# PSYCHOLOGY

## FRONTIERS AND APPLICATIONS

PASSER • SMITH • ATKINSON • MITCHELL • MUIR

# PSYCHOLOGY

## FRONTIERS AND APPLICATIONS

**FIFTH CANADIAN EDITION**


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**Psychology: Frontiers and Applications**
**Fifth Canadian Edition**

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# PREFACE

There is nothing more fascinating than the study of the mind and behaviour. But we didn't recognize this when we entered university. In fact, the study of psychology wasn't even on our radar screens. Some of us had planned careers in the "hard" sciences (M.P., M.A.) and others were focused on the "softer" side (R.S.). One of us (J.M.) was pretty sure he would pursue psychology, although philosophy was an attractive alternative. Then something unexpected occurred. Each of us took an introductory psychology course, and suddenly our life paths changed. Because of instructors who brought psychology to life, we were hooked, and that initial enthusiasm has never left us.

Now, through this textbook, we have the pleasure and privilege of sharing our enthusiasm with today's instructors and a new generation of students. We've endeavoured to create a thoughtfully integrated book and multimedia package that strikes just the right balance between student friendliness and scientific integrity—a teaching tool that introduces students to psychology as a science, while highlighting its relevance to their lives and society. We want students to experience, as we did, the intellectual excitement of studying the mind and behaviour. We also seek to help students sharpen their critical thinking skills, dispelling some commonly held myths. We have used clear prose, careful explanations, engaging examples, and supporting artwork to make the book and multimedia accessible to a wide range of students. All of this is done within a conceptual framework that emphasizes relations between biological, psychological, and environmental levels of analysis.

We are excited about the unique way in which our text is integrated with its pedagogy. This integration results in a learning package that "uses science to teach science." Specifically, we are impressed with research (e.g., Moreland et al., 1997; Pauk & Fiore, 2000) showing that recall of textual material is significantly enhanced by specific focus questions and learning objectives that serve as retrieval cues and help students identify important information and assess their mastery of the material. In addition, the opening vignettes are presented as Problem-Based Learning (PBL) case studies. PBL generates a deeper understanding of material and provides the student with critical problem-solving skills (see Aspy et al., 1993; Vernon & Blake, 1993). It is for precisely this reason that PBL is used in the curriculum of so many medical schools. Over the years, our students have profited from these pedagogical tools; consequently, we have retained these popular features from previous editions.

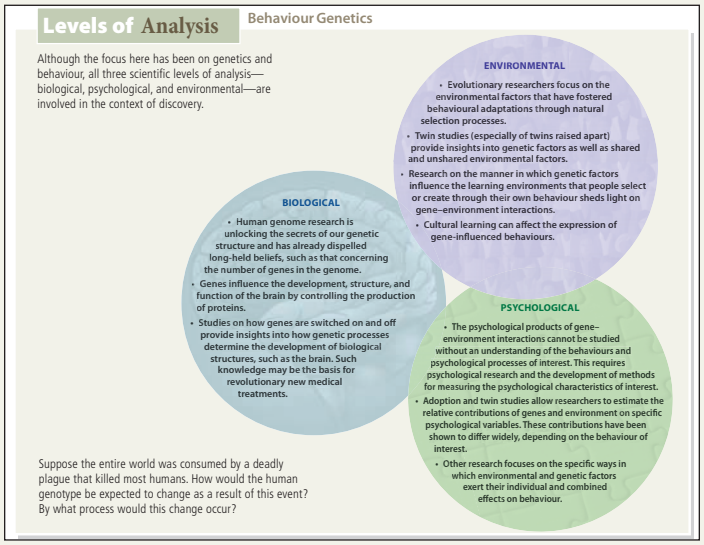
One of the fastest-evolving areas in psychology is neuroscience, particularly in the use of neuroimaging. By some estimates, published studies involving some aspect of neuroimaging have increased by 3000 percent over the past decade! We are now able to examine the neural substrates for most topics in psychology, including attitude change, fabricated memory, and psychological disorders, in addition to the more traditional topics of brain function and sensory processing. In an effort to embrace this fast-moving area of research, we continue to include a *Focus on Neuroscience* boxed feature in each chapter, which examines how neuroimaging provides a much more detailed understanding of how the mind and brain work.

Let's take a look at the features of our fifth Canadian edition.

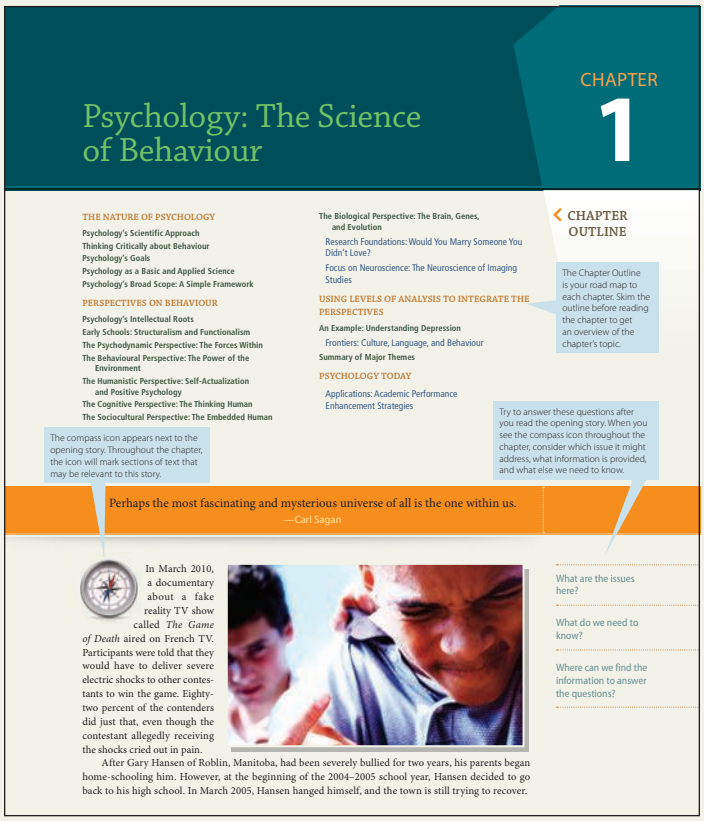
## OVERVIEW OF FEATURES

- **Problem-Based Learning:** Each chapter is structured around a set of tools to help students interact with the material at a level that exceeds reading alone. These tools include the chapter-opening vignette, which presents a real-world case related to the chapter topic; a margin icon throughout the chapter, which indicates when the discussion relates back to the case introduced in the vignette; and the *Gaining Direction* feature at the end of the chapter, which revisits the vignette and suggests some answers to the questions it poses. Together, these tools encourage students to apply the concepts they are learning to real-world situations.
- **Focus on Scientific Psychology:** Throughout the book, psychology is portrayed as a contemporary science without becoming excessively formal or terminological. The text focuses both on principles derived from research and on the methods by which good research is conducted.
- **Focus on Relations between Basic Science and Applications:** Whether in the context of students' personal lives or larger societal issues, many questions studied from a basic science perspective are inspired by real-world questions and issues, and basic research findings often guide solutions to social and individual problems. In this way, students can be guided by their knowledge in other aspects of their lives.

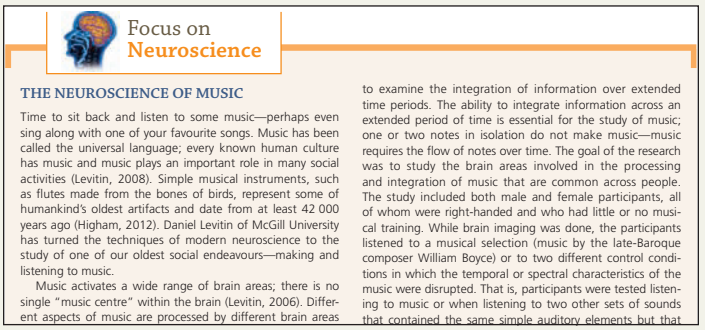
- **Levels of Analysis** emphasize how psychologists examine the interplay of biological, psychological, and environmental factors in their quest to understand behaviour. Topics explored include "Behaviour Genetics" (Chapter 4), "Aggression" (Chapter 13), and "Stress and Resilience" (Chapter 15).



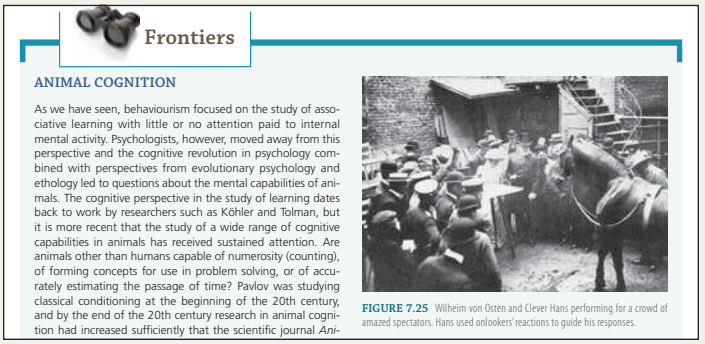

- To familiarize students with the text's pedagogical features, Chapter 1 includes a **Reader's Guide**—annotations written by the authors to draw attention to specific features and explain why they have been incorporated in the text.



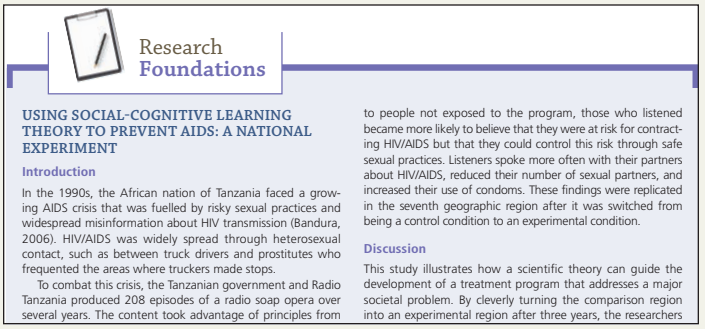

- **Focus on Neuroscience** features highlight how rapidly developing cutting-edge technology is paving the way for groundbreaking imaging studies that give new insights into the workings of the human brain and its relationship to behaviour.



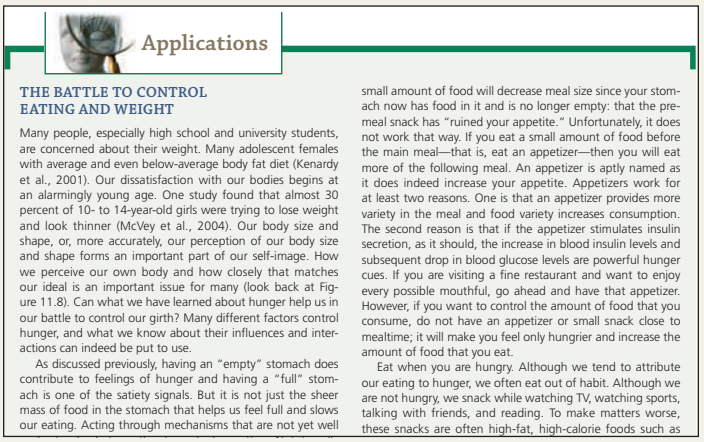

- **Frontiers** features highlight current and future directions in psychological theory and research, illustrating the dynamic nature of psychological science and the ways in which it can promote human development. New to the fifth Canadian edition are topics such as "Animal Cognition" (Chapter 7) and "Social Media and Social Development" (Chapter 12).




- **Research Foundations** features describe and critically evaluate a classic, high-interest study. Presented in a simplified journal format (introduction, method, results, discussion), the studies represent a diversity of research methods to help students learn the process of critical thinking. **Research Design** diagrams illustrate the research question, type of study, and variables for the study described in the *Research Foundations* feature.



- **Applications** features demonstrate how principles from basic psychological research can be applied to everyday life. Many of these features focus on important skills that can enhance students' learning and performance. Topics include "The Battle to Control Eating and Weight" (Chapter 11) and "How to Be Happy" (Chapter 15).



Applications

THE BATTLE TO CONTROL EATING AND WEIGHT

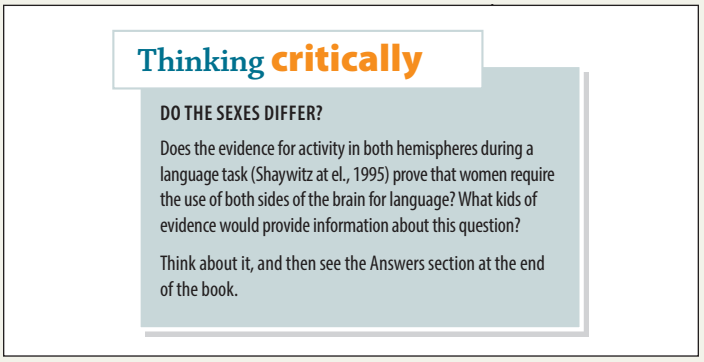
Many people, especially high school and university students, are concerned about their weight. Many adolescent females with average and even below-average body fat diet (Kenardy et al., 2001). Our dissatisfaction with our bodies begins at an alarmingly young age. One study found that almost 30 percent of 10- to 14-year-old girls were trying to lose weight and look thinner (McVey et al., 2004). Our body size and shape, or, more accurately, our perception of our body size and shape forms an important part of our self-image. How we perceive our own body and how closely that matches our ideal is an important issue for many (look back at Figure 11.8). Can what we have learned about hunger help us in our battle to control our girth? Many different factors control hunger, and what we know about their influences and interactions can indeed be put to use.

As discussed previously, having an "empty" stomach does contribute to feelings of hunger and having a "full" stomach is one of the satiety signals. But it is not just the sheer mass of food in the stomach that helps us feel full and slows our eating. Acting through mechanisms that are not yet well

small amount of food will decrease meal size since your stomach now has food in it and is no longer empty: that the pre-meal snack has "ruined your appetite." Unfortunately, it does not work that way. If you eat a small amount of food before the main meal—that is, eat an appetizer—then you will eat more of the following meal. An appetizer is aptly named as it does indeed increase your appetite. Appetizers work for at least two reasons. One is that an appetizer provides more variety in the meal and food variety increases consumption. The second reason is that if the appetizer stimulates insulin secretion, as it should, the increase in blood insulin levels and subsequent drop in blood glucose levels are powerful hunger cues. If you are visiting a fine restaurant and want to enjoy every possible mouthful, go ahead and have that appetizer. However, if you want to control the amount of food that you consume, do not have an appetizer or small snack close to mealtime; it will make you feel only hungrier and increase the amount of food that you eat.

Eat when you are hungry. Although we tend to attribute our eating to hunger, we often eat out of habit. Although we are not hungry, we snack while watching TV, watching sports, talking with friends, and reading. To make matters worse, these snacks are often high-fat, high-calorie foods such as

- **NEW! Thinking Critically** activities question a belief or information presented in the text, or pose a situation that requires analysis, and then ask students to construct an answer using their critical-examination skills. Students can then compare their answer to one provided on at the end of the book.



Thinking critically

DO THE SEXES DIFFER?

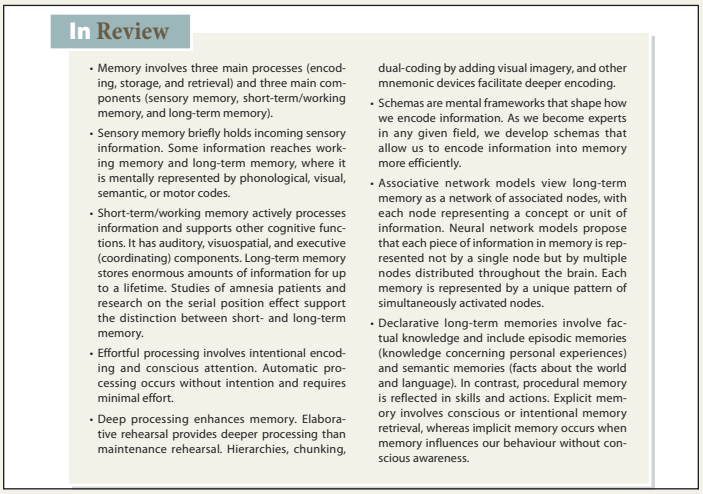
Does the evidence for activity in both hemispheres during a language task (Shaywitz at el., 1995) prove that women require the use of both sides of the brain for language? What kids of evidence would provide information about this question?

Think about it, and then see the Answers section at the end of the book.

- **Directed Questions** appear in the margins of the text adjacent to important material. Students are to read the question before reading the material, and then answer the question after reading the material. The Directed Questions enhance concept mastery, serve as retrieval clues during study, and act as a performance feedback measure.

4. What are perspectives on behaviour? Cite four ways in which they can influence psychological science.

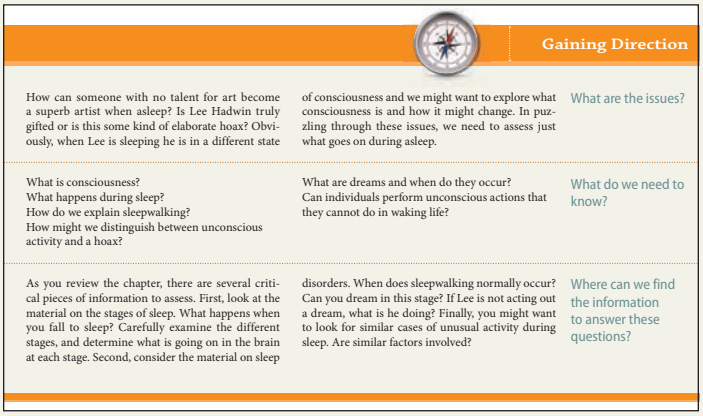
- Each major section ends with **In Review,** a bulleted interim summary that breaks the key content from each chapter into manageable segments.



In Review

- Memory involves three main processes (encoding, storage, and retrieval) and three main components (sensory memory, short-term/working memory, and long-term memory).
- Sensory memory briefly holds incoming sensory information. Some information reaches working memory and long-term memory, where it is mentally represented by phonological, visual, semantic, or motor codes.
- Short-term/working memory actively processes information and supports other cognitive functions. It has auditory, visuospatial, and executive (coordinating) components. Long-term memory stores enormous amounts of information for up to a lifetime. Studies of amnesia patients and research on the serial position effect support the distinction between short- and long-term memory.
- Effortful processing involves intentional encoding and conscious attention. Automatic processing occurs without intention and requires minimal effort.
- Deep processing enhances memory. Elaborative rehearsal provides deeper processing than maintenance rehearsal. Hierarchies, chunking, dual-coding by adding visual imagery, and other mnemonic devices facilitate deeper encoding.
- Schemas are mental frameworks that shape how we encode information. As we become experts in any given field, we develop schemas that allow us to encode information into memory more efficiently.
- Associative network models view long-term memory as a network of associated nodes, with each node representing a concept or unit of information. Neural network models propose that each piece of information in memory is represented not by a single node but by multiple nodes distributed throughout the brain. Each memory is represented by a unique pattern of simultaneously activated nodes.
- Declarative long-term memories involve factual knowledge and include episodic memories (knowledge concerning personal experiences) and semantic memories (facts about the world and language). In contrast, procedural memory is reflected in skills and actions. Explicit memory involves conscious or intentional memory retrieval, whereas implicit memory occurs when memory influences our behaviour without conscious awareness.

- At the end of each chapter, **Gaining Direction** features suggest some possible answers to the questions posed in the opening vignette. In the spirit of PBL, these answers are not definitive but merely suggest a set of issues to be explored and some sources of information. This feature helps students apply the newly learned material to real-world situations, thus enhancing their understanding of the text content and the use of psychology in real life.



Gaining Direction

| | | |
|---|---|---|
| How can someone with no talent for art become a superb artist when asleep? Is Lee Hadwin truly gifted or is this some kind of elaborate hoax? Obviously, when Lee is sleeping he is in a different state of consciousness and we might want to explore what consciousness is and how it might change. In puzzling through these issues, we need to assess just what goes on during asleep. | | What are the issues? |
| What is consciousness?<br>What happens during sleep?<br>How do we explain sleepwalking?<br>How might we distinguish between unconscious activity and a hoax? | What are dreams and when do they occur?<br>Can individuals perform unconscious actions that they cannot do in waking life? | What do we need to know? |
| As you review the chapter, there are several critical pieces of information to assess. First, look at the material on the stages of sleep. What happens when you fall to sleep? Carefully examine the different stages, and determine what is going on in the brain at each stage. Second, consider the material on sleep | disorders. When does sleepwalking normally occur? Can you dream in this stage? If Lee is not acting out a dream, what is he doing? Finally, you might want to look for similar cases of unusual activity during sleep. Are similar factors involved? | Where can we find the information to answer these questions? |

- **Additional Pedagogical Features:** A textbook should inspire students and help them master the material at hand. To accomplish these goals, our book incorporates chapter outlines, boldfaced key terms, and a full end-of-text glossary.
- **Canadian Content:** Times have changed and work that once was considered classic is now performed in labs all across North America. Thus, we have included a large number of studies by both Canadian and U.S. authors. Bringing psychology to life for students, the text includes examples that are relatable for students, statistics that reflect the Canadian and North American context, and stories and vignettes that occur in Canadian locations.

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## INSTRUCTOR RESOURCES

- **Instructor's Manual:** Course preparation is easy with this rich collection of learning objectives, in-class demonstrations and discussion activities, guest presentation ideas, current controversies, suggested readings, and more. The many tips and activities in this manual can be used with any class, regardless of size or teaching approach.
- **Validated Test Bank:** This Test Bank offers more than 4000 items, including multiple-choice, true/false, fill-in-the-blank, and essay questions. Each question has been analyzed to ensure complete accuracy and correlation to the text. Using data collected from Passer users, the Test Bank continues to include item difficulty and discrimination index values where available. Guidelines for good multiple-choice construction were used to improve questions where statistical information was not available. Further, each question is classified by difficulty level and Bloom's taxonomy, and is aligned with a learning objective from the text. Test items are available in EZ Test and Word format (Rich Text format).
- **Alternate Test Bank:** This Test Bank comprises more than 1600 multiple-choice questions. Each question is classified by Bloom's taxonomy and is aligned with a learning objective from the text. Test items are also available in EZ Test and Word format (Rich Text format).
- **Conceptual Test Bank:** This Test Bank offers 40 conceptual questions per chapter, each aligned with a learning objective from the text. This unique resource is especially appealing to instructors who wish to challenge their students to think more conceptually.
- **Microsoft® PowerPoint® Presentations:** Slides include images, weblinks, videos, and animations as well as lecture annotations, classroom activities, and discussion ideas in the notes field. Also available are concept-based **Dynamic PowerPoints,** which cover more than 80 core concepts in introductory psychology.
- **Image Library:** All figures, tables, and photos from the text are available so instructors can incorporate them as desired into their PowerPoints, course website, and assessment materials.

## ADDITIONAL RESOURCES

Contact your Learning Solutions Consultant for these additional resources to supplement your psychology course:

- ***Annual Editions: Psychology 14/15:*** Edited by Eric R. Landrum, Boise State University, this annually updated reader provides convenient, inexpensive access to current articles selected from the best of the public press. Organizational features include an annotated listing of selected websites, an annotated table of contents, a topic guide, a general introduction, brief overviews for each section, a topical index, and an instructor's resource guide with testing materials.
- ***Classic Edition Sources: Psychology*:** This book's fourth edition includes more than 40 book excerpts, classic articles, and research studies that have shaped the study of psychology and our contemporary understanding of it.
- ***Taking Sides: Clashing Views on Controversial Psychological Issues*:** The 16th edition of this debate-style reader is designed to introduce students to controversies issues in psychology. Each issue is framed for the student, and pro and con essays represent the arguments of leading scholars and commentators in their fields. *Taking Sides* helps students to actively develop critical thinking skills by requiring them to analyze opposing viewpoints and reach considered judgments.

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We also owe special thanks to our distinguished colleagues who recommended changes for the fifth Canadian edition of *Psychology: Frontiers and Applications*. We appreciate the time and effort graciously contributed by the following instructors:

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Catharine Rankin, *University of British Columbia*
Ken Stange, *Nipissing University*

M.A. & J.M.

CHAPTER

# 1

# Psychology: The Science of Behaviour

## CHAPTER OUTLINE


THE NATURE OF PSYCHOLOGY

Psychology's Scientific Approach
Thinking Critically about Behaviour
Psychology's Goals
Psychology as a Basic and Applied Science
Psychology's Broad Scope: A Simple Framework

PERSPECTIVES ON BEHAVIOUR

Psychology's Intellectual Roots
Early Schools: Structuralism and Functionalism
The Psychodynamic Perspective: The Forces Within
The Behavioural Perspective: The Power of the Environment
The Humanistic Perspective: Self-Actualization and Positive Psychology
The Cognitive Perspective: The Thinking Human
The Sociocultural Perspective: The Embedded Human
The Biological Perspective: The Brain, Genes, and Evolution
Research Foundations: Would You Marry Someone You Didn't Love?
Focus on Neuroscience: The Neuroscience of Imaging Studies

USING LEVELS OF ANALYSIS TO INTEGRATE THE PERSPECTIVES

An Example: Understanding Depression
Frontiers: Culture, Language, and Behaviour
Summary of Major Themes

PSYCHOLOGY TODAY

Applications: Academic Performance Enhancement Strategies

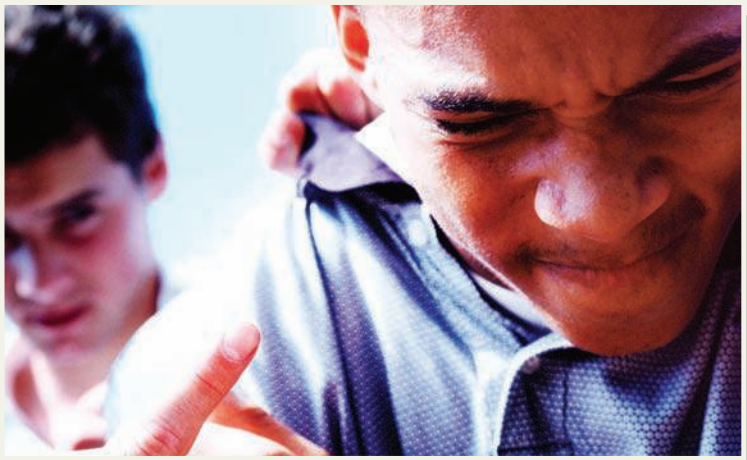

The Chapter Outline is your road map to each chapter. Skim the outline before reading the chapter to get an overview of the chapter's topic.

The compass icon appears next to the opening story. Throughout the chapter, the icon will mark sections of text that may be relevant to this story.

Try to answer these questions after you read the opening story. When you see the compass icon throughout the chapter, consider which issue it might address, what information is provided, and what else we need to know.

> Perhaps the most fascinating and mysterious universe of all is the one within us.
> —Carl Sagan

In March 2010, a documentary about a fake reality TV show called *The Game of Death* aired on French TV. Participants were told that they would have to deliver severe electric shocks to other contestants to win the game. Eighty-two percent of the contenders did just that, even though the contestant allegedly receiving the shocks cried out in pain.



After Gary Hansen of Roblin, Manitoba, had been severely bullied for two years, his parents began home-schooling him. However, at the beginning of the 2004–2005 school year, Hansen decided to go back to his high school. In March 2005, Hansen hanged himself, and the town is still trying to recover.

What are the issues here?

What do we need to know?

Where can we find the information to answer the questions?

Researchers at the University of Valencia, Spain, have reported that the brain structures involved in violence are also affected in empathy. It seems that our ability to "put ourselves in someone else's shoes" is mediated, in part, by the same neural circuits that lead us to violent aggression. The researchers suggest that empathy may actually prevent aggression by actively inhibiting these circuits.

Terms in boldface indicate new or important concepts. These terms are defined in the Glossary.

Let's begin our exploration of psychology with a quick exercise. Please read the paragraph below, unscrambling the words as you proceed.

> Aoccdrnig to rscheearch at Cmabrigde uinervtisy, it deosn't mttaer waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteres are at the rghit pclae. The rset can be a tatol mses, and you can sitll raed it wouthit a porbelm. Tihs is bcuseae we do not raed ervey lteter by istlef but the wrod as a wlohe.

1. Define psychology and indicate what kinds of behaviours it studies.

Directed questions appear throughout each chapter. Read the question before you read the material in the text. After reading the material, try to answer the question.

Type "jumbled words," "jumbled paragraph," or "scrambled letters" into a web browser. Dig around in the search results, and you'll find multiple sites and blogs about this paragraph. In 2003, it was all the rage. The paragraph spread across the Internet and reached countless email inboxes as people—amazed by how easily they could read it—passed it along. When we showed the paragraph to our students, most breezed through it, although some struggled (if you had trouble, that's okay; see the unscrambled version at the end of this chapter). Show the paragraph to some people you know and see how they do.

Do you accept the claim that if the first and last letters of a word remain intact "the rset can be a tatol mses and you can sitll raed it wouthit a porbelm"? From the paragraph's immense popularity, we speculate that many people do accept this statement. After all, the evidence is concrete; it's right before our eyes. Well, whether or not you accept it, take this challenge: Can you think of reasons why this particular jumbled paragraph is easy to read? Even better, can you create a short jumbled paragraph—keeping the first and last letters of words intact—that people find difficult to read? We'll return to this challenge later in the chapter.

So what does a jumbled paragraph have to do with psychology? If you personally view psychology as synonymous with *therapy, shrinks,* or *couches,* then your answer might be "not much." But as we'll see, psychologists study a tremendous diversity of topics—including language and how we recognize words (Mousikou et al., 2010).

The jumbled paragraph raises other key psychological issues, such as how we acquire knowledge and form beliefs about our world, which we'll discuss in the conclusion of this chapter. Among the countless beliefs we hold and the claims we hear about human nature and behaviour, how do we separate fact from fiction and myth from reality? The science of psychology leads us to engage these questions.

## THE NATURE OF PSYCHOLOGY

**Psychology** is the scientific study of behaviour and the mind. The term *behaviour* refers to actions and responses that we can directly observe, whereas the term *mind* refers to internal states and processes, such as thoughts and feelings, that cannot be seen directly and that must be inferred from observable, measurable responses. For example, we cannot directly see a person's feeling of love or admiration for someone else, but we can infer how the person feels based on observable verbal statements (e.g., "I love you"; "I really admire you").

When people hear the word *psychologist,* the first image that comes to their minds is often that of a therapist. This reaction is understandable, as a large number of psychologists work in a subfield called **clinical psychology**: the study and treatment of mental disorders. Many clinical psychologists diagnose and treat people with psychological problems in clinics, hospitals, and private practice. In addition, some are scientists who conduct research on the causes of mental disorders and the effectiveness of various treatments. Yet many psychologists have no connection with therapy and instead conduct research in other subfields (Figure 1.1). For example, **cognitive psychology** specializes in the study of mental processes, especially from a model that views the mind as an information processor. Cognitive psychologists examine such topics as consciousness, attention, memory, decision making, and problem solving. An area within cognitive psychology, called *psycholinguistics,* focuses on the psychology of language. The jumbled-word exercise relates directly to psycholinguistics.

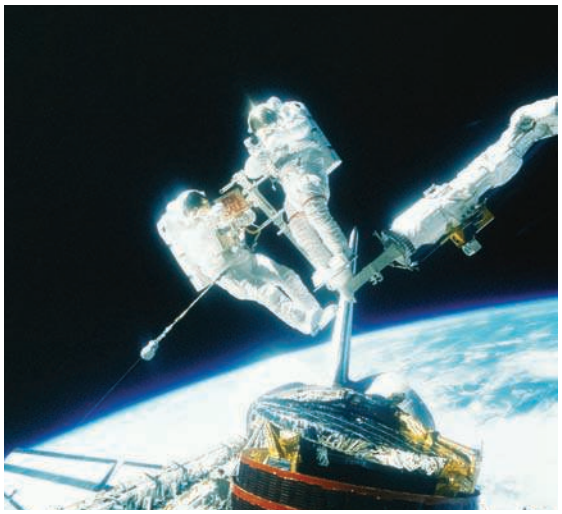


**FIGURE 1.1** Psychologists study diverse topics. Subfields that may not immediately occur to you include aviation and space psychology, educational psychology, and the law.

To illustrate psychology's diversity, here a few other subfields:

- **Biopsychology/neuroscience** focuses on the biological underpinnings of behaviour. Biopsychologists examine how brain processes, genes, and hormones influence our actions, thoughts, and feelings. Some biopsychologists seek to explain how evolution has shaped our psychological capabilities (e.g., our capacity for advanced thinking and language) and behavioural tendencies (e.g., to act aggressively or altruistically).
- **Developmental psychology** examines human physical, psychological, and social development across the lifespan. For example, some developmental psychologists explore the emotional world of infants, while others study how different parenting styles psychologically affect children or how our mental abilities change during adolescence and adulthood.
- **Experimental psychology** focuses on such basic processes as learning, sensory systems (e.g., vision, hearing), perception, and motivational states (e.g., sexual motivation, hunger, thirst). Most research in this subfield involves laboratory experiments, often with nonhuman animals. Although this subfield is called *experimental* psychology, be aware that researchers in many psychological subfields conduct experiments.
- **Industrial-organizational (I/O) psychology** examines people's behaviour in the workplace. I/O psychologists study leadership, teamwork, and factors that influence employees' job satisfaction, work motivation, and performance. They develop tests to help employers identify the best job applicants and design systems that companies use to evaluate employee performance.
- **Personality psychology** focuses on the study of human personality. Personality psychologists seek to identify core personality traits and how different traits relate to one another and influence behaviour. They also develop tests to measure personality.
- **Social psychology** examines people's thoughts, feelings, and behaviour pertaining to the social world: the world of other people. Social psychologists study how people influence one another, behave in groups, and form impressions and attitudes. They study social relationships involving attraction and love, prejudice and discrimination, helping, and aggression.

Note that topics studied in different subfields often overlap. Consider decision making, which is examined in all of the areas above. For example, a cognitive psychologist might study how wording the same

**FIGURE 1.2** Psychology as a scientific hub. Psychology links with and overlaps many sciences.

Material in tables and figures can be just as important as the text. Be sure you read these sections.

information in different ways affects people's decisions; a social psychologist might study decision making in groups; and a developmental psychologist could examine how children's decision-making strategies change with age (Josyln et al., 2009; Toma & Butera, 2009). Moreover, many psychologists have interests that bridge different subfields. Thus, a clinical psychologist might be interested in the biological bases of how adolescents with anxiety disorders make decisions. She could have adolescents who do and who don't have an anxiety disorder perform decision-making tasks, and use brain-imaging techniques to compare the neural activity of the two groups (Krain et al., 2008).

We'll encounter other branches of psychology throughout the chapter, but we hope you already get the picture. Psychologists do study the causes of mental disorders, provide therapy, and evaluate therapy effectiveness, but their interests and research span the entire realm of behaviour. Indeed, the scope of modern psychology stretches from the borders of medicine and the biological sciences to those of the social sciences (Figure 1.2).

The compass icon indicates that the material here may help us understand the opening story.

## Psychology's Scientific Approach

Across psychology's diverse subfields, researchers share a common underlying scientific approach to studying behaviour. *Science* is a process that involves systematically gathering and evaluating empirical evidence to answer questions and test beliefs about the natural world. *Empirical evidence* is evidence gained through experience and observation, and this includes evidence from manipulating or "tinkering around" with things and then observing what happens (this is the essence of experimentation). For example, if we want to know how people's intellectual abilities change as they age, we don't rely on intuition, pure reasoning, or folk wisdom to obtain an answer. Rather, we collect empirical data by exposing people to intellectual tasks and observing how they perform. Moreover, in science these observations need to be *systematic* (i.e., performed according to a system of rules or conditions) so that they will be as objective and precise as possible (Shaugnessy et al., 2010).

## Understanding Behaviour: Some Pitfalls of Everyday Approaches

Science is only one of many ways that we learn about human behaviour. Family and friends, great works of literature, secular and religious teachings, and the Internet and popular media all provide us with messages about human nature. Mix in our own intuitions (i.e., the knowledge that each of us acquires from years of personal experience interacting with people) and so-called "conventional" or "folk" wisdom, and we have potent ingredients for generating our personal beliefs about what makes people tick.

Unfortunately, in everyday life there are many ways in which these sources can end up promoting misconceptions. Other people—via conversations, books, the Internet, and other popular media—may provide us with information and insights that they believe to be accurate but really are not. Even personal experiences can lead us to form inaccurate beliefs. Although our experiences and everyday observations provide us with empirical information, unlike scientific observations, everyday observation usually is casual rather than systematic. Our own experiences also may be atypical and not representative of what most people experience.

As we'll explore in Chapter 9, misconceptions can also result from our own faulty thinking. For example, consider the following:

- We often take *mental shortcuts* when forming judgments—shortcuts that sometimes serve us poorly (White, 2009). Judging someone's personality based solely on stereotypes about his or her physical appearance would be an example of a mental shortcut (e.g., Kleider et al., 2012).
- Because many factors in real life may operate simultaneously to influence behaviour, we may

*fail to consider alternative explanations* for why a behaviour has occurred and assume that one factor has caused it, when in fact some less obvious factor was the true cause (Elek et al., 2012; Lassiter et al., 2007).

- Once our beliefs are established, we often fail to test them further. In this vein, we tend to display a *confirmation bias* by selectively paying attention to information that is consistent with our beliefs and downplaying or ignoring information that is inconsistent with them (Mendel et al., 2011; Hart et al., 2009).

## Using Science to Minimize Everyday Pitfalls

Yes, scientists are human too, and they may fall victim to all these pitfalls and to others that we'll discuss in the next chapter. But by adopting a scientific approach, psychologists can take concrete steps to avoid or at least minimize biases and problems that can lead to inaccurate conclusions. For example, rather than relying on imprecise casual observations, psychologists use various instruments (e.g., video recorders, questionnaires, brain-imaging devices) to objectively and precisely record people's responses. When directly watching people, several researchers can independently observe the same behaviours and compare their findings to ensure that their observations were reliable. To avoid perceiving illusory correlations, psychologists typically use statistics to analyze their data. To minimize drawing erroneous conclusions about what has caused what, psychologists often are able to examine behaviour under highly controlled experimental conditions in which they intentionally manipulate one factor, try to keep other factors constant, and see how the manipulated factor influences behaviour.

Science also is a public affair, as psychologists do publish their findings. Publication enables scientists to scrutinize and challenge each other's findings if they wish. This collective approach reduces the risk of confirmation bias. As new studies are conducted, the original findings are put to the test and may be contradicted, forcing scientists to modify their beliefs and conduct further research to sort out contradictory results.

To be sure, science has limitations and its own pitfalls. It is ideally suited to examining testable questions about the natural world. Psychologists can study such questions as "Do happy people differ from unhappy people in their degree of religiousness or spirituality?" and "What do people believe gives their life meaning?" But science cannot answer such questions as "Does God exist?" and "What is the meaning of life?" The former is a question of faith that is beyond scientific measurement; the latter is a question answered by personal values. As for pitfalls, poorly designed or poorly executed studies can produce misleading data that result in invalid conclusions.

Even when studies are designed well and conducted properly, "false starts" can occur in which other researchers later are unable to duplicate the original researchers' findings. Additionally, over time, new research often modifies or completely overturns existing scientific beliefs. But it's important to realize that these aren't weaknesses of the scientific approach. Rather, they reveal one of its great strengths: *In principle, science ultimately is a self-correcting process.* At any point in history, scientific knowledge represents a best estimate of how the world operates. As better or more complete information is gathered, that best estimate may continue to be supported or it may need to be changed. Understandably, to many people such change can be frustrating or confusing, as illustrated by the public uproar in 2009 when an expert medical panel issued new breast-cancer screening guidelines (Kolata, 2009). The panel stated that most women should start having regular mammogram tests at age 50, not at age 40 as recommended by prior, long-standing guidelines. Similarly, researchers in the Czech Republic reported that eating only two larger meals per day rather than multiple small meals actually leads to greater weight loss (Kahleova et al., 2012). To scientists, however, such changes represent an evolution of knowledge called *scientific progress.*

## Thinking Critically about Behaviour

Because behaviour is so complex, its scientific study poses special challenges. As you become familiar with the kinds of evidence necessary to validate scientific conclusions, you will become a better-informed consumer of the many claims made in the name of psychology. For one thing, this course will teach you that many widely held beliefs about behaviour are inaccurate. Can you distinguish the valid claims from the invalid ones in Table 1.1?

Perhaps more important than the concepts you learn in this course will be the habits of thought that you acquire—habits that involve *critical thinking.* Critical thinking involves taking an active role in understanding the world around you rather than merely receiving information. It's important to reflect on what that information means, how it fits in with your experiences, and its implications for your life and society. Critical thinking also means evaluating the validity of something presented to you as fact (Levy, 2010). For example, when someone makes a claim or asserts a new "fact," ask

**TABLE 1.1 Widely Held Beliefs about Behaviour: Fact or Fiction?**

*Directions:* Decide whether each statement is true or false.

1. Most people with exceptionally high IQs are well adjusted in other areas of their lives.
2. In romantic relationships, opposites usually attract.
3. Overall, married adults are less happy than adults who aren't married.
4. Graphology (handwriting analysis) is a valid method for measuring people's personality.
5. A person who is innocent of a crime has nothing to fear from a lie detector test.
6. People who commit suicide usually have signalled to others their intention to do so.
7. When you negatively reinforce someone's behaviour, the person becomes more likely to behave that way.
8. On some types of mental tasks, people perform as well or better when they are 70 years old than when they are 20 years old.
9. Usually, it is safe to awaken someone who is sleepwalking.
10. A schizophrenic is a person who has two or more distinct personalities, hence the term *split personality.*

*Answers:* Items 1, 6, 8, and 9 are supported by psychological research. Item 7 is true by definition. The remaining items are false. (If you correctly answered 9 or 10 of these items, you've done significantly better than random guessing.)

yourself the following questions, just as a scientist would:

- What, exactly, is the claim or assertion?
- Who is making the claim? Is the source credible and trustworthy?
- What's the evidence, and how good is it?
- Are other explanations possible? Can I evaluate them?
- What is the most appropriate conclusion?

## The Jumbled-Word Challenge

Let's think critically about the jumbled-word paragraph presented earlier. First, *what's the claim?* There are three, actually: (1) that people can read jumbled words without a problem as long as the first and last letters stay in place, (2) that people have no problems because we read words as a whole rather than as individual letters, and (3) that this finding is based on research at Cambridge University.

Second, *who is making the claim?* The jumbled paragraph's author is anonymous, which is *caution flag 1.* We can't evaluate the author's credibility and trustworthiness.

Third, *what's the evidence, and how good is it?* The evidence begins with an unsubstantiated claim that research was conducted at Cambridge. No reference information (researchers' names, publisher location, date) is given, which is *caution flag 2.* Indeed, scientists did no such research at Cambridge, although unpublished research at another university may have been the source (Davis, 2003; Rawlinson, 1999).

There's also the dramatic evidence of your own experience: reading the jumbled paragraph easily. But this is only one short paragraph. Also, overall, the transposition (i.e., switched ordering) of letters is minimal, which is *caution flag 3,* leading to the next question.

Fourth, *are other explanations possible* for why the paragraph is easy to read? We'll discuss reading more fully in Chapter 9. For now, consider the following:

- Of the words in the paragraph, 65 percent either aren't jumbled (because they have only one to three letters), or—with four-letter words—are "jumbled" only in that their second and third letters are switched (because there is only one possible transposition), which makes unscrambling them easy.
- Of words with five or six letters, in all but one case, the transposition is minor because only a single letter is out of sequence (e.g., for *mttaer,* only the *a* is out of order).
- Thus, in total, 83 percent of the words are either unjumbled or have only minor transpositions. This preserves much of the way the words sound when we read them. Further, these words provide contextual information in the sentence that makes it easier to anticipate the meaning of some of the few longer scrambled words.

In everyday life, you're unlikely to conduct a scientific study to test these alternative explanations, but you can gather additional evidence by constructing sentences with longer words and more complex transpositions and having some people try to read them. Try reading the following paragraph (the unjumbled version is revealed at the end of the chapter), and see if it changes your belief about the ease of reading jumbled words.

A plciaiiotn dieend the mtnaalueghsr of a clgaloeue, but was coincetvd and dlepoeelvd sreeve macedil cdointonis in posirn, wrhee he deid. Arnodiistitman of agctannloauit dgurs ptttnaioeed the eefctfs of atehonr durg, and rprsoiearty frliaue rleeutsd.

Lastly, *what is the most appropriate conclusion?* The claim that it's relatively easy to read words as long as the first and last letters are intact appears to be too broad and absolute. Stated as such, it's clearly wrong. Stated in qualified terms of "under some conditions" the claim has support, although one study found that even minor transpositions of interior letters slowed reading speed by 11 percent (Rayner, White, Johnson, & Liversedge, 2006). In some languages, however, such interior transpositions may make words very difficult, if not impossible, to read (Davis, 2003).

### Of Astrology and Asstrology: Potential Costs of Uncritical Thinking

Suppose someone swallows the bait of the original jumbled-word paragraph and now erroneously believes that it's always easy to read words with transposed letters. Unless it's a smart-aleck student or worker who plans to turn in "jumbled" school papers or work reports (citing "scientific justification" for doing so), what's the harm in holding this little false belief? Perhaps the immediate personal consequences are minimal, but misconceptions can add up and contribute to an increasingly misguided view of how the world operates.

Unfortunately, people uncritically accept many misconceptions that do have concrete harmful consequences. For example, in the hope of making their babies smarter, consumers have shelled out about $200 million annually for *Baby Einstein* videos that the Walt Disney Company advertised as educational, despite a lack of scientific support for its claim (Zimmerman et al., 2007). Under government and consumer group pressure, Disney eventually dropped the *educational* label and later agreed to partially refund consumers (Lewin, 2009).

Despite a lack of scientific evidence, people spend untold amounts of their hard-earned money to have their personalities analyzed and their futures forecasted by astrologers, graphologists (i.e., handwriting analyzers), tea-leaf readers, and other so-called "fortune tellers"—including rumpologists (sometimes referred to as *asstrologers*) who "read" people's buttocks to obtain their presumed psychic insights (Wyman & Vyse, 2008). Money aside, it's impossible to estimate how many people may have made major life decisions based on fortune tellers' bogus advice. It's also hard to know how many people have not only wasted money on bogus therapies for ailments, diseases, and mental disorders, but also experienced needless continued distress or further bodily harm by failing to employ scientifically validated treatments. Unfortunately, *pseudoscience*—a field that incorporates astrology, graphology, rumpology, and so on—is dressed up to look like science and it attracts many believers, despite its lack of credible scientific evidence (Figure 1.3). Critical scrutiny is important for all scientific claims, as illustrated by Bem's recent article claiming support for extrasensory perception (Bem, 2011). Daryl Bem is a highly respected researcher and the article was published in a prestigious journal. However, many other authors (e.g., Francis, 2012; LeBel et al., 2011) claimed that the data simply do not support the conclusions.

## Psychology's Goals

2. What are the four goals of psychology? How are these goals linked to one another?

As a science, psychology has four central goals:

1. To *describe* how people and other animals behave
2. To *explain and understand* the causes of these behaviours
3. To *predict* how people and animals will behave under certain conditions
4. To *influence or control* behaviour through knowledge and control of its causes to enhance human welfare

As you will learn in Chapter 2, the scientific goals of understanding, prediction, and control are linked in the following manner: If we understand the causes of a behaviour and know when the causal factors are present or absent, then we should be able to successfully predict when the behaviour will occur. Moreover, if we can control the causes, then we should be able to control the behaviour. For scientists,

**FIGURE 1.3** The popularity of pseudoscience.

Source: © Sidney Harris. ScienceCartoonsPlus.com. Reprinted with permission.

successful prediction and control are the best ways for us to know whether we truly understand the causes of behaviour. We should also note, however, that prediction can have important practical uses that do not require a complete understanding of why some behaviour occurs. For example, a psychologist might find that scores on a personality test dependably predict school drop-out rates, without fully understanding the psychological processes involved.

## Psychology as a Basic and Applied Science

3. How do the goals of basic research and applied research differ?

As scientists, psychologists employ a variety of research methods for developing and testing theories about behaviour and its causes. A distinction is sometimes made between **basic research**, the quest for knowledge purely for its own sake, and **applied research**, which is designed to solve specific practical problems. In psychology, the goals of basic research are to describe how people behave and to identify the factors that influence or cause a particular type of behaviour. Such research may be carried out in the laboratory or in real-world settings. Applied research often uses principles discovered through basic research to solve practical problems. Research methods will be discussed more fully in Chapter 2, but five research articles have been listed below to help you understand the difference between basic and applied research. These actual titles of articles appeared in psychological journals. Can you identify whether each study represents basic or applied research?

1. Two Forms of Spatial Imagery: Neuroimaging Evidence
2. The prevention of depressive symptoms in low-income, minority children: Two-year follow-up
3. Increasing Seat Belt Use on a College Campus: An Evaluation of Two Prompting Procedures
4. Facial Structure Is a Reliable Cue of Aggressive Behaviour
5. Recognizing speech under a processing load: Dissociating energetic from informational factors

Check your answers at the end of the chapter.

## Psychology's Broad Scope: A Simple Framework

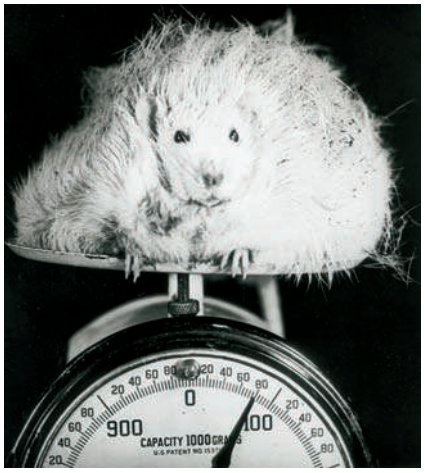
Because we are biological creatures, living in a complex social world, psychologists study an amazing array of factors to understand why people behave, think, and feel as they do. At times, this diversity of factors may seem a bit overwhelming, but we would like to provide you with a framework that will greatly simplify matters. We call it **levels of analysis**: Behaviour and its causes can be examined at the *biological level* (e.g., brain processes, genetic influences), the *psychological level* (e.g., our thoughts, feelings, and motives), and the *environmental level* (e.g., past and current physical and social environments to which we are exposed).

Here is a brief example of how the framework can be applied. Consider a behaviour that you engage in every day: eating (Figure 1.4). At the biological level, various chemicals, neural circuits, and structures in your brain respond to bodily signals and help to regulate whether you feel hungry or full. At the psychological level, your moods, food preferences, and motives affect eating. Do you ever eat when you're not hungry—perhaps because you feel stressed or bored? The environmental level of analysis calls attention to specific stimuli (such as the appearance or aroma of different foods) that may trigger eating and to cultural customs that influence our food preferences. Does the aroma of freshly baked treats ever make your stomach growl? How about the sight of duck feet or a mound of fish gills on a plate? To most Westerners, duck feet and fish gills may not be appetizing, but during a stay in China, we discovered that our hosts considered them delicious.

## In Review

- Psychology is the scientific study of behaviour and the mind. The term *behaviour* refers to actions and responses that we can directly observe, whereas the term *mind* refers to internal states and processes, such as thoughts and feelings, that cannot be seen directly and that must be inferred from observable, measurable responses.
- The primary goals of psychological science are to describe, explain, predict, and influence behaviour and to apply psychological knowledge to enhance human welfare.
- Basic research is the quest for knowledge for its own sake, whereas applied research involves the application of knowledge derived from basic research to solve practical problems.

The Biological Level




The Psychological Level

The Environmental Level

**FIGURE 1.4** *Biological level* (left). This rat weighs about triple the weight of a normal rat. As we (or rats) eat, hunger decreases as certain brain regions regulate the sensation of becoming full. Those regions in this rat's brain have been damaged, causing it to overeat and become obese. *Psychological level* (centre). At times, we may eat out of habit, stress, or boredom. With a chocolate bar in hand and other candies lined up, this student is ready for some autopilot munching. *Environmental level* (right). Does a plateful of insect-topped crackers sound appetizing to you? Cultural norms influence food preferences.

### Mind–Body and Nature–Nurture Interactions

Form a mental picture of a favourite food, and you may trigger a hunger pang. Focus on positive thoughts when facing a challenging situation, and you may keep your bodily arousal in check. Dwell instead on negative thoughts, and you can rapidly stimulate the release of stress hormones (Borod, 2000). These examples illustrate what traditionally have been called *mind–body interactions*—the relations between mental processes in the brain and the functioning of other bodily systems. Mind–body interactions focus our attention on the fascinating interplay between the psychological and biological levels of analysis. This topic has a long history within psychology, and, as you will see throughout the textbook, it remains one of psychology's most exciting frontiers.

The levels-of-analysis framework also addresses an issue that has been debated since antiquity: Is our behaviour primarily shaped by nature (our biological endowment) or nurture (our environment and learning history)? The pendulum has swung toward one end or the other at different times in history, but today, growing interest in cultural influences and advances in genetics and brain research keep the nature–nurture pendulum in a more balanced position.

Perhaps most important, modern research increasingly reveals that nature and nurture interact (Masterpasqua, 2009; Moffitt et al., 2006). Just as our biological capacities affect how we behave and experience the world, our experiences influence our biological capacities. For humans and rats alike, continually depriving a newborn of physical contact, or providing a newborn with an enriched environment in which to grow, can influence its brain functioning and biological development (Rosenzweig, 1984). Thus, while it may be tempting to take sides, "Nature *or* nurture?" usually is the wrong question. As the levels-of-analysis framework implies, nature, nurture, and psychological factors must all be taken into account to gain the fullest understanding of behaviour. Later in the chapter, we'll provide a more detailed example of how looking at behaviour from multiple levels enhances our understanding.

## PERSPECTIVES ON BEHAVIOUR

Psychologists' focus on biological, psychological, and environmental factors that influence behaviour is not new; this focus has been an integral part of psychology's history. But just how did psychology's scope become so broad? In part, it happened because psychology has roots in such varied disciplines as philosophy, medicine, and the biological