceptions and recollections.

Moreover, the dual processing model, a fundamental theory within the cognitive approach, assumes that humans operate on both conscious and unconscious levels, leading to cognitive *biases* that shape behaviors and decision-making processes. Cognitive theories have become instrumental in applied psychology, offering insights into human development, as well as the emergence and mitigation of health issues and educational challenges.



Conceptual question

As cognitive psychology focuses on internal processes, how might our understanding of human behavior be *biased* if the research relies too heavily on culturally specific models or populations?

Anchoring bias

Anchoring bias refers to the human tendency to rely too heavily on the first piece of information (the “anchor”) encountered when making decisions. This initial information sets a reference point, and subsequent judgments are made by adjusting away from that anchor, often insufficiently.

This cognitive bias affects various types of decision-making, including financial, sociocultural and personal decisions. For example, Tversky and Kahneman (1974) asked participants to estimate the percentage of African countries in the United Nations after seeing a random number generated by a “wheel of fortune” (Figure 2.9). The key manipulation was that the wheel produced either a high number (65) or a low number (10) as the starting point or “anchor”. Despite the anchor’s irrelevance to the actual question, participants’ estimates were significantly influenced by it: those who saw the higher number gave higher estimates, and those who saw the lower number gave lower estimates.



Figure 2.9 The wheel of fortune can provide an anchoring bias.

This study shows how an anchoring bias using unrelated initial information can skew subsequent judgments and decisions. Even when individuals are aware that the anchor should not influence their estimation (by spinning the wheel), the initial number significantly impacts their final judgment. Further research has shown that initial salary offers, for example, have a strong anchoring effect on the final agreed-upon salary, illustrating the influence of anchoring bias in practical settings.

You will be asked to explain or describe a psychological idea or a theory and be expected to provide an example. Make sure you cite a specific behavior and state clearly how it illustrates the idea or theory.



Anchoring bias demonstrates how initial information, even if arbitrary, can significantly influence subsequent judgments and decisions, emphasizing the need for awareness and strategies to mitigate its effects in critical decision-making processes.

Activity 30

Think about situations in your school where initial information or first impressions play a significant role. Consider academic settings, social interactions and extracurricular activities. For example, consider how the first test score in a class might influence a student's perception of their ability in that subject.

Classical conditioning

Classical conditioning is defined as a type of unconscious or automatic learning that creates a conditioned response through associations between an unconditioned stimulus and a neutral stimulus (Wolpe and Plaud, 1997).

This mechanism explains how organisms adapt to their environments by learning to predict occurrences of significant events. The process involves pairing a neutral stimulus (which initially does not elicit a particular response) with an unconditioned stimulus (which naturally elicits a response) until the neutral stimulus alone can evoke a similar response, now termed a conditioned response.

Classical conditioning can explain a phobia such as anxiety around spiders through the association of spiders (a supposed neutral stimulus) with a frightening experience (unconditioned stimulus) such as a parent screaming. This elicits a fear response (unconditioned response). Over time, the mere sight of spiders becomes a conditioned stimulus, triggering a conditioned fear response (phobia) even without the original frightening experience of the parent screaming (Figure 2.10). However, it should be noted that there are evolutionary explanations as to why people are afraid of certain stimuli, and therefore classical conditioning may not provide a full explanation for all phobias. This shows how different *perspectives* can be used to explain behaviors.

Ivan Pavlov (1849–1936) was a Russian physiologist who used sound as a neutral stimulus and paired it with the presentation of food to dogs. After repeated pairings, the sound alone, without the presentation of food, began to cause the dogs to salivate. Pavlov's work not only illustrates the basic principles of classical conditioning but also highlights its implications for understanding a wide range of behaviors and psychological phenomena. This foundational study has paved the way for subsequent research exploring the mechanisms of learning and adaptation in both animals and humans (such as in the development of phobias). It reveals the significance of conditioned learning in behavior and mental processes.



Conceptual question

Pavlov's work shows how conditioning can alter behavior, but how can we know whether a behavior *change* is due to purposeful intervention (like conditioning) or natural maturation over time?



Now consider which contexts of psychology these examples could connect to.



Figure 2.10 Are you scared of spiders? Are members of your family scared too?



You will learn more about Pavlov's experiment on pages 277–278.

If there are competing perspectives for behaviors, how can their validity be measured, and to what extent can we be certain which one is more correct?

TOK

Activity 31 (CAS)

Step 1: Draw a flow diagram to illustrate the process of classical conditioning for one of the following behaviors:

- a student feeling anxious when entering a classroom
- a person feeling hungry when they see a food advertisement
- a child becoming fearful of the doctor's office
- a cat coming to the kitchen when it hears the can opener.

Step 2: Now you have completed the steps of classical conditioning, label your diagram with potential alternative explanations for the behavior.

Cognitive load theory

Cognitive load theory (CLT) draws on evolutionary theory to understand human cognitive architecture (Sweller, 2011). It has been used to develop instructional methods in education.

CLT proposes that knowledge can be categorized into biologically primary knowledge, which we are naturally predisposed to acquire, and biologically secondary knowledge, which is significant for cultural reasons and is the focus of instruction. Engaging with secondary knowledge requires a substantial information store, the bulk of which is acquired by assimilating information from other sources. The theory suggests that any new information is produced through a random generate-and-test method, with the capacity to process new information being severely limited at any given time. CLT suggests, therefore, that the human brain has a limited capacity in its working memory for processing new information, that the design of tasks can either help or hinder learning based on how information is presented and the cognitive demands placed on learners.



Conceptual question

Cognitive load theory offers a reductionist explanation of how humans process information, but what are the strengths and limitations of using such a reductionist approach to study human learning?

To understand cognitive load, CLT uses well-known cognitive theories about how humans process and store information:

- human memory is divided into long-term memory and working memory
- processing of new knowledge leads to “cognitive load” on working memory, which may influence learning outcomes
- content knowledge is stored in the form of schemas in long-term memory (Figure 2.11).

CLT identifies three types of cognitive load: intrinsic (the complexity of the material), extraneous (how the material is presented) and germane (the effort required to process and understand the material).

Therefore, for an effective learning process, one must:

- optimize extraneous cognitive load
- manage intrinsic cognitive load
- promote germane cognitive load.

Therefore, CLT can be useful in planning for effective learning. It recommends reducing unnecessary cognitive demands (extraneous loads such as unnecessary imagery or teacher-added content), managing the complexity of the material (intrinsic load) and maximizing the resources devoted to meaningful learning processes (germane load, such as writing out key points). A CLT approach would aim to optimize the use of limited cognitive resources to enhance the learning and comprehension of new content.

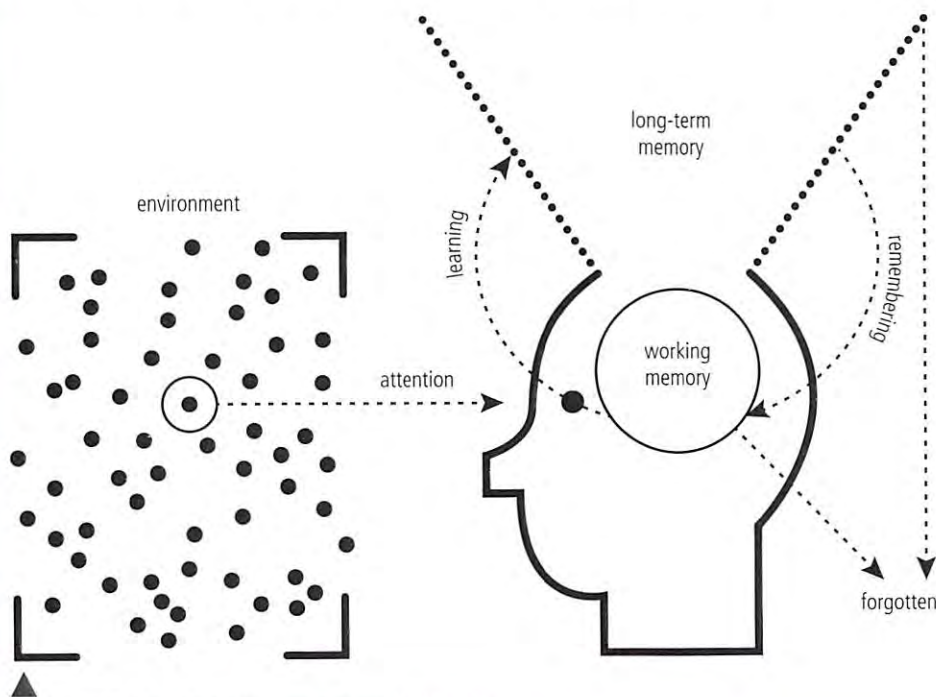


Figure 2.11 How the brain stores long-term memory.

Activity 32

Find a teaching resource from any one of your IB Diploma subjects that you find cognitively demanding. Think of ways to reduce cognitive demand using the principles of CLT.

Cognitive models

Cognitive models are theoretical constructs that attempt to simulate human thought processes. Cognitive models help us to understand how people perceive, remember, think and solve problems. They aim to represent how human cognition functions to predict and explain behavior in various cognitive tasks.

For example, memory models provide a framework for understanding human memory processes.

Example: Multi-store model (MSM) – Atkinson and Shiffrin (1968)

The MSM assumes that human memory has three separate components that are characterized differently according to encoding, capacity and duration (Table 2.3).

- Encoding: Refers to the way information is processed.
- Capacity: Refers to the amount of information that can be processed.
- Duration: Refers to the amount of time information can be stored for.

Sensory register (SM, for sensory memory)

This store receives and processes information from the senses. When a stimulus is detected, such as when a sound is heard or when a visual image is seen, it is “stored” very briefly in the sensory register. If the stimulus is given attention, it is transferred to the model’s short-term store (STS). If no attention is given to the stimulus, it quickly decays and is forgotten. Most information in the SM is lost.

Short-term store (STS)

This store receives and processes information from the sensory register and the long-term store (LTS). Information can be retained in the STS for up to 30 seconds if it is actively rehearsed. If it is not rehearsed, it decays and is forgotten. Information that is rehearsed sufficiently can be stored in the LTS. The longer an item is rehearsed in short-term memory, the stronger its memory trace will be in long-term memory.

Long-term store (LTS)

This store receives and processes information from the STS. Information that has been rehearsed in the STS is held indefinitely in the LTS. Information is retrieved from the LTS into the STS so that it can be recalled.

Store	Encoding	Capacity	Duration
SM	Sense specific. For example, visual information is encoded visually.	1 sensation	Less than 1 second
STS	Mainly acoustic.	7 ± 2 chunks (pieces of information)	18–30 seconds
LTS	Mainly semantic (according to meaning) but can be visual and auditory.	Unlimited	Unlimited



Table 2.3 The encoding, capacity and duration of the human memory components.

The MSM assumes that information passes from store to store in a linear way. It has been described as an information-processing model (like a computer) with an input, process and output. Information is detected by the sense organs and enters the SM, which stores a fleeting impression of sensory stimuli. If attended to, this information enters the STS; if the information is rehearsed, it is passed on to the LTS (Figure 2.12).

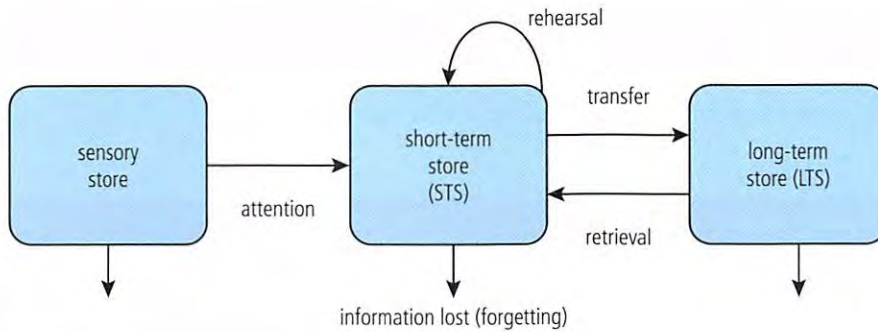


Figure 2.12 The multi-store model of memory – Atkinson & Shiffrin (1968).

Example: Working memory model (WMM) – Baddeley and Hitch (1974)

The WMM is a further development of the STS proposed by the MSM (Figure 2.13). It separates the STS into three main components.

- Central executive (CE): Controls the flow of information and acts as a general manager of the WMM. The CE allocates data to the subsystems: the phonological loop and the visuospatial sketchpad. The CE uses an episodic buffer as a temporary storage device that integrates information from the other components. It acts as a link to the LTS and maintains a sense of time, so that events occur in a continuing sequence.
- Phonological loop: Processes spoken and written material. It is further subdivided:
 - Phonological store (inner ear): holds information in a speech-based form.
 - Articulatory control process (inner voice): rehearses verbal information in a loop.
- Visuospatial sketchpad (inner eye): Processes visual and spatial information. Visual information refers to objects' characteristics such as their size, shape, surface texture and color. Spatial information refers to where images are relative to each other.



Conceptual question

Cognitive models like the WMM allow us to study mental processes, but how can we express complex psychological constructs, such as memory, in terms of observable, *measurable* behavior?

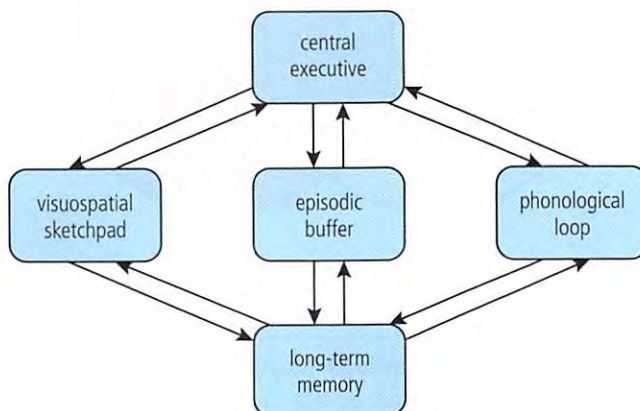


Figure 2.13 The working memory model – Baddeley and Hitch (1974).

TOK

What role do models play in the acquisition of knowledge in the human sciences? Do models help or hinder knowledge in psychology? For example, what is the value of having two models of memory? What does the working memory model explain that the multi-store model cannot?

Activity 33

The WMM is really an elaboration of the short-term memory from the MSM. Can you draw a diagram that combines the WMM with the MSM?

Activity 34

Check your digit-memory span! Work with a partner. Devise eight strings of digits each, starting with a string of three (e.g. 682), then four (e.g. 9184), five (e.g. 36187) and so on until you have a string of 10 numbers. Do not let your partner see the number sequences you have devised.

Now, one of you reads out your three-digit string while the other writes down your digits in the same sequence immediately after hearing them. Work in order through the eight digit strings until each string has been read out and recalled.

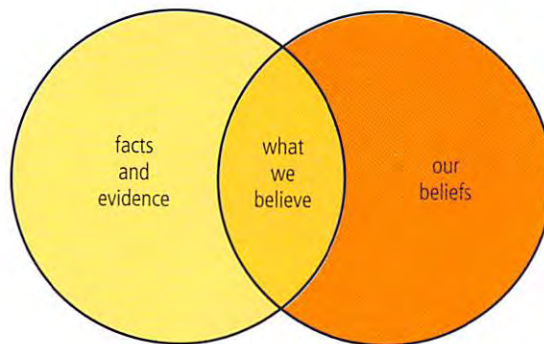
Now swap roles and repeat the procedure, so that the other person reads out their strings of digits. Note your scores.

- How did you try to remember the numbers?
- How might you increase your short-term memory span?

Research alternative models of memory such as the Levels of Processing approach. How can competing explanations in the human sciences be resolved?

Confirmation bias

Confirmation bias is defined as a cognitive *bias* that influences individuals to favor, seek out, interpret and remember information in a way that confirms their pre-existing beliefs or hypotheses, while giving disproportionately less consideration to alternative possibilities.



▲ **Figure 2.14** Confirmation bias.

Confirmation bias occurs in various contexts, including decision-making, belief formation and interpersonal relationships. It can lead to overconfidence in personal beliefs and can maintain or strengthen beliefs in the face of contrary evidence (Figure 2.14). Essentially, confirmation bias causes individuals to selectively gather or recall information that supports their own opinions, leading to a skewed

Confirmation bias can often be presented as a negative human behavior by teachers. Is the role of the human scientist only to describe what the case is or also to make judgments about what should be the case?

TOK

perception of reality. It demonstrates the impact of pre-existing attitudes on the interpretation of new information, potentially hindering objective analysis and critical thinking.

For example, Lord, Ross and Lepper (1979) asked participants with opposing views on the death penalty to examine evidence from two studies regarding the effectiveness of capital punishment as a deterrent to crime. One study suggested that the death penalty was effective as a deterrent to crime, while the other study suggested that the death penalty was not an effective deterrent. The crucial point was that the data from these studies could be interpreted in different ways, depending on one's prior beliefs. Participants were divided based on their existing views on the death penalty – either strongly in favor or strongly against.



Conceptual question

While confirmation *bias* studies provide important insights into human decision-making, can the potential benefits of research justify partial relaxation of ethical standards, especially when using deceptive techniques?

After reading summaries of the two studies, each group was asked to evaluate the methodology and overall persuasiveness of the studies. Participants who were pro-death penalty found the study supporting the deterrent effect of the death penalty to be more convincing and methodologically sound, while they criticized the study that argued against the deterrent effect. Conversely, participants who were anti-death penalty found the study that supported their stance (against the deterrent effect) to be more credible and well-conducted, while they found faults in the study supporting the death penalty's effectiveness. This selective evaluation of the same set of data, based on pre-existing beliefs, demonstrates how individuals gave more weight to evidence that supported their initial beliefs and discounted evidence that contradicted them, leading to further polarization of their views.

Activity 35

Look at the study by Lord, Ross and Lepper (1979). The important point was that the data from the studies they used could be interpreted in different ways, depending on one's prior beliefs. Design a similar study (which you should *not* carry out) to investigate the effect of cognitive bias on a specific perception or behavior.



This activity links to the concept of *measurement*. What method would you select, and why, when deciding on a valid way to measure confirmation bias?

Dual processing theory

Kahneman (2011) proposed a dual system model that explains the difference between two types of thinking.

- System 1: Intuitive thinking (automatic), which is seen as quick, requires limited effort and is more influenced by biases.
- System 2: Rational thinking (controlled), which is seen as slower, requires intentional effort over time and is less influenced by biases.

The model suggests that decision-making can be divided into relatively quick, intuitive decisions and relatively slow, more rational decisions.

Kahneman and Tversky (1983) demonstrated **conjunction fallacy** through a seemingly straightforward questionnaire. Conjunction fallacy refers to the belief that two or more specific conditions are more probable than a single, general condition – when the opposite is true. Therefore, it is an example of intuitive thinking over more rational thinking. Participants, varying from statistically naive undergraduates to sophisticated PhD candidates, were presented with a description of a character called “Linda”, who was described as a stereotypical “social justice warrior”. When asked to evaluate the likelihood of Linda being merely a bank teller versus being a bank teller who is also an active feminist, an overwhelming majority – almost 90 percent – erroneously leaned toward the latter, more specific yet statistically less probable scenario.



Conceptual question

Dual processing theory suggests that both intuitive and rational thinking influence decisions, but how can we know whether an observed behavior is caused by fast, intuitive thinking or more deliberate, rational thinking?

The study shows the prevalence of intuitive thinking because 90 percent of the participants were unable to spot the conjunction fallacy (whereby general conditions are more probable than specific conditions) and fell into this style of thinking. However, the study also shows rational thinking: 10 percent of the participants were able to spot the conjunction fallacy and not fall into this style of thinking.

Activity 36

Do you think you have ever been the victim of the conjunction fallacy or other people’s over-reliance on intuitive thinking? Have there been situations where people have known a few things about you and then “filled in the blanks”, assuming other things about you without any evidence?

TOK

Human scientists consider to what extent the instrument they are using to measure a behavior can allow them to measure accurately and then make predictions. Are predictions in the human sciences inevitably unreliable? Furthermore, human behavior is often simplified to allow it to be researched in a way that produces reliable data. To what extent do these approaches provide accurate understanding of human behavior? How can we be certain?

It might be noted, Bechara et al. (2000) explored decision-making in individuals with ventromedial prefrontal cortex (vmPFC) damage. They compared them with healthy controls using an apparatus known as the Iowa Gambling Task. This *measures* decision-making abilities by requiring participants to choose cards from decks that offer varying rewards and penalties. “Good decks” have fewer rewards but fewer penalties, so the overall rewards are greater, while “bad decks” have larger rewards but greater penalties, so the overall rewards are fewer. The study found that those with vmPFC damage struggled to choose “good” decks, which provide long-term gains, demonstrating impaired impulse control and decision-making. This suggests that the vmPFC plays a role in enabling rational, System 2 processing, highlighting biological underpinnings for the dual processing theory.

Operant conditioning

Operant conditioning is defined as a type of learning in which the strength of a behavior is modified by the behavior’s consequences, such as reward or punishment (Skinner, 1938).

This psychological mechanism explains how organisms adjust their actions based on the outcomes they experience, thereby learning to repeat behaviors that lead to

positive results and avoid those that lead to negative outcomes. The process involves applying reinforcement (which increases the likelihood of a behavior being repeated) or punishment (which decreases the likelihood of a behavior being repeated) after the behavior has occurred.

For example, Skinner used a specially designed chamber (known as the Skinner box) for research with rats. In this setup, a rat pressing a lever (the behavior) would receive food (a reinforcement), which naturally increased the likelihood of the lever-pressing behavior being repeated. Over time, the rats learned to press the lever more frequently to obtain food. Conversely, if pressing the lever resulted in an unpleasant stimulus (a punishment), the rats would learn to avoid pressing the lever. This demonstrates, in an academic and controlled setting, how behaviors are influenced by their consequences.



Using animal participants raises questions about *responsibility* in psychology research.

Activity 37

How could you use operant conditioning to increase or decrease the behaviors of those around you? Could you add in a reinforcement such as praise when your younger siblings help out with some chores or an expression of gratitude when a peer supports you through a tricky situation? Can you think of a time when the principles of operant conditioning have been applied to you to make you change your behavior?

Therefore, operant conditioning can explain a wide range of human behaviors through the concepts of reinforcement and punishment.

- **Language acquisition:** Children learn to speak and use language effectively through positive reinforcement. When a child says a word correctly and receives praise or attention, they are more likely to repeat the word.
- **Study habits:** Students may develop effective study habits due to the positive outcomes associated with them, such as good grades (positive reinforcement) or the avoidance of poor grades (negative reinforcement).
- **Addiction:** **Drug misuse** can be reinforced by the pleasurable feelings that substances provide (positive reinforcement) or by the relief they offer from negative states (negative reinforcement).
- **Phobias and anxiety:** Avoidance behaviors in anxiety disorders can be reinforced if avoiding a feared object or situation leads to reduced anxiety.
- **Consumer habits:** Shopping behaviors can be reinforced by the satisfaction or rewards obtained from making a purchase (positive reinforcement) or by sales and discounts that reduce the cost (negative reinforcement).



Activity 38

Operant conditioning can explain a wide range of human behaviors through reinforcement and punishment. Some of those behaviors are listed above. In groups, list other behaviors that operant conditioning can explain. Then, categorize them in terms of how they might apply to various contexts. Are there any alternative perspectives that can also explain these behaviors?

Schema theory

Schema theory proposes that cognitive frameworks known as schemas help to organize and interpret information. Therefore, schemas are mental representations that organize knowledge, beliefs and expectations. Schema processing is to a large extent automatic and unconscious, which saves cognitive energy, but can therefore result in *biases* in thinking and memory processes.

Schemas can influence memory via their connection with language. Cognitive linguistics suggests that language can help form image schemas, which are representations of scenes and events (Lakoff, 1987). In particular, action verbs can lead to the formation of schemas that help people make sense of their environment (Hart, 2019). Furthermore, the presence of action verbs can create schemas that influence the retrieval of information from long-term memory.

Activity 39

As an IB student, you are also a language learner. Do you notice any differences between action verbs in your native language compared to the language(s) you are learning? Are there examples of action verbs that cannot be translated directly?

For example, Loftus and Palmer (1974) demonstrated that schemas can create false memories, which refers to the recall of an event that never happened but is believed to be true. They showed 150 students a film of a car accident, then questioned them using leading questions with different verbs. Some participants were asked: "About how fast were the cars going when they smashed each other?". Others were asked: "About how fast were the cars going when they contacted each other?" A week later, participants were asked about seeing non-existent broken glass. Those questioned using the verb "smashed" were more likely to recall false memories of broken glass, illustrating how schemas can be created using certain words, leading to possibly false memories about events.

Investigating psychological concepts in the cognitive approach

Bias: In what way may our knowledge of human behavior be biased?

Our knowledge of human behavior can be biased by the methods, assumptions and cultural influences that shape psychological research. One way this happens is through

Is human behavior too complex to study reliably and accurately? For example, schemas may provide fixed patterns of thought that organize categories of information, but they are unlikely to work in the same way for everyone. Many factors influence them, such as emotions and culture. This presents researchers with problems when trying to accurately predict human behavior in wider populations.

TOK

Use relevant technical terminology in your answers. Create vocabulary lists to help you memorize the key terms as part of your ongoing revision exercises.



the reliance on culturally specific models or samples that do not account for global diversity. For example, much psychological research is conducted in Western, Educated, Industrialized, Rich and Democratic (WEIRD) societies, which can lead to biased conclusions about human behavior that are not universally applicable. A bias in sampling can result in theories that claim to be generalizable but only reflect the behaviors and attitudes of a specific subset of the global population. Anchoring bias, as demonstrated by Tversky and Kahneman (1974), shows how individuals' judgments can be systematically skewed by initial information. If researchers or participants are influenced by culturally or contextually specific anchors, their understanding and interpretation of behavior can be limited to those influences, leading to a biased view of human psychology. This highlights the importance of being mindful of cultural, methodological and contextual biases that can shape the findings in psychological studies, potentially leading to a distorted or incomplete understanding of human behavior.

Activity 40

Research another example of how cultural or methodological biases can influence psychological research. Consider how these biases might limit the generalizability of findings and suggest ways to reduce these biases in future studies.

Causality: How can we know the cause(s) of observed behavior?

To establish the causes of observed behavior, researchers must isolate variables and control external factors through experimental designs. Pavlov's (1927) classical conditioning experiment is a famous example of how controlled conditions can reveal causal relationships in behavior. Pavlov trained dogs to associate a neutral stimulus (a bell) with an unconditioned stimulus (food), eventually causing the dogs to salivate at the sound of the bell alone. This conditioned response occurred because the controlled pairing of the bell and food established a clear cause-and-effect relationship. The experiment's controlled environment ensured that other potential variables, such as distractions or alternative stimuli, did not influence the outcome. While classical conditioning provides a clear understanding of how associations between stimuli lead to learned behaviors, such tightly controlled experiments are not always reflective of real-world conditions, where multiple variables interact to shape behavior. Establishing causality in human behavior, especially in complex environments, often requires sophisticated experimental designs that account for these interactions, while maintaining a degree of ecological validity.

Activity 41

Pick another cognitive psychology experiment. Identify how the researchers controlled variables to establish causality. What were the limitations of their approach in understanding real-world behavior?

Change: How can we know if a behavior is a result of natural maturation or purposeful intervention?

Determining whether behavior is due to natural maturation or purposeful intervention often requires comparing intervention and control groups. A

classic example is Skinner's (1938) operant conditioning experiments, which demonstrated how reinforcement can shape behavior. In these experiments, Skinner placed rats in a "Skinner box" where pressing a lever resulted in food (reinforcement). Over time, the rats learned to press the lever more frequently. To confirm that this behavioral change was due to reinforcement and not maturation, Skinner used control groups that did not receive food after pressing the lever. The difference in behavior between the groups demonstrated that the intervention (reinforcement) caused the change, rather than any natural development in the rats' learning capabilities. This approach, by comparing intervention and control groups, helps to isolate the effects of the intervention, though in real-world scenarios, factors like maturation, social influences and environmental conditions interact in more complex ways, making it harder to attribute behavior changes to a single factor.

Activity 42

Identify another study from the cognitive approach in which the researchers distinguished between the effects of natural maturation and purposeful intervention. How did they control for external variables, and what were the implications? Create a flowchart that illustrates how the researchers differentiated between changes due to natural maturation and those caused by an intervention.

Measurement: How can we express complex psychological constructs in terms of observable, measurable behavior?

In cognitive psychology, abstract constructs such as memory, decision-making and attention are often expressed through observable behaviors. For instance, Tversky and Kahneman (1974) quantified the abstract concept of anchoring bias by asking participants to estimate the percentage of African countries in the UN after being shown a random number. Despite the number being irrelevant, participants' estimates were skewed, showing that their decision-making was influenced by the anchor. The numerical estimates provided a measurable outcome that allowed researchers to quantify the bias. Similarly, Bechara et al. (2000) used the Iowa Gambling Task to measure decision-making abilities. Participants had to choose between "good" and "bad" decks, and their choices provided observable data that reflected their underlying cognitive processes related to risk and reward. By transforming complex mental processes into quantifiable behaviors, researchers can create standardized tasks that allow for objective analysis and comparison of cognitive phenomena, enhancing both the reliability and validity of their findings.

Activity 43

In small groups, research how a specific psychological construct has been operationalized in a study. Explain to your peers the observable behaviors used to measure this construct, and discuss how these methods enhance the reliability of the findings.

Perspective: What are the strengths and limitations of a reductionist approach to studying behavior?

The reductionist approach, which breaks down complex behaviors into simpler components, provides scientific precision but may oversimplify human experience. Cognitive load theory (Sweller, 2011) exemplifies this approach by focusing on how different types of cognitive load (intrinsic, extraneous and germane) impact learning. By isolating these factors, the theory allows for clear, testable predictions about how instructional design can improve learning outcomes. For example, reducing extraneous cognitive load – such as removing distractions – improves learners' ability to process new information. However, this reductionist approach also has significant limitations. While cognitive load theory effectively addresses the mechanics of memory and learning, it often ignores the broader social, emotional and environmental factors that also affect how people learn. Human behavior is shaped by a complex web of influences, and focusing solely on cognitive processes may miss key variables, such as a student's emotional state or cultural background. Therefore, while reductionism provides useful insights, it must be balanced with approaches that consider the full range of human experience.

Activity 44

Identify another example of a reductionist study in cognitive psychology. Discuss how breaking down complex processes into smaller components benefited the research, but also what important factors might have been overlooked.

Responsibility: Can potential benefits of research justify partial relaxation of ethical standards?

Ethical standards in psychological research are vital to protect participants, but in some cases, researchers argue that partial relaxation of these standards is justified by the potential benefits. Loftus and Palmer (1974) used deceptive techniques in their study of false memories, where they misled participants by using different verbs ("smashed" versus "contacted") to describe a car accident. The study found that participants who were exposed to the word "smashed" were more likely to report seeing broken glass, even though no glass was present. This research provided critical insights into the malleability of memory, with important applications in legal settings, such as improving the reliability of eyewitness testimony. However, the use of deception raises ethical concerns, as it can cause emotional distress and erode participants' trust in research. Ethical guidelines such as informed consent and debriefing help mitigate these risks, but the justification for ethical compromises must always weigh the potential long-term benefits of the research against any harm caused to participants.

Activity 45

Imagine you are part of a Research Ethics Committee evaluating a study you have researched. You can choose one from this chapter and access the full version online, or use an entirely new study. Discuss whether the potential benefits of the research outweighed the ethical concerns, and how the researchers balanced these considerations.

Sociocultural approach

Psychological terminology	Learning objective
Cognitive dissonance	The role of cognitive dissonance in understanding human behavior.
Compliance techniques	The role of one or more compliance techniques in changing human behavior.
Conformity	The process of conformity and its role in understanding human behavior.
Cultural dimensions	The role of one or more cultural dimensions in understanding cross-cultural similarities and differences in behavior.
Emic approach	The value of emic approaches in researching human behavior.
Enculturation	One or more theories of enculturation for one or more behaviors.
Etic approach	The limitation of etic approaches to researching human behavior.
Models of acculturation	The application of one or more acculturation models to explain the experience of immigrants, refugees or other people taking an extended stay in another culture.
Social identity theory	The application of social identity theory to change or explain behavior.
Social learning theory	The application of social learning theory to explain and change behavior.

Table 2.4 Sociocultural approach learning objectives from Subject Guide, pages 25–26.

Introduction to the sociocultural approach

The sociocultural approach to understanding human behavior emphasizes the influence of social and cultural factors on human behavior. This approach has grown out of social psychology, which explores how social environments, interaction and relationships shape individuals. Sociocultural psychologists investigate how culture influences values, beliefs and behavior.

The study of cross-cultural psychology developed using an etic approach to compare how different cultures shape human behavior. An etic approach is a research strategy that emphasizes the objective analysis and comparison of cultures from an external, often global *perspective*. This can be contrasted with an emic approach, which focuses on understanding a culture from within, according to its own norms and values. While the etic approach aims for objectivity and comparability across cultures, it may sometimes overlook the unique aspects and nuances of individual cultures.



However, social psychologists also followed the earlier lead of anthropologists and engaged in an emic approach to research, studying different social and cultural groups from an “insider perspective”, allowing for a deeper and more sensitive understanding of behavior. It is from here that a psychological understanding of Indigenous communities developed into a growing **Indigenous psychology**.

Cognitive dissonance

Cognitive dissonance refers to the state of having inconsistent thoughts, beliefs or attitudes. Cognitive dissonance relates to making behavioral decisions and causing attitude *change*. Cognitive dissonance occurs when a person holds two or more contradictory beliefs, ideas or values, or participates in an action that goes against one of these three, and experiences psychological stress as a result. Individuals feel uncomfortable in a state of dissonance and seek to reduce it, which leads to a motivational *bias* to change thoughts and/or behavior.

It has been assumed that cognitive dissonance is always a negative experience; however, it can actually help to keep individuals mentally healthy. For example, cognitive dissonance can help people to feel satisfied with their choices, especially when the choices cannot be easily reversed, because it makes them justify their choices. Furthermore, resolving dissonance may help prevent individuals from making bad choices and/or motivate them to make good ones.

For example, Festinger and Carlsmith (1959) explored cognitive dissonance through an experiment where 71 male students performed boring tasks and were then paid \$1 or \$20 to tell a confederate (a research actor employed to secretly participate) the tasks were interesting. The study aimed to see if small rewards (\$1) versus larger rewards (\$20) would affect their task–enjoyment ratings. This was assessed by asking participants to tell a waiting confederate that the tasks were really interesting. Almost all of the participants agreed to walk into the waiting room and persuade the confederate that the boring task would be fun. Results showed those paid \$1 rated the task as more enjoyable. This suggests that lower compensation led to greater cognitive dissonance, as participants justified the effort for a minimal reward. In contrast, a \$20 payment provided sufficient external justification, reducing dissonance and allowing participants to rate the task honestly as boring. In this experiment, cognitive dissonance was created in the low-paid condition and so had to be reduced by creating a *bias* that the tasks were more interesting and enjoyable than they really were.



Conceptual question

Cognitive dissonance illustrates how people resolve conflicting beliefs and actions, but how can we know if a change in behavior is truly *caused* by dissonance or influenced by other social or personal factors?



In your exams/assessments, you will be asked to explain or describe a psychological idea or a theory and be expected to provide an example. Make sure you cite a specific behavior and state clearly how it illustrates the idea or theory.

Cognitive dissonance can occur socioculturally when an individual’s deeply held cultural beliefs or practices come into conflict with new cultural norms or values they encounter, for example, through migration or exposure to different cultures via media. For instance someone raised in a culture that highly values collective decision-making might experience cognitive dissonance when moving to a society that prioritizes individual autonomy and decision-making. Collective decision-making refers to a