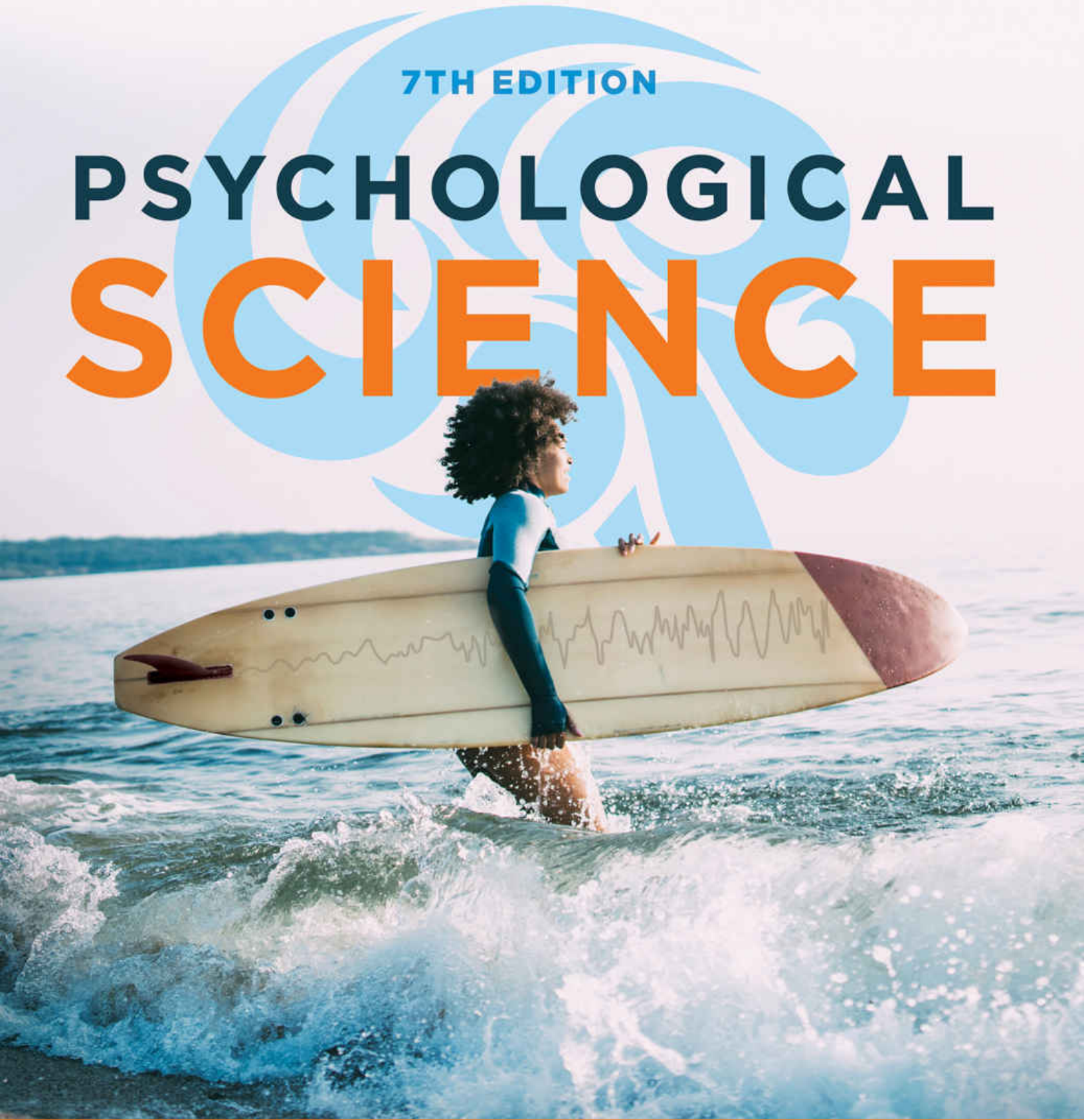
7TH EDITION

PSYCHOLOGICAL SCIENCE



ELIZABETH A. PHELPS • ELLIOT T. BERKMAN • MICHAEL S. GAZZANIGA

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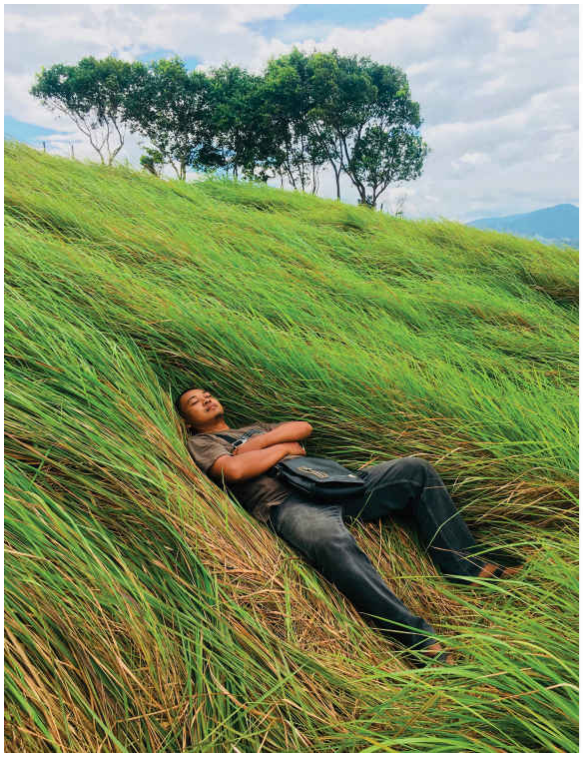

7TH EDITION

Psychological Science

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For Tyler, Alexandra, Connor, Samantha, and Evangeline—*LP*

For my wife, Natalie—*ET*

With gratitude, Lilly, Emmy, Garth, Dante, Rebecca, Leonardo, Fiala, and Carmen—*MG*

Brief Contents

Meet the Authors

ELIZABETH (LIZ) A. PHELPS is the Pershing Square professor of human neuroscience at Harvard University. Her career is characterized by distinguished scholarship and cutting-edge research in cognitive neuroscience, along with her passion to communicate the excitement of psychology to students by teaching introductory psychology nearly every year of her career. The primary inspiration behind her research is the observation that emotions color our lives, and even subtle, everyday variations in our emotional experience can alter our thoughts and actions. Liz received her PhD from Princeton University and served on the faculty of Yale University and New York University. Professor Phelps is the recipient of the 21st Century Scientist Award from the James S. McDonnell Foundation, the George A. Miller Prize in

Cognitive Neuroscience, the Distinguished Scholar Award from the Social and Affective Neuroscience Society, and the William James Award from the Association for Psychological Science. She is a Fellow of the American Association for the Advancement of Science, the Society for Experimental Psychology, and the American Academy of Arts and Sciences. She has served on several distinguished boards and has served as the president of three societies, including Society for Neuroeconomics, the Association for Psychological Science, and the Social and Affective Neuroscience Society

ELLIOT T. BERKMAN is a professor of psychology at the University of Oregon. He teaches social psychology, introductory psychology, and graduate courses in statistics and neuroimaging. His research is about the motivational and cognitive factors that contribute to success and failure in real-world goals such as cigarette smoking cessation and dieting. His teaching, research, and mentorship have been recognized with the APS Janet Taylor Spence Transformative Early Career Award, the Excellence in Graduate Mentorship Award from the

University of Oregon, the Social-Personality Health Network Early Career Award, the Joseph A. Gengerelli Distinguished Dissertation Award, the UCLA Social Psychology Dissertation Award, the Arthur J. Woodward Peer Mentoring Award, and the UCLA Distinguished Teaching Award. He received his PhD in 2010 from the University of California, Los Angeles. His blog, The Motivated Brain, is located at Psychology Today, and he tweets as @Psychologician.

MICHAEL S. GAZZANIGA is distinguished professor and director of the Sage Center for the Study of the Mind at the University of California, Santa Barbara. He received a PhD from the California Institute of Technology, where he worked with Roger Sperry and had primary responsibility for initiating human split-brain research. He has carried out extensive studies on both subhuman primate and human behavior and cognition. He is the founding editor of the *Journal of Cognitive Neuroscience* and also a founder of the Cognitive Neuroscience Society. For 20 years he directed the Summer Institute in Cognitive Neuroscience, and he serves as

editor in chief of the major reference text *The Cognitive Neurosciences*. He is a member of the American Academy of Arts and Sciences, the National Academy of Medicine, and the National Academy of Sciences. He has written many notable books, including, most recently, *Psychological Science,* 6e; *Cognitive Neuroscience,* 5e; and *The Consciousness Instinct: Unraveling the Mystery of How the Brain Makes the Mind*.

Preface

Welcome to the seventh edition of *Psychological Science*! A lot has happened in the world in the past few years: social upheaval, contentious elections, and a global pandemic. The field of psychological science grew and changed because of these developments. At the same time, psychological scientists continued to make headways on methodological reforms stemming from the replication crisis. When we set out to revise this edition as new coauthors, our goal was to update *Psychological Science* to reflect the latest developments in the field while also strengthening the parts that we loved about the previous editions. This book retains the soul of *Psychological Science*—a science-forward, comprehensive text with a focus on the intersection of neuroscience and psychology—while bringing new style and content that will resonate with the introductory psychology students of the post-pandemic era.

The Soul of *Psychological Science*

Longtime users of this book will be familiar with the seventh edition's nuanced, accurate presentation of robust and innovative findings in psychological science, as well as its strong focus on critical thinking. A distinguishing characteristic of *Psychological Science* is the integration of neuroscience data and methods to inform psychological questions. Over the past few decades, neuroscience has become increasingly integrated with psychological research, and this book remains at the frontier of teaching students the ways that neuroscience is increasingly woven throughout psychology. As in most introductory textbooks, one chapter focuses on the brain and neuroscience methods, but we do not stop there. Throughout the book, we introduce level-appropriate neuroscience data along with psychological findings when considering a broad range of psychological questions. Our goal when discussing neuroscience is not just to show that a behavioral or mental function has a brain basis. Instead, we specifically identify how neuroscience findings have advanced our understanding of psychological questions. Many introductory students question why they need to learn about neurons and the brain. By emphasizing how brain data has enhanced psychological science throughout the text, we aim to help students understand the value of this approach.

As every introductory psychology instructor knows, the most important lessons from an introductory psychology course are not about the content, but rather the process of critical and scientific thinking. The content of psychological science is an outstanding vehicle to teach students this kind of thinking because people are "intuitive scientists" when it comes to psychology. We naturally hypothesize about the causes of our own and other people's thoughts and behaviors. The "You Be the Psychologist" feature in this textbook leverages this inherent curiosity to scaffold the scientific thinking process for our readers. In these sections, students are encouraged to hypothesize about the factors contributing to some psychological phenomenon, consider alternative explanations for it, weigh the strengths and limitations of methodological tools to study it, and ponder the conditions under which the phenomenon does and does not hold. Asking questions and critically thinking about interesting questions that are relevant to their lives is highly engaging for students, and practicing this kind of thinking is an evidence-based way to improve learning. Indeed, we designed several features around the best

practices for learning outlined in APA's Introductory Psychology Initiative, including a focus on basic concepts and integrative themes, application of psychological principles to students' lives, and scientific thinking.

Understanding the thought process that drives psychological research can also help students appreciate the methodological issues around scientific replication. Like all sciences, psychology is "self-correcting" only when its knowledge base is updated by teachers and researchers to reflect the current state of the evidence. We are proud that the seventh edition upholds that essential scientific activity by showcasing the psychological principles that are supported by current, replicable evidence. The first two chapters feature thoughtful discussions of open science and replication. Mentions of open science and reproducibility follow throughout the text, building on the foundation laid in the first two chapters.

Updates for the Post-Pandemic World

We are passionate teachers who are dedicated to understanding the perspectives of our undergraduate students. We witnessed the many ways that the social and political turmoil of the past few years and the massive disruption caused by the global pandemic upended our students' lives and understanding of the world. And, though we've been in the field for decades, we keenly remember (and are reminded by our students) what it was like to be new to the science of psychology. Knowing that the challenges of learning are compounded by the changes in course delivery brought on by the pandemic, we made many revisions in this edition that consider the learning process from the student perspective.

CONNECTING PSYCHOLOGY TO STUDENTS' LIVES Psychology is perhaps the academic discipline that is most inherently relevant to people's everyday lives. Students become motivated to learn about the field of psychology when they understand the connection between the concepts they learn about in class and what they see around themselves from day to day. A side effect of psychology's embrace of the rigors of experimental research is that a great proportion of studies are conducted in laboratory settings. Nonetheless, the idea that psychology is *the science of us*, the science of human minds and behavior, is always at the forefront in this text. It is critical for students to learn that laboratory studies are not an end unto themselves, but rather a means to model and understand human behavior in the wild. The "Psychology Outside the Lab" feature highlights ways that features of human psychology and methods from psychological science play out in the world beyond academia. This feature makes an explicit case for the relevance of the material to students' lives and includes concrete and relatable examples, including the racial justice movement and the COVID-19 pandemic.

OUR FOCUS ON STUDENT LEARNING Our commitment to empathic and active pedagogy also emerges in the text's research-based emphasis on students' conceptual understanding. Along with the Learning Objectives and "Red Q" questions from previous editions, we've also created new "Learning Tips" in each chapter to help make tricky concepts accessible to all students. We drew from our decades of collective teaching experience to compile a list of topics that are often confusing to introductory psychology students. The Learning Tips target one or two areas in each chapter that are particularly challenging for students to understand. Each Learning Tip zooms in on one tricky concept, definition, or distinction and presents students with our advice for thinking about and understanding it. This

feature is emblematic of the ways the seventh edition is particularly student focused. Revisiting a concept, at a different time and from a different perspective, will enhance students' understanding and retention of it.

OUR FOCUS ON DIVERSITY, EQUITY, AND INCLUSIVITY Promoting the values of diversity, equity, and inclusion was a primary goal of ours for the seventh edition. Too often, diversity in psychology texts is limited only to racial/ethnic diversity and, even then, is inadequately addressed under the label of "culture." This revision adopts a broad conceptualization of diversity and inclusivity to encompass not only race/ethnicity but also gender identity, sexuality, immigration status, socioeconomic class, body type, neurodiversity, disability, and age, among others. We do not mince words about the race-and gender-based social hierarchies that systematically advantage some groups of people and disadvantage others. Throughout the text, we address the many ways structural racism manifests across the field of psychology, including in the chapters on health, social psychology, and clinical psychology.

Psychological science observes the human world, but it is also a product of that world. The insidious effects of structural racism and other forms of systemic discrimination also harm and distort the field of psychological science itself. Despite some recent progress, the fact remains that scholars from many groups have been excluded from the field. Women; queer and nonbinary people; people with disabilities; non-Americans and immigrants; people living in poverty; and Black, Indigenous, and other people of color, among many others, are underrepresented as psychological scientists. Even when such scholars enter the field, their work is underappreciated and undercited. The lack of representation and acknowledgment of people in these groups harms the field by narrowing its scope and limiting its reach. The seventh edition does not sugarcoat these realities, but it does take steps to increase the visibility of the scholarship and personhood of psychological scientists from groups that have been excluded from the field. Recent research and classic discoveries by scientists who have historically been undervalued by the field are featured throughout the text.

Another benefit of the equity focus in the seventh edition is to increase the sense of belonging of all readers in the field. Students who do not see people who look and live like them featured as scientists, used as examples, shown in photos, and included in quiz questions receive the implicit messages that psychological science is not for them and that they do not belong in the field. We took particular care throughout the book, not only in the studies featured in the narrative but also in the examples, figures and illustrations, chapter-opening vignettes, and quiz questions, to be broadly inclusive of people of all genders, sexualities, abilities, nationalities, bodies, incomes, races, and ethnicities. The implicit message for readers is simple: Psychological science is for all people.

Major Changes in the Seventh Edition

We revised the style of the narrative to go along with our student-centered approach in the seventh edition. This edition maintains the focus on high-quality science that has always been a hallmark of *Psychological Science* while providing a clear and digestible experience for the reader. Our aim was to provide comprehensive and accurate coverage of the major ideas under each topic while keeping the text concise and easy to read. We wanted to convey the nuances

of the most important findings in psychological science without the complex and sometimes confusing language that often accompanies scientific writing. Much of the narrative has been recast into a livelier, more relaxed style that allows the voices of the authors to come through. The length of the text has also been reduced compared with previous editions. These stylistic changes were accompanied by increased use of tables, figures, and other visual features to break up lengthy blocks of text. On the following page is a table with the major changes made to each chapter.

Wrapping It Up

We hope you enjoy the seventh edition of *Psychological Science* as much as we enjoyed writing it. We know many students taking introductory psychology will not major in psychology, and only a small fraction will go on to be researchers in psychology. As such, our goal as authors is to encourage students to *think like* psychological scientists without assuming they will all *become* psychological scientists. Learning about and developing a passion for critical thinking about psychological questions foster life skills that benefit students across the natural sciences, social sciences, and humanities. More than anything, we hope we will encourage introductory students to use these critical-thinking skills as they evaluate information and understand the behavior of those around them in their everyday lives.

Major Changes in the 7th Edition **CHAPTER 1**

- Increased emphasis on critical thinking as a key learning outcome
- New section on diversity and inclusion in psychological science
- New section on the science of learning
- New sections on computational modeling, big data, and data science

CHAPTER 2

- New running example through the chapter on using e-cigarettes, a highly relevant topic
- Expanded coverage of replication and open science practices
- New coverage of A/B testing in marketing and on social media
- New coverage of the Bem ESP study as an example of questionable research practices

CHAPTER 3

- Streamlined discussion of neurotransmitters and the action of drugs
- Reorganized discussion of brain anatomy, highlighting regions most relevant to psychological science
- New discussion of the insular cortex
- Increased emphasis on the value of brain methods in informing psychological questions
- Additional online teaching tools for brain anatomy and neurons

CHAPTER 4

- Increased discussion of attention as a gateway to consciousness
- New critical-thinking exercise on meditation and brain changes

- Revised discussion on the impact of brain injury on consciousness
- Updated coverage of drugs and consciousness

CHAPTER 5

- Revised and streamlined discussion of principles of perception, including Gestalt principles
- Updated and expanded section on depth and motion perception
- New critical-thinking discussion on the special status of face processing in the brain

CHAPTER 6

- Expanded coverage of social learning, including its contribution to attitudes about race
- Increased emphasis on principles of learning common to classical and operant conditioning
- Streamlined and reorganized discussion of principles of classical conditioning
- Added coverage of instructed learning

CHAPTER 7

- Reorganized coverage of memory principles based on stages of memory processing
- Streamlined discussion of types of memory
- Updated discussion of memory replay and reconsolidation
- Integrated tips for enhancing memory into neuroscience of memory
- Eliminated discussion of molecular basis of memory

CHAPTER 8

- New and revised coverage of emotion and decision making
- New discussion of the value of big data in psychological research on decision making
- Expanded discussion of critical periods and communication in language learning
- Reduced coverage of group differences in intelligence

CHAPTER 9

- Updated section on the lifelong effects of early experiences
- New coverage on the effects of neonatal opioid exposure
- Updated coverage on identity development, including sexual and gender identity
- New critical-thinking section on the effects of screen time on development
- Refocused discussion of the factors that promote thriving in older adulthood

CHAPTER 10

- New critical-thinking component to the learning unit on lie detectors
- New section on cultural differences in emotional display rules
- New coverage on the relation between motivation and meaning in life
- New section on SMART goals
- New coverage on the needs for consistency and coherence

CHAPTER 11

- New, more extensive coverage of social and cultural effects on health
- Substantially expanded coverage of health disparities between groups
- Updated sections on healthy eating and smoking, incorporating the latest research
- New critical-thinking component in the section on everyday health behaviors

CHAPTER 12

- Removal of discussion of the Stanford Prison Study, elements of which had been fabricated
- Enhanced critical-thinking elements in the coverage of social norms marketing
- Updated coverage of the IAT to reflect the current scientific consensus
- New coverage of stereotype threat and the shooter bias to the section on prejudice

CHAPTER 13

- Added coverage of gene-environment correlations in shaping behavior and personality
- Removal of outdated Freudian theories of personality
- Added coverage of cultural variation in the structure of personality
- Substantially revised section on personality psychology in the workplace and I/O psychology context
- Added coverage of cognitive-affective system theory in advancing the person-situation debate in the personality literature

CHAPTER 14

- Reorganization of the chapter into sections about disorders of emotion, thought, and behavior
- New section on disorders linked to trauma
- Emphasis on the socially defined nature of psychological disorders
- Added coverage of addictions as disorders of behavior

CHAPTER 15

- Expanded and updated discussion of stigma and cultural differences in the treatment of psychopathology
- Added discussion of internet-based treatments
- New coverage on the treatment of addiction
- New critical-thinking exercise on the efficacy of antidepressants

Acknowledgments

As new authors of *Psychological Science*, we've benefited from the advice and responses of many reviewers, both well-known researchers and star instructors. Thanks go out to the many colleagues who reviewed specific revisions; read chapters for inclusivity, accuracy, and consistency; and shared their experience with our book. We would like to thank our students at New York University, Harvard University, and the University of Oregon over the years for informing our approach to this revision. We wrote the seventh edition with you in mind. We particularly would like to acknowledge Jagdeep Bala and Jordan Pennefather at the University of Oregon for their guidance and student-mindedness in helping us craft this revision. In addition to the excellent reviews supplied by Ines Segert (University of Missouri) and Becky Gazzaniga over six editions, we'd like to thank Adriana Uruena-Agnes at the University of South Florida for thoughtfully accuracy checking every word and figure in each chapter of the book and providing valuable insight and advice.

***PSYCHOLOGICAL SCIENCE, 7E*, TEXT AND MEDIA REVIEWERS** We thank the reviewers who have worked to further strengthen *Psychological Science*. Your excellent revisions, inspired ideas, and insightful guidance have shaped an inclusive book and resources that greatly benefit instructors and students alike. Your students are lucky to have you in their classroom.

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The past five editions of *Psychological Science* would simply not exist without Sheri Snavely. Sheri has reinvented the book over and over again by inspiring authors to bring their own vision to the text. We are grateful to Sheri for inviting us into the Norton family for this edition and encouraging us at each step in the process to let our voices and perspectives shine through. We deeply valued Sheri's guidance and her attention to both the student and instructor experience of the text.

We are forever indebted to senior developmental editor Beth Ammerman for her seamless and collaborative editing. A great editor is most often invisible to the reader, so we wish to inform readers: When the prose in this revision sings, it is because of Beth.

We are grateful to media editor Kaitlin Coats and her team, assistant media editor Emilia Pesantes and associate media editor Christina Fuery, for creating and producing first-rate digital tools to support both students and instructors. They worked on the ebook and InQuizitive online assessment; a myriad of top-quality instructor resources, test questions, and video; and the exciting new 3D brain and neuron animations. We appreciate all their efforts to ensure these tools give instructors the highest-quality materials they need to teach the course and to give students every opportunity to learn challenging topics interactively and effectively.

Many others also provided crucial support. Assistant editor Chloe Weiss kept the project running smoothly and managed our rigorous editorial review program, allowing us to revise chapters based on high-quality extensive feedback from professors in the field. She also worked tirelessly to ensure that the book's content and illustration program is inclusive,

reflecting today's psychologists and psychology students in all their variety. Project editor Linda Feldman patiently saw this project through from start to finish. We are grateful for her sharp eyes and attention to detail, making sure every change in the pages was made and finding ways to include all our material while still having clean and spacious pages. Photo editor Ted Szczepanski did a wonderful job of researching and editing all the photos in the book and finding excellent photos that reflect real people from a wide array of identities. Production managers Eric Pier Hocking, Sean Mintus, and Richard Bretan made sure all the trains ran on time so the book and resources were ready for instructors to consider for their courses. Art director Lissi Sigillo worked her magic in creating a design that was both beautiful and accessible to a variety of learners. Head of design at W. W. Norton, Debra Morton Hoyt, worked to give us a beautiful cover that mirrors the energy and fresh perspective of the new edition.

THE NORTON SALES AND MARKETING TEAM Thanks to the book's marketing manager, Casey Johnson, for analyzing the market and using her substantial sales experience as the basis for putting together a cutting-edge and informative marketing campaign. She understands what instructors and students need to be successful and is doing a marvelous job of making sure the book's message reaches travelers and professors. A big thank-you to psychology sales specialist Dorothy Laymon, our boots on the ground for rallying the troops, doing countless presentations, and understanding so intuitively the challenges that instructors and students face today. In fact, we are grateful to the whole psychological science sales team —travelers, managers, science specialists, media specialists, and institutional sales group. Indeed, the entire sales force, led by Erik Fahlgren and Dennis Fernandes, has supported this book and is distinguished by their knowledge of psychology and consultative partnerships with instructors.

Digital Tools for Instructors and Students

The *Psychological Science* teaching and learning resources give you all the tools you need to increase student retention, understanding, and engagement.

InQuizitive


Created by a cognitive psychologist, InQuizitive adaptive assessment is built on evidence-based principles of learning, including retrieval practice, learning by doing, and metacognitive monitoring. Personalized question sets target students' individual areas for improvement, and formative answer-specific feedback helps them understand core concepts. Game-like elements and a variety of interactive question types maximize engagement.

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Norton Teaching Tools are your first stop when looking for creative resources to design or refresh your course. The Norton Teaching Tools site is a searchable, sortable database of resources for engaging students in active and applied learning, in the classroom or online. Norton Teaching Tools for *Psychological Science* include Active Learning + Lecture PowerPoints, Activities and Demonstrations, Class Discussion Topics, Suggested Video Links, and much more.

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New Norton Testmaker makes it easy to build customized, outcome-driven assessments from more than 3,800 questions in the *Psychological Science* test bank. Search and filter test bank questions by question types, difficulty levels, new APA Introductory Psychology Initiative Student Learning Outcomes, and more. You can customize questions to fit your course, or simply "grab and go" with our ready-to-use quizzes. Easily export your tests and quizzes to Microsoft Word or Common Cartridge files for your learning management system.

3D Brain and Neuron Animations


A **new** interactive 3D brain and **new** interactive neuron animations give students the opportunity to visualize and interact with difficult concepts in the Biology and Behavior chapter. The interactive 3D brain gives students a hands-on way to explore brain structure and function by rotating, zooming, and adding/removing structures. The interactive neuron animations help students comprehend challenging processes by moving beyond traditional video animations, pausing at key points to allow students to interact with them.

ZAPS 3.0


New ZAPS 3.0 Interactive Labs are brief, easy-to-use activities that invite students to actively participate in the process of psychological research and discovery. **New** in ZAPS Version 3.0: streamlined content, embedded videos, added formative assessment and feedback, enhanced data literacy content, a **brand-new** suite of instructor support tools, and four **new** lab activities on developmental, clinical, and social psychology.

HIP Guide


New *High-Impact Practices: A Teaching Guide for Psychology* (the HIP Guide) recommends practical methods for applying the latest psychological research on teaching and learning in order to design and teach introductory courses that respond to current challenges. The HIP Guide includes advice on teaching in online and hybrid environments, creating an inclusive learning environment, incorporating active learning into the course, and more.

Resources for your LMS


Easily add high-quality, integrated Norton digital resources to your online, hybrid, or lecture courses. All activities can be accessed right within your existing learning management system.

Videos

 A robust library of videos brings psychology to life. Concept Videos are brief (1 to 2 minutes), friendly animated illustrations of the most important concepts in introductory psychology. Demonstration Videos show a real instructor and students participating in classroom demonstrations.

Contents

1 The Science of Psychology

Big Questions

WHY IS PSYCHOLOGY ONE OF THE MOST POPULAR MAJORS at many colleges? The simple answer is that people want to understand the minds and actions of themselves and others. Knowing how humans think, feel, and behave can be incredibly useful. The science of psychology can help you understand your motives, your personality, even why you remember some things and forget others. In addition, psychology will prepare you for many professions, and much of the research you will read about in this book can be used to make people's lives better. It will benefit you whether you're studying environmental science (how do you encourage people to recycle?), anthropology (how does culture shape behavior?), biology (how do animals learn?), or philosophy (do people have free will?). Whatever your major, this class will help you succeed in your academic work and your broader life beyond it, now and in the future.

What Is Psychological Science?

Learning Objectives

- Define psychological science.
- Define critical thinking, and describe what it means to be a critical thinker.
- Identify major biases in thinking, and explain why these biases result in faulty thinking.

Psychology involves the study of thoughts, feelings, and behavior. The term *psychologist* is used broadly to describe someone whose career involves understanding people's minds or predicting their behavior. We humans are intuitive psychologists. We could not function very well in our world without natural ways to understand and predict others' behavior. For example, we quite rapidly get a sense of whether we can trust a stranger before we interact with them. But we cannot simply use our own common sense or gut feelings as a guide to know whether many of the claims related to psychology are fact or fiction. Will playing music to newborns make them more intelligent? Do birds of a feather flock together, or do opposites attract? Psychological science uses data to find answers.

1.1 Psychological Science Is the Study of Mind, Brain, and Behavior

Psychological science is the study, through research, of mind, brain, and behavior. But what exactly does each of these terms mean, and how are they all related?

Mind refers to mental activity. The mind includes the memories, thoughts, feelings, and perceptual experiences (sights, smells, tastes, sounds, and touches) we have while interacting with the world. Mental activity results from biochemical processes within the *brain*. *Behavior* describes the totality of observable human (or animal) actions. These actions range from the subtle to the complex. Some occur exclusively in humans, such as debating philosophy or performing surgery. Others occur in all animals, such as eating and drinking.

For many years, psychologists focused on behavior rather than on mental states. They did so largely because they had few objective techniques for assessing the mind. The advent of technology to observe the working brain in action has enabled psychologists to study mental states and has led to a fuller understanding of human behavior. Although psychological science is most often associated with its important contributions to understanding and treating mental disorders, much of the field seeks to understand mental activity (both typical and atypical), the biological basis of that activity, how people change as they develop through life, how people differ from one another, how people vary in their responses to social situations, and how people acquire healthy and unhealthy behaviors.

Q

How do the mind and the brain relate?

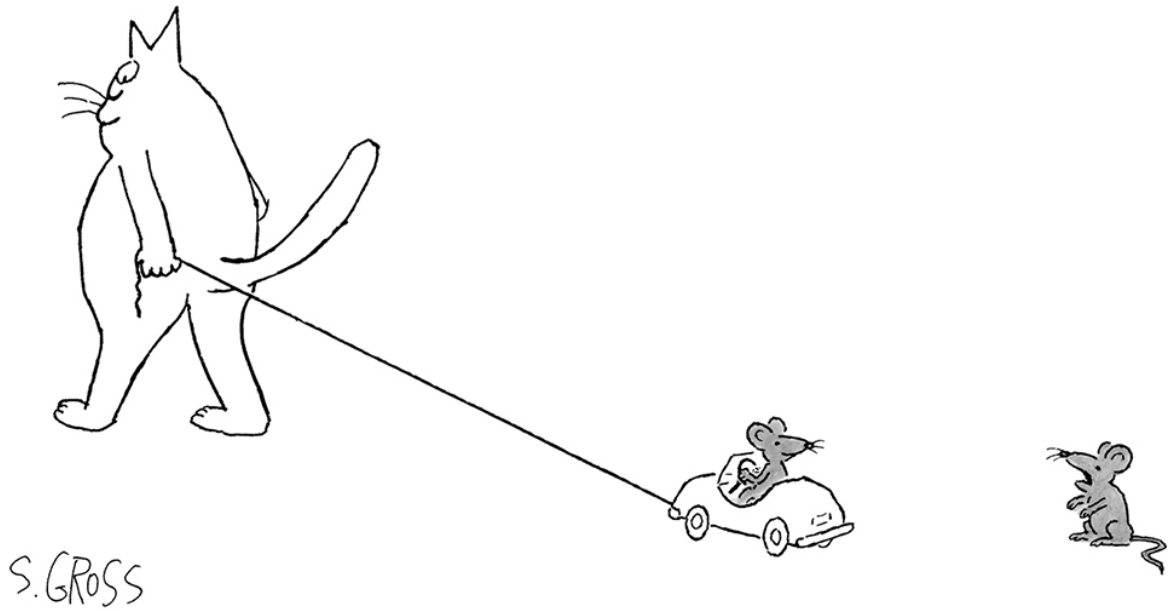
Answer: The mind (mental activity) is produced by biochemical processes in the brain.

Glossary

psychological science
: The study, through research, of mind, brain, and behavior.

1.2 Psychological Science Teaches Critical Thinking

One of this textbook's most important goals is to provide a basic, state-of-the-art education about the methods of psychological science. Even if your only exposure to psychology is through the introductory course and this textbook, you will become psychologically literate. That means you will learn not only how to critically evaluate psychological claims you hear about in social and traditional media but also how to use data to answer your own questions about people's minds and behavior. With a good understanding of the field's major issues, theories, and controversies, you will also avoid common misunderstandings about psychology.



"For God's sake, think! Why is he being so nice to you?"

The media love a good story, and findings from psychological research are often provocative (**FIGURE 1.1**). Unfortunately, media reports can be distorted or even flat-out wrong. Throughout your life, as a consumer of psychological science, you will need to be skeptical of overblown media reports of "brand-new" findings obtained by "groundbreaking" research. With the rapid expansion of online information sharing and thousands of searchable research findings on just about any topic, you need to be able to sort through and evaluate the information you find in order to gain a correct understanding of the phenomenon (observable thing) you are trying to investigate.

FIGURE 1.1

Psychology in the News

Psychological research is often in the news because the findings are intriguing and relevant to people's lives.

One of the hallmarks of a good scientist—or a savvy consumer of scientific research—is *amiable skepticism*. This trait combines openness and wariness. An amiable skeptic remains open to new ideas but is wary of new "scientific findings" when good evidence and sound reasoning do not seem to support them. An amiable skeptic develops the habit of carefully weighing the facts when deciding what to believe. Thinking in this way—systematically questioning and evaluating information using well-supported evidence—is called critical thinking.

Critical thinking is useful in every aspect of your life. It is also important in all fields of study throughout the humanities and the sciences. In fact, psychological science itself sheds light on the way people typically think when they encounter information. Many decades of psychological research have shown that people's intuitions are often wrong, and they tend to be wrong in predictable ways that make critical thinking very difficult. Through scientific study, psychologists have discovered types of situations in which common sense fails and biases influence people's judgments.

Being aware of your own biases in thinking will also help you do better in your classes, including this one. Many students have misconceptions about psychological phenomena before they have taken a psychology course. The psychologists Patricia Kowalski and Annette Kujawski Taylor (2004) found that students who employ critical thinking skills complete an introductory course with a more accurate understanding of psychology than students who complete the same course but do not employ critical thinking skills. As you read this book, you will benefit from the critical thinking skills that you will learn about and get to practice. These skills are the most valuable lessons from this course, and you will bring them to your other classes, your workplace, and your everyday life.

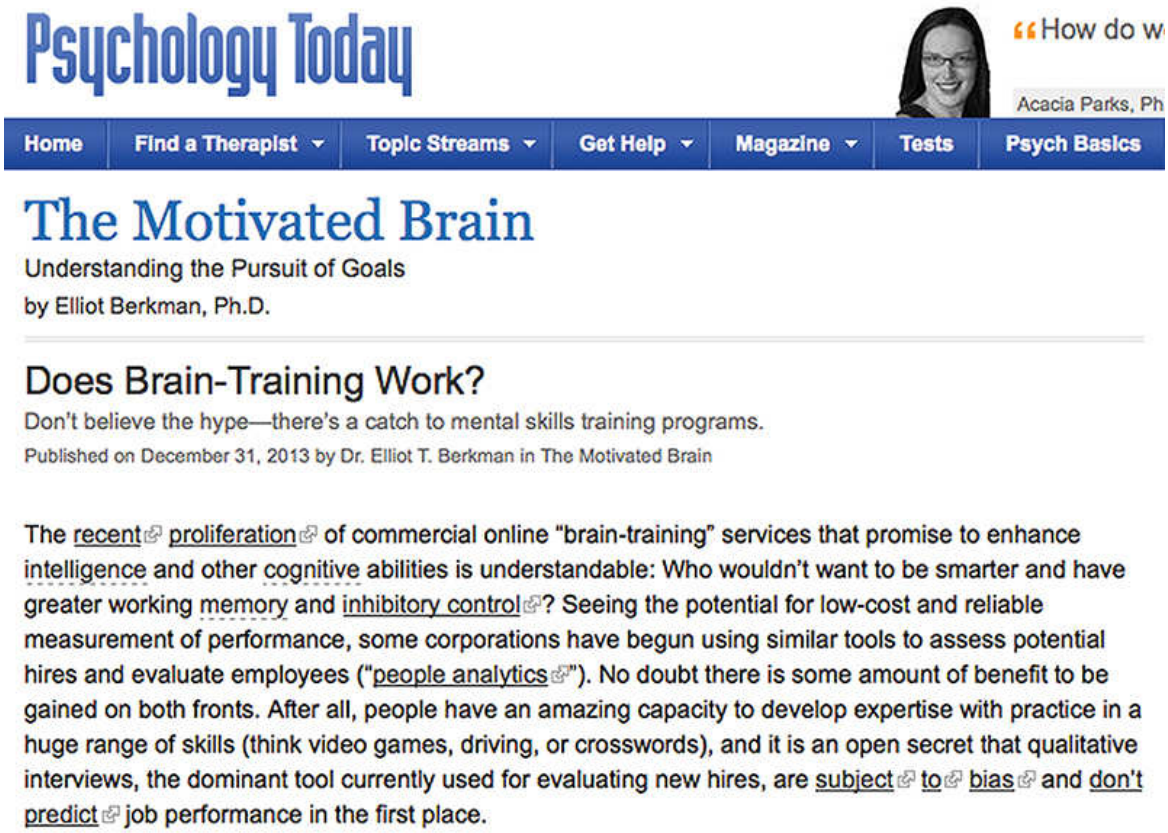


FIGURE 1.2

Critically Evaluating Research

Psychologists use critical thinking to evaluate provocative research questions. Here, Elliot Berkman cautions against believing the hype about brain training.

Being a critical thinker involves looking for holes in evidence, using logic and reasoning to see whether the information makes sense, and considering alternative explanations (**FIGURE 1.2**). It also requires considering whether the information might be biased, such as by personal or political agendas. Most people are quick to question information that does not fit with their beliefs. But as an educated person, you need to think critically about all information. Even when you "know" something, you need to keep refreshing that information in your mind. Ask yourself: Is my belief still true? What led me to believe it? What facts support it? Has science produced new findings that require me to reevaluate and update my beliefs? This exercise is important because you may be least motivated to think critically about information that verifies your preconceptions. In Chapter 2, you will learn much more about how critical thinking helps our scientific understanding of psychological phenomena. A feature throughout the book called "You Be the Psychologist" gives you opportunities to practice critical thinking about psychology.

Q

What is amiable skepticism?

Answer: being open to new ideas but carefully considering the evidence

Glossary

critical thinking
: Systematically questioning and evaluating information using well-supported evidence.

1.3 Psychological Science Helps Us Understand Biased or Inaccurate Thinking

Psychologists have cataloged some ways that intuitive thinking can lead to errors (Gilovich, 1991; Hines, 2003; Kida, 2006; Stanovich, 2013). These errors and biases do not occur because we lack intelligence or motivation. Just the opposite is true. Most of these biases occur *because* we are motivated to use our intelligence. We want to make sense of events that involve us or happen around us. Our minds are constantly analyzing all the information we receive and trying to make sense of that information. These attempts generally result in relevant and correct conclusions.

FIGURE 1.3

Patterns That Do Not Exist

People often think they see faces in objects. When someone claimed to see the face of the Virgin Mary on this grilled cheese sandwich, the sandwich sold to a casino for $28,000 on eBay.

Indeed, the human brain is highly efficient at finding patterns and noting connections between things. By using these abilities, we make new discoveries and advance society. But sometimes we see patterns that do not really exist (**FIGURE 1.3**). We see images of famous people in toast. We play recorded music backward and hear satanic messages. We believe that events, such as the deaths of celebrities, happen in threes. Often, we see what we expect to see and fail to notice things that do not fit with our expectations. For instance, as you will learn in Chapter 12, our stereotypes about people shape our expectations about them, and we interpret their behavior in ways that confirm these stereotypes.

Why is it important to care about errors and biases in thinking? False beliefs can sometimes lead to dangerous actions. During the coronavirus pandemic that circled the globe in 2020, many people were motivated to believe that the disease was not as deadly as reported. Sometimes people reject information that is not consistent with their political beliefs or that threatens their self-image (for example, as being invulnerable to illness). People who dismissed the evidence about how the virus was spread were less likely to engage in social distancing and more likely to contract the disease (Hamel et al., 2020; Owens, 2020).

In each chapter, the feature "You Be the Psychologist" draws your attention to at least one major example of biased or erroneous thinking and how psychological science has provided insights into it. The following are a few of the common biases you will encounter.

- *Ignoring evidence (confirmation bias)*. People are inclined to overweigh evidence that supports their beliefs and tend to downplay evidence that does not match what they believe. When people hear about a study that is consistent with their beliefs, they generally believe the study has merit. When they hear about a study that contradicts those beliefs, they look for flaws or other problems. One factor that contributes to confirmation bias is the selective sampling of information. For instance, people with certain political beliefs may visit only websites that are consistent with those beliefs. However, if we restrict ourselves to evidence that supports our views, then of course we will believe we are right. Similarly, people show selective memory, tending to better remember information that supports their existing beliefs.
- *Seeing causal relationships that do not exist*. An extremely common reasoning error is the misperception that two events that happen at the same time must somehow be related. In our desire to find predictability in the world, we sometimes see order that does not exist. For instance, over the past 200 years, the mean global temperature has increased, and during that same period the number of pirates on the high seas has decreased. Would you argue that the demise of pirates has led to increased global warming?
- *Accepting after-the-fact explanations*. Another reasoning bias is known as *hindsight bias*. We are wonderful at explaining why things happened in the past, but we are much less successful at predicting future events. Think about the shooting in 2016 at the Pulse nightclub in Orlando, Florida. In hindsight, we know that there were warning signs that the shooter might become violent, such as a history of violence against women (**FIGURE 1.4**). Yet none of these warning signs prompted anyone to take action. People saw the signs but failed to predict the tragic outcome. More generally, once we know the outcome, we interpret and reinterpret old evidence to make sense of that outcome. We need to be wary of after-the-fact explanations because they give a false sense of certainty about our ability to make predictions about future behavior.

FIGURE 1.4

Orlando Pulse Shootings

In hindsight, there were warning signs that the shooter, Omar Mateen, was troubled. But it is very difficult to predict violent behavior in advance.

- *Taking mental shortcuts*. People often follow simple rules, called *heuristics*, to make decisions. These mental shortcuts are valuable because they often produce reasonably good decisions without too much effort (Kahneman, 2011). But at times heuristics can lead to inaccurate judgments and biased outcomes. One example of this problem occurs when things that come most easily to mind guide our thinking. This shortcut is known as the *availability heuristic*. For example, child abductions are much more likely to be reported in the news than more common dangers are, and the vivid nature of the reports makes them easy to remember. After hearing a series of news reports about child abductions, parents may overestimate their frequency and become overly concerned that their children might be abducted. As a result, they may underestimate other dangers facing their children, such as bicycle accidents, food poisoning, or drowning. Similar processes lead people to drive rather than fly even though the chances of injury or death from passenger vehicles are much greater than the chances of dying in a plane crash. In Chapter 8, we will consider a number of heuristic biases.

Q

Why should you be suspicious of after-the-fact explanations?

Answer: Once people know an outcome, they interpret and reinterpret old evidence to make sense of that outcome, giving a false sense of predictability.

YOU BE THE PSYCHOLOGIST

1.4 Why Are People Unaware of Their Weaknesses?

Another bias in thinking is that people are motivated to feel good about themselves, and this motivation affects how they interpret information (Cai et al., 2016). For example, many people believe they are better than average on any number of dimensions. Ask your friends, for example, if they think they are better-than-average drivers. More than 90 percent of drivers hold this belief despite the statistical reality that only 50 percent can be above average. People use various strategies to support their positive views, such as choosing a definition of what it means to be good at something in a self-serving way. The flip side of this is that people are resistant to recognizing their own weaknesses. Consider the following.

You are judging an audition for a musical, and the singer, while passionate, is just awful (**FIGURE 1.5**). Everyone in the room is laughing or holding back laughter out of politeness. When the judges react unenthusiastically and worse, the performer is crushed and cannot believe the verdict. "But everyone says I am a great singer," he argues. "Singing is my life!" You sit there thinking, *How does he not know how bad he is?*

FIGURE 1.5

Judging a Performance

Judges react to an audition.

How is it that people who are tone-deaf can believe their singing talents merit participating in singing competitions? The social psychologists David Dunning and Justin Kruger have an explanation: People are often blissfully unaware of their weaknesses because they cannot judge those weaknesses at all (Dunning et al., 2003; Kruger & Dunning, 1999). How does this limitation come about?

Take a moment to consider some possibilities. This kind of thinking is known as *hypothesis generation*, and it occurs near the beginning of the scientific process. Hypothesis generation is also one of the most fun parts of thinking like a psychologist. You get to explore the idea space of explanations. Are people unaware of their weaknesses because they have never bothered to think carefully about them? Or is it that they have never received honest feedback? Try to come up with three explanations for the effect. And keep in mind that there is rarely only one explanation for something in psychology, so combinations of explanations count, too!

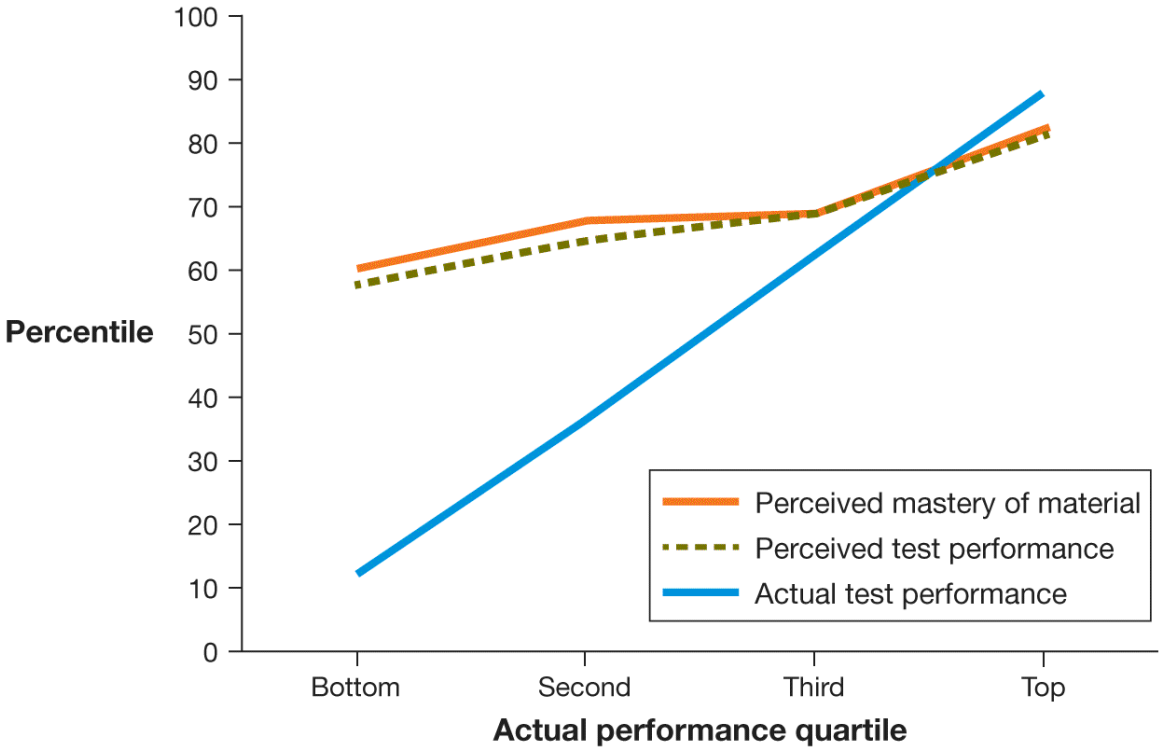


FIGURE 1.6

Personal Ratings Versus Actual Performance

Students rated their mastery of course material and test performance. Points on the *y*-axis reflect how the students perceived their percentile rankings (value on a scale of 100). Points on the *x*-axis reflect these students' actual performance rank (*quartile* here means that people are divided into four groups). The top students' predictions were close to their actual results. By contrast, the bottom students' predictions were far off.

In studies of college students, Dunning and Kruger found that people with the lowest grades rate their mastery of academic skills much higher than is warranted by their performance (**FIGURE 1.6**). A student who receives a grade of C may protest to the instructor, "My work is as good as my roommate's, but she got an A." This result hints that one explanation might be that people lack the ability to evaluate their own performance in areas where they have little expertise—a phenomenon known as the *Dunning-Kruger effect*.

Of course, additional explanations might also be at play. Think like a psychologist and ask yourself: Why do people hold overly rosy estimations of their own abilities to begin with? How does it benefit us, and when might it be harmful? What function does it serve for us in social situations? In Chapter 12, you will learn why most people believe they are better than average in many things. As is often the case in psychology research, the answer to one question leads us to the next. Thinking like a psychologist begins, and ends, by asking questions and considering multiple possible answers. ■

Why should you be skeptical of people's descriptions of their personal strengths?

Answer: because people often lack the expertise to accurately evaluate and compare their abilities.

What Is the Scientific Scope of Psychology?

Learning Objectives

- Trace the history of the mind/body problem and the nature/nurture debate.
- Define the concept of functionalism and understand how it fits into an evolutionary framework.
- Identify the major areas of research within psychology and the focus of their work.

FIGURE 1.7

Confucius

Confucius studied topics that remain important in contemporary psychology.

Psychology originated with the ancient philosophers, who explored questions about human nature. For example, the Chinese philosopher Confucius emphasized human development, education, and interpersonal relations, all of which remain contemporary topics in psychology around the world (Higgins & Zheng, 2002; **FIGURE 1.7**). But it was not until the 1800s that psychologists began to use scientific methods to investigate mind, brain, and behavior. Now, psychologists study a wide range of topics, from brain and other biological mechanisms to life span development to cultural and social issues.

1.5 Many Psychological Questions Have a Long History

Since at least the times of ancient Greece, people have wondered why humans think and act in certain ways. The mind/body problem was perhaps the quintessential psychological issue: Are the mind and body separate and distinct, or is the mind simply the subjective experience of ongoing brain activity? Throughout history, the mind has been viewed as residing in many organs of the body, including the liver and the heart. The ancient Egyptians, for example, elaborately embalmed each dead person's heart, which was to be weighed in the afterlife to determine the person's fate. They simply threw away the brain. In the following centuries, scholars continued to believe that the mind was separate from the body, as though thoughts and behaviors were directed by something other than the squishy ball of tissue between our ears. Around 1500, the artist Leonardo da Vinci challenged this doctrine when he dissected human bodies to make his anatomical drawings more accurate. His dissections led him to many conclusions about the brain's workings. Some of da Vinci's specific conclusions about brain functions were not accurate, but his work represents an early and important attempt to link the brain's anatomy to psychological functions (**FIGURE 1.8**).

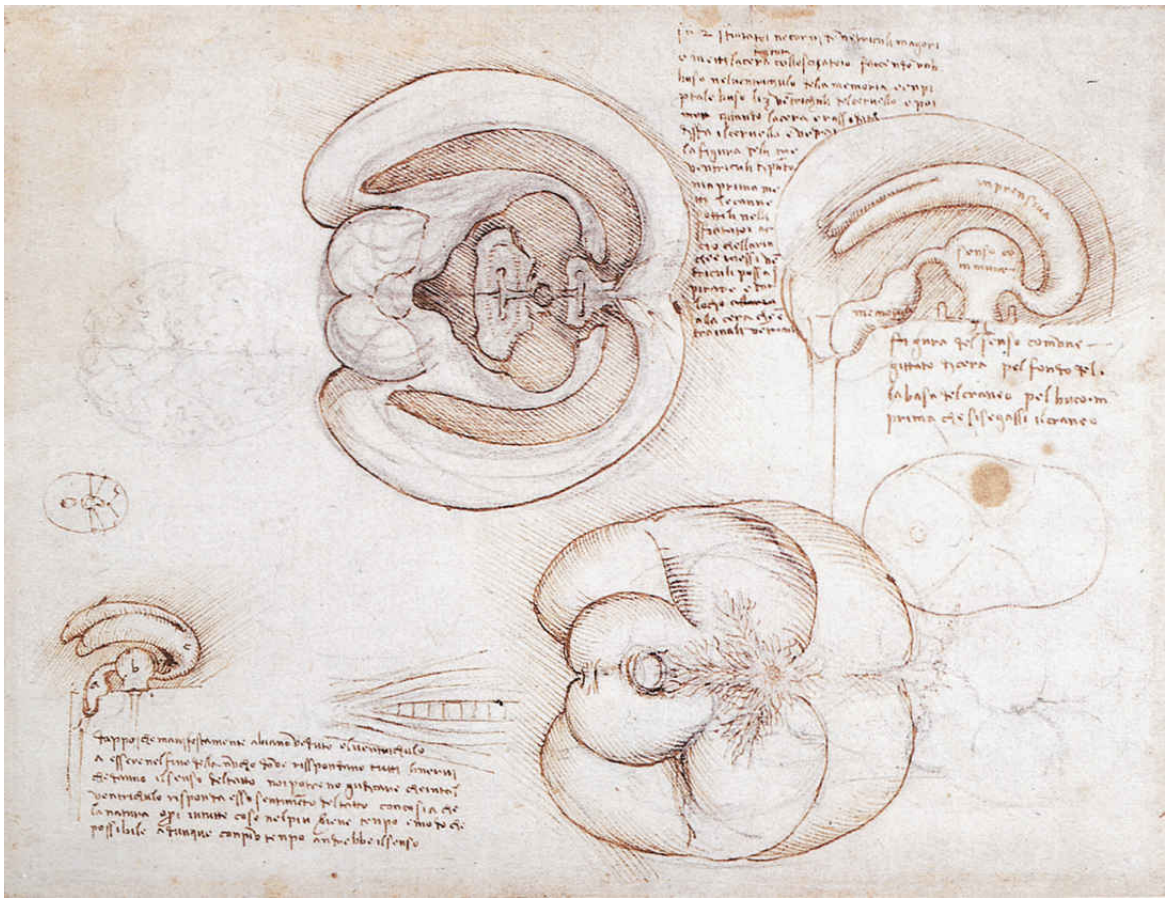


FIGURE 1.8

Da Vinci and the Brain

This drawing by Leonardo da Vinci dates from around 1506. Da Vinci used a wax cast to study the brain. He believed that sensory images arrived in the middle region of the brain. He called this region the *sensus communis*.

In the 1600s, the philosopher René Descartes promoted the influential theory of *dualism*. This term refers to the idea that the mind and the body are separate yet intertwined. In earlier views of dualism, mental functions had been considered the mind's sovereign domain, separate from body functions. Descartes proposed a somewhat different view. The body, he argued, was nothing more than an organic machine governed by "reflex." Many mental functions—such as memory and imagination—resulted from body functions. Deliberate action, however, was controlled by the rational mind. And in keeping with the prevailing religious beliefs, Descartes concluded that the rational mind was divine and separate from the body. Nowadays, psychologists reject dualism. In their view, the mind arises from brain activity, and the activities of the mind change the brain. The mind and brain do not exist separately.

Learning Tip

Students often confuse the mind/body problem and the nature/nurture debate. This is understandable because they are similar in some ways. Remember, however, that the mind/body problem speaks to the *separation of mental life and the body*. For instance, is an emotion separate from the brain that produces it? In contrast, the nature/nurture debate is about the *origin of mental life*. Is an emotion caused by genetics or culture (regardless of whether the emotion "lives" in the mind or brain)?

Other questions considered by the ancients are still explored by psychologists today. Greek philosophers such as Aristotle and Plato debated whether an individual's psychology is attributable more to *nature* or to *nurture*. That is, are psychological characteristics biologically innate? Or are they acquired through education, experience, and culture—the beliefs, values, rules, norms, and customs existing within a group of people who share a common language and environment? The nature/nurture debate has taken one form or another throughout psychology's history. Psychologists now widely recognize that nature and nurture dynamically interact in human psychological development. For example, consider a college basketball player who is very tall (nature) and has an excellent coach (nurture). That player has a better chance of excelling enough to become a professional player than does an equally talented player who has only the height or the coach. In many of the psychological phenomena you will read about in this book, nature and nurture are so enmeshed that they cannot be separated.

Why is it important for psychologists to pay attention to both nature and nurture?

Answer: They both contribute to our mental activity and behavior, individually and in interaction with each other.

Glossary

mind/body problem
: A fundamental psychological issue: Are mind and body separate and distinct, or is the mind simply the physical brain's subjective experience?

culture
: The beliefs, values, rules, norms, and customs that exist within a group of people who share a common language and environment.

nature/nurture debate
: The arguments concerning whether psychological characteristics are biologically innate or acquired through education, experience, and culture.

1.6 Mental Processes and Behaviors Serve Functions for Individuals and Groups

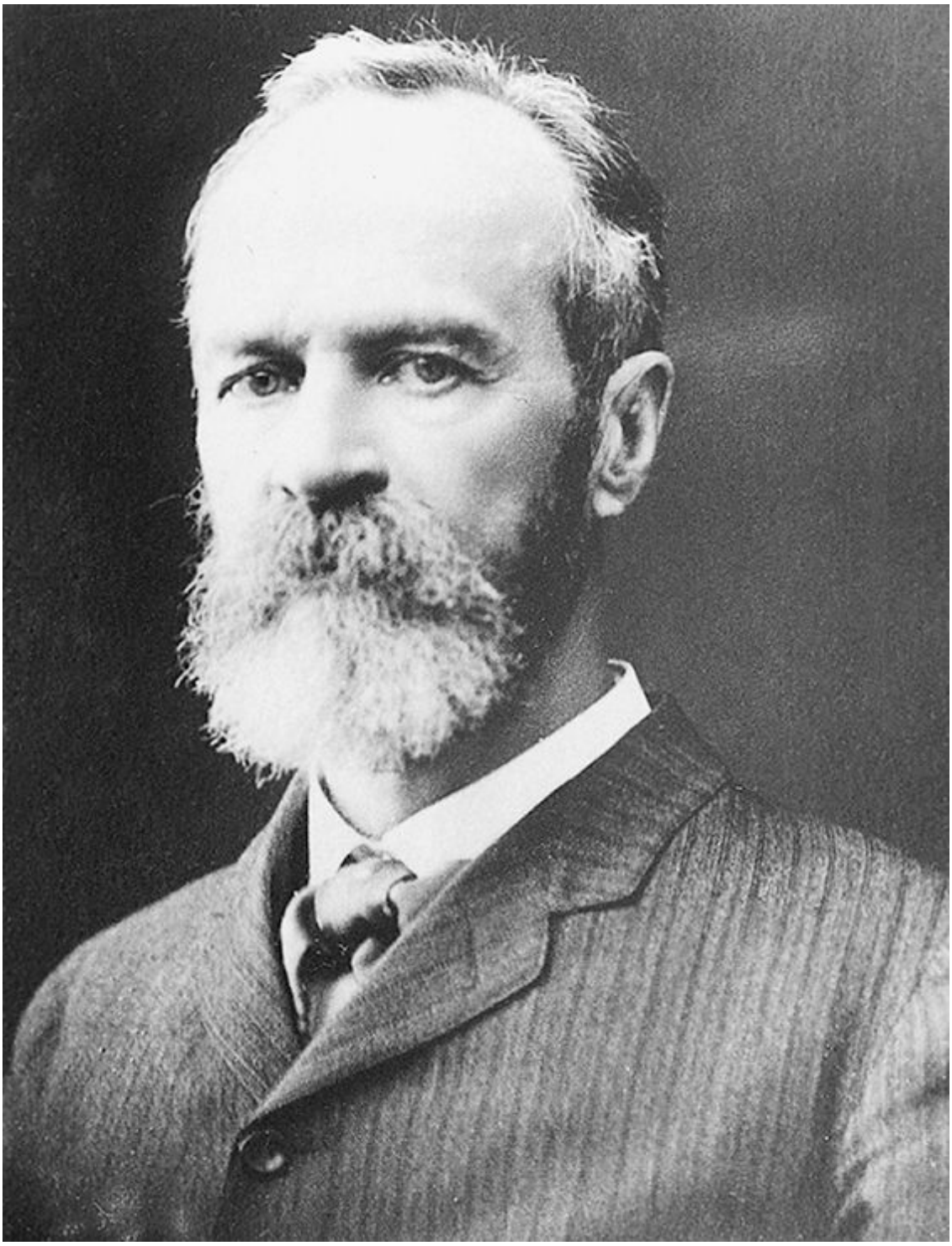


FIGURE 1.9

William James

In 1890, James published the first major overview of psychology. Many of his ideas have passed the test of time. In theorizing about how the mind works, he moved psychology

beyond considering minds as sums of individual units (e.g., a sensory part, an emotional part, and so forth) and into functionalism.

In the mid-1800s in Europe, psychology arose as a field of study built on the experimental method. In *A System of Logic* (1843), the philosopher John Stuart Mill declared that psychology should leave the realms of philosophy and speculation and become a science of observation and experiment. Indeed, he defined psychology as "the science of the elementary laws of the mind" and argued that only through the methods of science would the processes of the mind be understood. Throughout the 1800s, early psychologists increasingly studied mental activity through careful scientific observation.

If one person could be credited for laying the intellectual foundation for modern psychology, it would be William James, a brilliant scholar whose wide-ranging work has had an enormous, enduring impact on psychology (**FIGURE 1.9**). In 1873, James abandoned a career in medicine to teach physiology at Harvard University. In 1875, he gave his first lecture on psychology. (He later quipped that it was also the first lecture on psychology he had ever heard.) He was among the first professors at Harvard to openly welcome questions from students rather than have them listen silently to lectures. James also was an early supporter of women trying to break into the male-dominated sciences. He trained Mary Whiton Calkins, who was the first woman to set up a psychological laboratory and was the first woman president of the American Psychological Association (**FIGURE 1.10**).

FIGURE 1.10

Mary Whiton Calkins

Calkins was an important early contributor to psychological science. In 1905, she became the first woman president of the American Psychological Association.

James's personal interests were more philosophical than physiological. He was captivated by the nature of conscious experience. To this day, psychologists find rich delight in reading James's penetrating analysis of the human mind, *Principles of Psychology* (1890). It was the most influential book in the early history of psychology, and many of its central ideas have held up over time.

A core idea James had that remains a central pillar of psychology today is that the mind is much more complex than its elements and therefore cannot be broken down. For instance, he noted that the mind consists of an ever-changing, continuous series of thoughts. This stream of consciousness is the product of interacting and dynamic stimuli coming from both inside our heads, such as the decision of what to have for lunch, and outside in the world, such as the smell of pie wafting from downstairs. Because of this complexity, James argued, the mind is too complex to understand merely as a sum of separate parts, such as a decision-making unit, a smelling unit, and so forth. Trying to understand psychology like that, he said, would be like people trying to understand a house by studying each of its bricks individually. More important to James was that the bricks together form a house and that a house has a particular function (i.e., as a place where you can live). The mind's elements matter less than the mind's usefulness to people.

James argued that psychologists ought to examine the functions served by the mind—how the mind operates. According to his approach, which became known as functionalism, the mind came into existence over the course of human evolution. It works as it does because it is useful for preserving life and passing along genes to future generations. In other words, it helps humans *adapt* to environmental demands.

Nowadays, psychologists take for granted that any given feature of human psychology serves some kind of purpose. Some features, particularly those that are common to all humans (e.g., sensation and perception), are likely to have evolved through the evolutionary process of natural selection, by which features that are adaptive (that facilitate survival and reproduction) are passed along and those that are not adaptive (that hinder survival and reproduction) are not passed along. Language is a good example, as it is easy to see how the ability to represent and communicate ideas in social groups would be beneficial for human survival: just try communicating to your brother without using words that the third tree on the left about a quarter of a mile down the road has the best apples. Other features, particularly those that are specific to a culture or an individual, probably did not evolve through natural selection but might still be functional. Cultural traditions, such as religious rules against eating certain types of foods, or personal quirks, such as nail biting, are viewed within psychology as "functional" in the sense that they arose to solve a problem: Food prohibitions can protect against illness, and nervous habits can be ways people learn to reduce their anxiety.

Q

According to William James's functionalism, why should psychologists focus on the operations of the mind?

Answer: The mind is too complex to understand as a sum of separate parts.

Glossary

stream of consciousness
: A phrase coined by William James to describe each person's continuous series of ever-changing thoughts.

functionalism
: An approach to psychology concerned with the adaptive purpose, or function, of mind and behavior.

natural selection
: In evolutionary theory, the idea that those who inherit characteristics that help them adapt to their particular environments have a selective advantage over those who do not.

1.7 The Field of Psychology Spans the Range of Human Experience

Psychologists are interested in mental phenomena ranging from basic sensory and brain processes to abstract thoughts and complex social interactions (**FIGURE 1.11**). Those topics are universal to humans, but the way we experience sensations, thoughts, feelings, and so forth can vary dramatically within an individual person and across people. Consider, for example, your own emotional range within a day when you were a toddler compared to now, or what a refugee of the Syrian civil war would consider to be a stressful event compared with a typical North American undergraduate student.

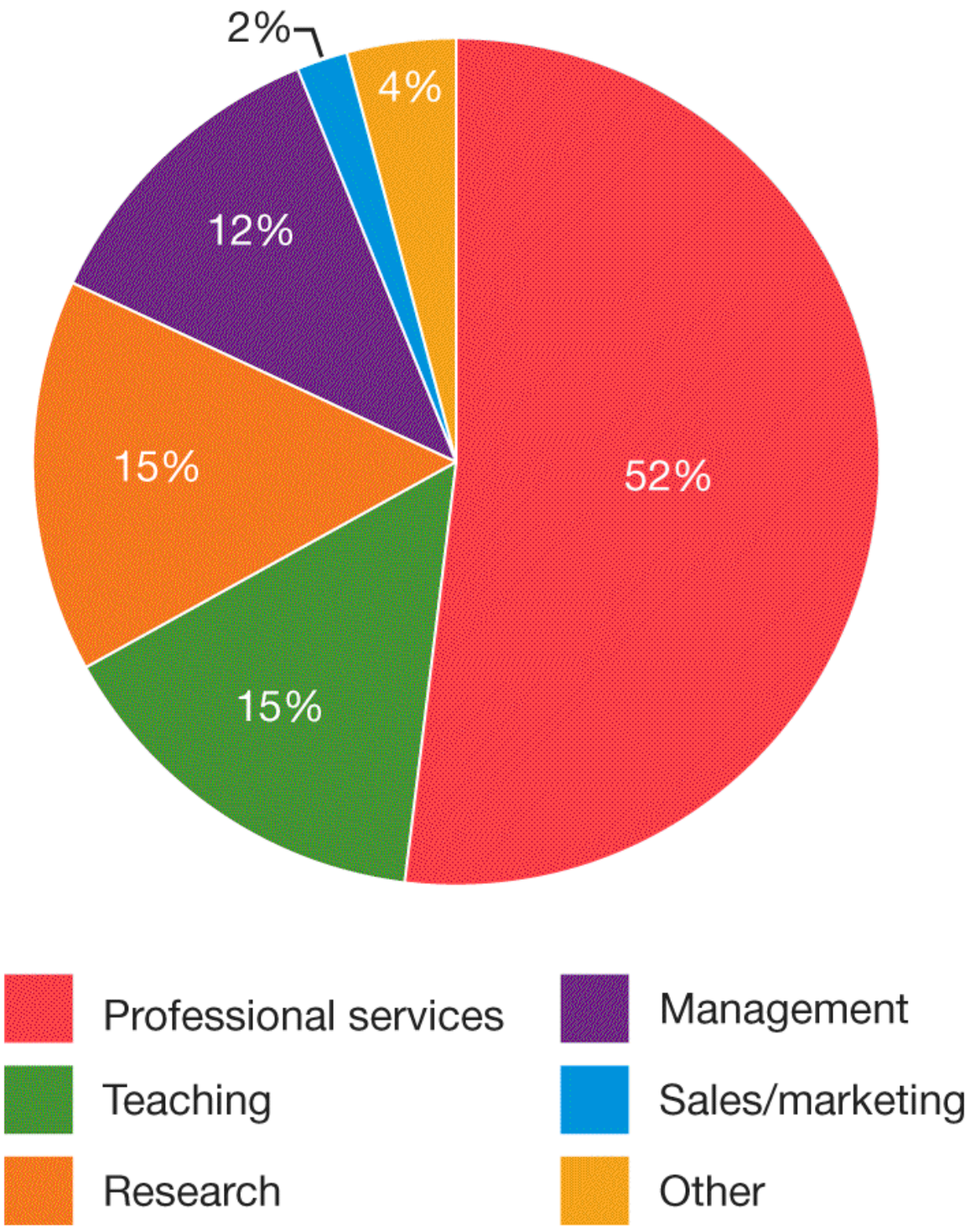


FIGURE 1.11

Employment Settings for Psychologists

This chart shows the types of settings where psychologists work, based on a survey of those obtaining a doctorate or professional degree in psychology in 2017 (American Psychological Association, 2018).

After decades of focusing on a relatively narrow slice of the world population, the field of psychology is finally beginning to increase its diversity and inclusion. The field views as critical to its mission not only racial, ethnic, and cultural diversity but also diversity in terms of age, ability, gender identity, sexual orientation, socioeconomic status, and immigration status, among other features. As part of this shift toward a broader and more central view of diversity and inclusion, the field is moving away from viewing cultural psychology as an area unto itself. Culture and many other forms of diversity are becoming integral to all areas of psychology as researchers learn that key developmental, social, personality, cognitive, and clinical phenomena can vary considerably as a function of culture and personal experiences. The internet allows researchers to gather data from across the globe, and it is becoming more and more common for research projects to feature samples from several and even dozens of countries. Many psychology departments now ask applicants to professor positions to include as part of the application package a statement about how their research considers diversity and inclusion. The field still lacks diversity in many ways, but this progress shows that there is motivation to change.

Psychologists began to specialize in specific areas of research as the kinds of human experiences under investigation by psychological science broadened over the years. **Table 1.1** describes some of the most popular areas of specialization in psychology. The psychology departments at most universities have clusters of professors in several of these areas. Some departments offer master's and doctorate degrees with these specializations.

Table 1.1 Areas of Specialization in Psychology

AREA	**FOCUS**	**SAMPLE QUESTIONS**	**CHAPTER**
Clinical	The area of psychology that seeks to understand, characterize, and treat mental illness is called **clinical psychology**. Clinical psychology is one of the most common specializations in the field. Advanced degrees in clinical psychology focus on research, clinical work/therapy, or a blend of the two.	Are there underlying psychological or biological causes across different mental disorders? What are the most effective ways to treat personality disorders? Can mindfulness meditation reduce psychological distress in	14 15

		anxiety disorders?	
Cognitive	Laboratory research in **cognitive psychology** aims to understand the basic skills and processes that are the foundation of mental life and behavior. Topics such as attention, memory, sensation, and perception are within the scope of cognitive psychology.	Why is multitasking harder than working on tasks one after the other? How does damage in particular areas of the brain alter color perception but not motion perception? Do some people learn more quickly than others to associate cause and effect?	3 4 5 6 7 8
Cultural	**Cultural psychology** studies how cultural factors such as geographical regions, national beliefs, and religious values can have profound effects on mental life and behavior. A major contribution of cultural psychology is to highlight the profound ways that the samples used in psychological studies can influence the results and their implications. Cultural psychology is the area most closely linked to the adjacent fields of sociology and anthropology.	Why does the southern United States have the highest rate of per capita gun violence in the country? Do people think of themselves in fundamentally different ways depending on where they were raised? Does thinking about a forgiving	1 2

		versus vengeful deity influence moral behavior such as lying?	
Developmental	**Developmental psychology** studies how humans grow and develop from the prenatal period through infancy and early childhood, through adolescence and early adulthood, and into old age. Developmental psychology encompasses the full range of topics covered by other areas in psychology, focusing on how experiences change across the life span and the periods in life when they are particularly important.	How does stress experienced by the mother alter the developing immune system of a fetus in utero? Why do children learn languages more easily than adults? In what ways is risk-taking functional for adolescents as they seek to establish themselves in new social groups?	9
Health	**Health psychology** is concerned with how psychological processes influence physical health and vice versa. Psychological factors such as stress, loneliness, and impulsivity can powerfully influence a range of health disorders and even mortality. In contrast, optimism, social support, and conscientiousness can promote healthy behaviors.	How can strong friendships protect or "buffer" us from the harmful effects of stress? Does memory training help people resist temptations such as excessive	11

		alcohol or tobacco use? When does experiencing discrimination increase the likelihood of heart disease?	
Industrial/Organizational	**Industrial/organizational** (I/O) psychology explores how psychological processes play out in the workplace. This field is one of the more pragmatic specializations in psychology because it speaks to real-world problems such as dealing with interpersonal conflicts at work and organizational change. I/O psychology blends social-personality psychology approaches with principles from management, communication, and marketing. Research on I/O psychology happens in organizational settings as well as in psychology departments and business schools.	What are ways that organizations can increase employee motivation in stressful times? How can critical feedback be provided to managers so that it is gentle yet results in behavior change? What types of people should organizations hire into specialized versus more general roles?	
Relationships	The quality of our close relationships, including romantic partnerships and intimate friendships, is the most consistent predictor of overall happiness and well-being, and relationship issues are the most common reason people seek psychotherapy. **Close relationships**	What differentiates long-lasting marriages from those that end in early divorce? In what ways do romantic partners	12

	psychologists research our intimate relationships, properties that make them succeed or fail, and the two-way effects between intimate relationships and other aspects of our lives.	influence each other's goal pursuit? Is it important for relationship satisfaction that partners "match" on certain personality traits? If so, which ones?	
Social-Personality	**Social-personality psychology** is the study of everyday thoughts, feelings, and behaviors—and the factors that give rise to them. Social-personality psychology focuses on the situational and dispositional causes of behavior and the interactions between them. Social and personality psychology were once separate fields, but scholars from both sides now recognize that mental life and behavior cannot be fully understood without both pieces and their interaction.	How do people understand and explain other people's behaviors? What are the causes of stereotyping and prejudice and what are their effects on victims? Does personality remain stable across the life span? If not, in what ways does personality change as people age and why?	10 12 13

Which area of psychology specializes in understanding the thoughts, feelings, and behaviors of daily life?

Answer: social-personality psychology

Glossary

diversity and inclusion
: The value and practice of ensuring that psychological science represents the experiences of all humans.

What Are the Latest Developments in Psychology?

Learning Objectives

- Identify recent developments in psychological science.
- Explain how the science of learning can help your performance in class.

In the many decades since psychology was founded, researchers have made significant progress in understanding mind, brain, and behavior. As in all sciences, this wisdom progresses incrementally: As psychologists ask more questions about what is already known, new knowledge springs forth. During various periods in the history of the field, new approaches have transformed psychology, such as when William James prompted psychologists to collect data to study minds. We do not know what approaches the future of psychology will bring, but this section outlines some of the developments that contemporary psychologists are most excited about.

1.8 Biology Is Increasingly Emphasized in Explaining Psychological Phenomena

Recent decades have seen remarkable growth in the understanding of the biological bases of mental activities. This section outlines three major advances that have helped further the scientific understanding of psychological phenomena: developments in neuroscience, progress in genetics and epigenetics, and advances in immunology and other peripheral systems.

BRAIN IMAGING There is a very long history of brain science in psychology. Since ancient times, people have recognized that alterations to the soft mass of tissue between our ears can cause profound changes in mind and behavior. Pioneers such as Pierre Paul Broca discovered that damage to specific regions can correspond to specific changes in parts of our psychology, such as speech and language. But technology such as electroencephalography (EEG), which measures changes in electrical activity, and now devices that measure subtle changes in the magnetic field caused by changes in blood flow have significantly accelerated progress in brain science.

One method, functional magnetic resonance imaging (fMRI), enables researchers to study the working brain as it performs its psychological functions in close to real time (**FIGURE 1.12**). Since its development, the progress in understanding the neural basis of mental life has been rapid and dramatic. Knowing where in the brain something happens does not by itself reveal much. However, when consistent patterns of brain activation are associated with specific mental tasks, the activation appears to be connected with the tasks. Earlier scientists disagreed about whether psychological processes are located in specific parts of the brain or are distributed throughout the brain. Research has made clear that there is some *localization* of function. That is, different areas of the brain are specialized for different functions, such as language, control over behavior, and abstract thinking.

FIGURE 1.12

fMRI

Functional magnetic resonance imaging (fMRI) can reveal changes in brain activation in response to different mental processes.

However, many brain regions have to work together to produce complex behaviors and mental activity. One of the greatest contemporary scientific challenges is mapping out how various brain regions are connected and how they work together to produce mental activity. To achieve this mapping, the *Human Connectome Project* was launched in 2010 as a major international research effort involving collaborators at a number of universities. A greater understanding of brain connectivity may be especially useful for understanding how brain circuitry changes in psychological disorders (**FIGURE 1.13**).

FIGURE 1.13

Brain Connectivity

Psychologist Damien Fair received a MacArthur "Genius" Fellowship for his research on the ways parts of the brain are connected to each other and how those patterns of connectivity relate to disorders in children and adolescents.

Neuroscience approaches, such as fMRI, were originally used to study basic psychological processes, such as how people see or remember information. Today, such techniques are used to understand a wide range of phenomena, from how emotions change during adolescence (Silvers et al., 2017), to how people process information regarding social groups (Freeman & Johnson, 2016), to how thinking patterns contribute to depression (Hamilton et al., 2015).

GENETICS AND EPIGENETICS The *human genome* is the basic *genetic code*, or blueprint, for the human body. For psychologists, this map represents the foundational knowledge for studying how specific genes—the basic units of hereditary transmission—affect thoughts, actions, feelings, and disorders. By identifying the genes involved in memory, for example, researchers might eventually be able to develop treatments, based on genetic manipulation, that will assist people who have memory problems.

Meanwhile, the scientific study of genetic influences has made clear that though nearly all aspects of human psychology and behavior have at least a small genetic component, very few single genes cause specific behaviors. Combinations of genes can predict certain psychological characteristics, but the pathways of these effects are mostly unknown. Adding to the complexity of this picture, a number of biological and environmental processes can influence how genes are expressed (for example, which genes get "turned on" and when) without changing the genetic code itself. Epigenetics is the study of the ways these environmental mechanisms can get "under the skin," particularly in early life, to influence our mind and behavior.

IMMUNOLOGY AND OTHER PERIPHERAL SYSTEMS Scientists have made enormous progress in understanding how the immune system protects our bodies and interacts with other systems that respond to stress, regulate our digestion, and metabolize energy. And all of these systems interact with brain function, structure, and development in fascinating ways. For psychologists, this knowledge reveals the deep and multilayered connections between our minds and other systems previously thought to be relatively independent. Some recent discoveries have transformed how psychologists conceive of stress, pain, and even depression (Alfven et al., 2019; Peirce & Alviña, 2019).

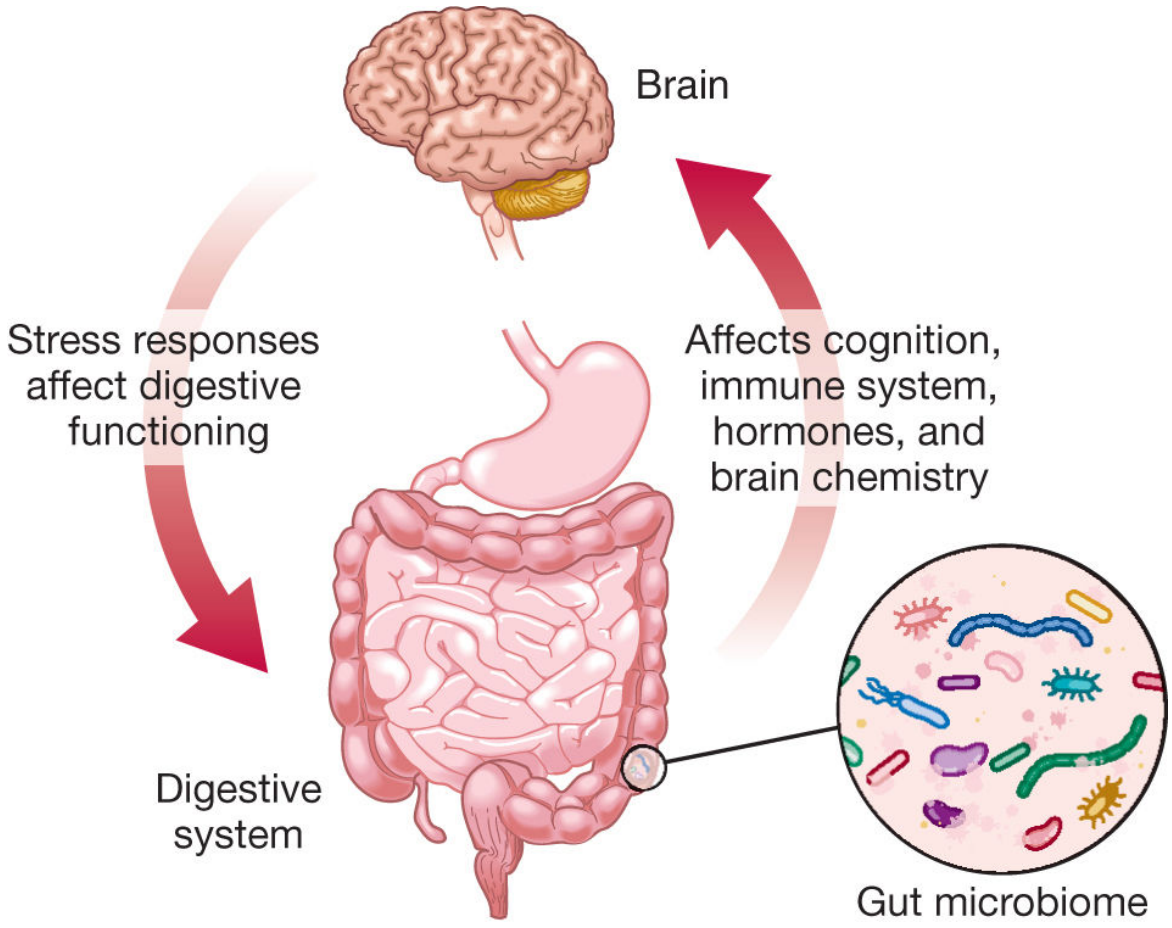


FIGURE 1.14

Gut-Brain Axis

Peripheral systems in the body, including the digestive system shown here, have two-way communication with the brain.

One particularly active area of research in psychology explores the two-way relation between the *gut microbiome*, the billions of microorganisms that live in our digestive tract, and our mind and behavior. Rapidly emerging science on the *gut-brain axis* reveals that the composition and diversity of these microorganisms can alter, and be altered by, the way our bodies respond to stress, mount an immune response, and direct attention (Foster et al., 2017; **FIGURE 1.14**). Through its complex interactions with the immune and metabolic systems, hormones, and neurotransmitters, the gut microbiome has a role in a variety of health conditions including irritable bowel syndrome, autism spectrum disorders, and anxiety.

Biological data can provide a unique window into understanding human psychology. But keep in mind that human psychology is the product of many factors beyond just biological ones. Our early experiences, our genes, our close relationships, our brains, and our cultures all contribute to who we are and what we do.

Q

What does brain imaging help psychologists study?

Answer: localization of mental activity

Glossary

epigenetics
: The study of biological or environmental influences on gene expression that are not part of inherited genes.

1.9 Psychology Is a Computational and Data Science

The widespread availability of very fast computers, low storage costs, and the internet connecting it all has transformed the way psychologists do their jobs. What began as a handy technological tool is now an integral part of the way psychologists gather, share, and analyze their data. Psychology is part of the "data science" revolution in at least three ways.

COMPUTATIONAL MODELING During the first half of the twentieth century, psychology was largely focused on studying observable behavior to the exclusion of mental events such as thoughts and feelings, an approach known as behaviorism. Evidence slowly emerged, however, that learning is not as simple as the behaviorists believed it to be. Research across psychology in memory, language, and development showed that the simple laws of behaviorism could not explain, for example, why culture influences how people remember a story, why grammar develops systematically, and why children interpret the world in different ways during different stages of development. All of these findings suggested that psychologists would need to study people's mental functions and not just their overt actions to understand behavior.

FIGURE 1.15

George A. Miller

In 1957, Miller launched the cognitive revolution by establishing the Center for Cognitive Science at Harvard University.

To address this need, the psychologist George A. Miller and his colleagues launched the *cognitive revolution* in psychology (**FIGURE 1.15**) in the 1950s. In 1967, Ulric Neisser integrated a wide range of cognitive phenomena in his book *Cognitive Psychology*. This classic work named and defined the field and fully embraced the mind, which the behaviorist B. F. Skinner had argued was "fictional" (Skinner, 1974). (Radical behaviorism held that unobservable mental events are part of behavior, not its cause.)

The cognitive revolution was accelerated by the computer age. Psychologists learned how to use simple computerized tasks to indirectly measure some components of cognition, including attention,

working memory, inhibitory control, and reward learning. At first, the data extracted from these tasks were relatively simple measures such as reaction times and error rates. Now psychologists use computers to help build and test mathematical models of behavior that capture some of the important but invisible factors that underlie it. Just as mathematical models help physicists estimate the force of gravity using equations that describe the motion of the planets (**FIGURE 1.16**), computational models help psychologists understand processes such as a person's ability to learn about rewards. As these tools continue to develop, they will sharpen psychologists' ability to look inside the black box of the mind with increasing precision.

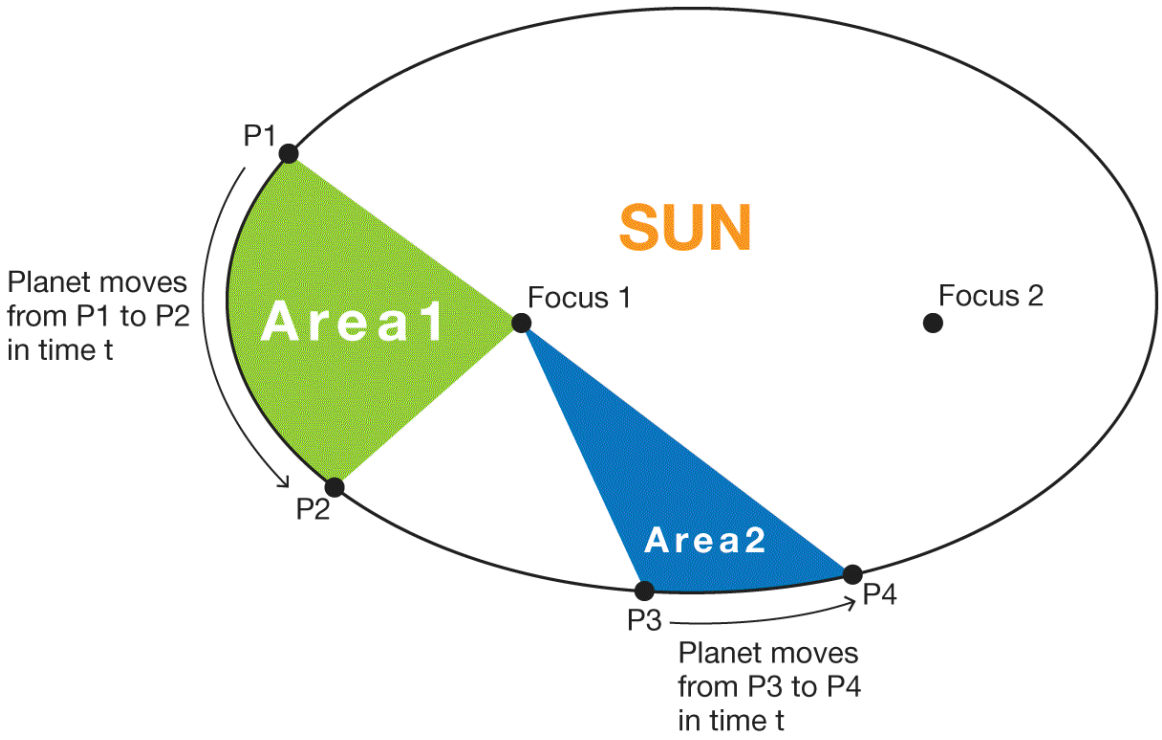


FIGURE 1.16

Computational Modeling

Computers can solve mathematical models that describe the motion of the planets and the invisible properties of thought.

BIG DATA The computer that guided the *Apollo 11* flight to the moon in 1969 had about 72 kilobytes of memory, which is about enough memory for 0.2 seconds of a typical YouTube video. Zoom forward to today, when about 300 hours of video are uploaded to YouTube every minute. The world is awash in data, and much of them are directly relevant to psychological questions. Psychologists are partnering with computer scientists to answer some of those questions using data available online from sources such as social media platforms, electronic medical records, and—yes—even YouTube.

The big data approach uses tools from the computer science world, such as data mining and machine learning, to identify complex patterns in large data sets. These new methods have allowed psychologists to study topics such as ethnic discrimination in geographical regions based on Google searches, risk of alcoholism using specific combinations of genes or gene expressions, and personality profiles gleaned from activity on Twitter. The availability of very large data sets has also increased the

diversity of the samples used in psychology research. At the same time, these methods are not without controversy. For instance, critics have questioned the ethics of using data that were originally collected for one purpose to answer different research questions. As big data moves forward, it is clear that the technology is advancing faster than our capacity to understand its implications. The related and equally important field of data ethics grapples with issues of privacy, equal access to information, and how much we can control information about ourselves.

REPLICABILITY, OPEN SCIENCE, AND DATA SHARING One of the features of a good scientific study is replicability, meaning that the results would be more or less the same if someone ran the study again. There is an unavoidable element of chance in psychological science because studies use small groups of people, or samples, to make inferences about larger groups of individuals. So, it is always possible that something about the particular sample or the details of how a study was run might cause a study not to replicate in a new sample. Psychologists have known about this possibility for a very long time and have taken measures to prevent it. Even so, a large-scale study by the Open Science Collaboration surprised the field in revealing that less than half of a sample of experiments in prominent psychology journals replicated (Open Science Collaboration, 2015). This and similar disturbing results prompted a movement to adopt reforms to increase the reliability of the results in the field.

FIGURE 1.17

Open Science

Open science emphasizes research transparency and data accessibility. Psychologists have developed tools to help promote open science at all phases of the research process.

In the ensuing years, the field coalesced around an open science movement to improve the methods used in psychological science by making research plans and designs more transparent, documenting failed studies, and sharing data among researchers, among other steps (**FIGURE 1.17**). These steps have been adopted with enthusiasm by scientists in the field. The number of psychologists using best practices, such as writing down or publishing their research plans at the beginning of a study and allowing other people access to their data, has increased each year (Nosek & Lindsay, 2018). This textbook features studies that have replicated or would likely replicate based on the rigor of their

methods. Chapter 2 describes some of the best practices for psychological research that emerged as part of the open science movement.

Among the benefits of the open science movement is a shift in norms about data sharing in psychology. It is now increasingly expected that researchers share original, anonymous data from experiments, and numerous internet platforms have sprung up to facilitate this access. These platforms host data from all areas of psychology, from lab experiments to developmental psychology studies to neuroimaging repositories. With some help from colleagues in computer science, psychological scientists are learning to combine data from these growing databases to conduct some of the most powerful and inclusive studies in the history of psychology.

What is data ethics?

Answer: the branch of philosophy examining ethical questions around the collection, use, and sharing of human data

Glossary

behaviorism
: A psychological approach that emphasizes environmental influences on observable behaviors.

big data
: Science that uses very large data sets and advanced computational methods to discover patterns that would be difficult to detect with smaller data sets.

data ethics
: The branch of philosophy that addresses ethical issues in data sciences, including data accessibility, identifiability, and autonomy.

replicability
: The likelihood that the results of a study would be very similar if it were run again.

open science movement
: A social movement among scientists to improve methods, increase research transparency, and promote data sharing.

1.10 Culture Provides Adaptive Solutions

Through evolution, specialized mechanisms and adaptive behaviors have been built into our bodies and brains. For instance, a mechanism that produces calluses has evolved, protecting the skin from the abuses of physical labor.

Likewise, specialized circuits have evolved in the brain to address the most demanding adaptive challenges we face, many of which involve dealing with other people (Mills et al., 2014). These challenges include selecting mates, cooperating in hunting and in gathering, forming alliances, competing for scarce resources, and even warring with neighboring groups. This dependency on group living is not unique to humans, but the nature of interactions within and between groups is especially complex in human societies. The complexity of living in groups gives rise to culture, and culture's various aspects are transmitted from one generation to the next through learning. For instance, musical preferences, some food preferences, subtle ways of expressing emotion, and tolerance of body odors are affected by the culture one is raised in. Many of a culture's "rules" reflect adaptive solutions worked out by previous generations.

Human cultural evolution has occurred much faster than human biological evolution, and the most dramatic cultural changes have come in the past few thousand years. Although humans have changed only modestly in physical terms in that time, they have changed profoundly in regard to how they live together. Even within the past century, dramatic changes have occurred in how human societies interact. The flow of people, commodities, and financial instruments among all regions of the world, often referred to as *globalization*, has increased in velocity and scale in ways that were previously unimaginable. Even more recently, the internet has created a worldwide network of humans, essentially a new form of culture with its own rules, values, and customs.

Over the past two decades, recognition has grown that culture plays a foundational role in shaping how people view and reason about the world around them—and that people from different cultures possess strikingly different minds (Heine, 2015). For example, the social psychologist Richard Nisbett and his colleagues (2001) have demonstrated that people from most European and North American countries are much more analytical than people from most Asian countries. Westerners break complex ideas into simpler components, categorize information, and use logic and rules to explain behavior. Easterners tend to be more holistic in their thinking, seeing everything in front of them as an inherently complicated whole, with all elements affecting all other elements (**FIGURE 1.18**).

(a)

(b)

FIGURE 1.18

Cultural Differences

(a) Westerners tend to be "independent" and autonomous, stressing their individuality. **(b)** Easterners—such as this Cambodian family—tend to be more "interdependent," stressing their sense of being part of a collective.

The culture in which people live shapes many aspects of their daily lives. Pause for a moment and think about the following questions: How do people decide what is most important in their lives? How do people relate to family members? to friends? to colleagues at work? How should people spend their leisure time? How do they define themselves in relation to their own culture—or across cultures?

Culture shapes beliefs and values, such as the extent to which people should emphasize their own interests versus the interests of the group. This effect is more apparent when we compare phenomena across cultures. Culture instills certain rules, called *norms*, which specify how people ought to behave in different contexts. For example, norms tell us not to laugh uproariously at funerals and to keep quiet in libraries. Culture can influence our biology by altering our behavior. For instance, diet is partly determined by culture, and some diets have epigenetic effects. Culture also has material aspects, such as media, technology, health care, and transportation. Many people find it hard to imagine life without computers, televisions, cell phones, and cars. We also recognize that each of these inventions has changed the fundamental ways in which people interact. Historical and social changes can have similar effects. For instance, the increased participation of women in the workforce has changed the nature of contemporary Western culture in numerous ways, from a fundamental change in how women are viewed to more practical changes, such as people marrying and having children later in life, a greater number of children in day care, and a greater reliance on convenient, fast foods.

Q

What are cultural norms?

Answer: socially upheld rules regarding how people ought to behave in certain situations

1.11 Psychological Science Crosses Levels of Analysis

Four broadly defined levels of analysis reflect the most common research methods for studying mind and behavior (**FIGURE 1.19**). The *biological level of analysis* deals with how the physical body contributes to mind and behavior (such as through the chemical and genetic processes that occur in the body). The *individual level of analysis* focuses on individual differences in personality and in the mental processes that affect how people perceive and know the world. The *social level of analysis* involves how group contexts affect the ways in which people interact and influence each other. The first three together are sometimes referred to as the biopsychosocial model. On top of that is the *cultural level of analysis*, which explores how people's thoughts, feelings, and actions are similar or different across cultures. Differences between cultures highlight the role that cultural experiences play in shaping psychological processes, whereas similarities between cultures reveal evidence for universal phenomena that emerge regardless of cultural experiences.

	LEVEL	FOCUS	WHAT IS STUDIED?
	Biological	Brain systems Neurochemistry Genetics	Neuroanatomy, animal research, brain imaging Neurotransmitters and hormones, animal studies, drug studies Gene mechanisms, heritability, twin and adoption studies
	Individual	Individual differences Perception and cognition Behavior	Personality, gender, developmental age groups, self-concept Thinking, decision making, language, memory, seeing, hearing Observable actions, responses, physical movements
	Social	Interpersonal behavior Social cognition	Groups, relationships, persuasion, influence, workplace Attitudes, stereotypes, perceptions
	Cultural	Thoughts, actions, behaviors—in different societies and cultural groups	Norms, beliefs, values, symbols, ethnicity

FIGURE 1.19

Levels of Analysis

Studying a psychological phenomenon at one level of analysis (e.g., behavioral or neural data alone) has traditionally been the favored approach, but these days researchers have started to explain behavior at several levels of analysis. By crossing levels in this way, psychologists are able to provide a more complete picture of mental and behavioral processes.

To understand how research is conducted at the different levels, consider the many ways psychologists have studied listening to music (Hallam et al., 2016). Why do you like some kinds of music and not others? Do you prefer some types of music when you are in a good mood and other types when you are in a bad mood? If you listen to music while you study, how does it affect how you learn?

At the biological level of analysis, for instance, researchers have studied the effects of musical training. They have shown that training can change not only how the brain functions but also its anatomy, such as by changing brain structures associated with learning and memory (Herdener et al., 2010). Interestingly, music does not affect the brain exactly the way other types of sounds, such as the spoken word, do. Instead, music recruits brain regions involved in a number of mental processes, such as those involved in mood and memory (Levitin & Menon, 2003; Peretz & Zatorre, 2005). Music appears to be treated by the brain as a special category of auditory information. For this reason, patients with certain types of brain injury become unable to perceive tones and melody but can understand speech and environmental sounds perfectly well.

Working at the individual level of analysis, researchers have used laboratory experiments to study music's effects on mood, memory, decision making, and various other mental states that exist within an individual person (Levitin, 2006). In one study, music from participants' childhoods evoked specific memories from that period (Janata, 2009; **FIGURE 1.20**). Moreover, music affects emotions and thoughts. Listening to sad background music leads young children to interpret a story negatively, whereas listening to happy background music leads them to interpret the story much more positively (Ziv & Goshen, 2006). Our cognitive expectations also shape how we experience music (Collins et al., 2014).

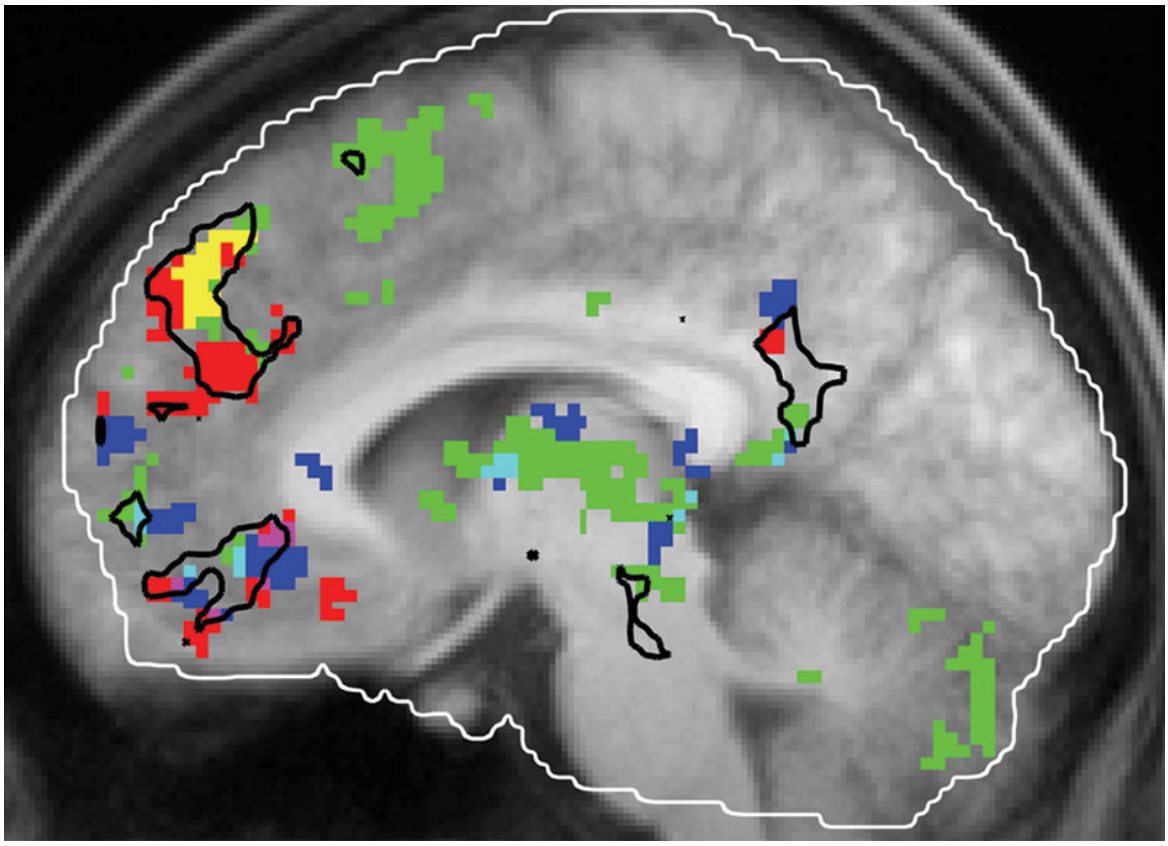


FIGURE 1.20

Your Brain on Music

The researcher Petr Janata played familiar and unfamiliar music to study participants. Activity in green indicates familiarity with the music, activity in blue indicates emotional reactions to the music, and activity in red indicates memories from the past. The yellow section in the frontal lobe links together familiar music, emotions, and memories.

A study of music at the social level of analysis might investigate how the effect of music changes or the types of music people prefer change when they are in groups compared with when they are alone. For example, music reduces stress regardless of context but especially when enjoyed in the presence of others (Linnemann et al., 2016). Romantic partners can also influence the way we experience music. For example, in heterosexual couples, men experience more stress reduction from listening to music than their partners do, particularly when the two individuals have shared music preferences (Wuttke-Linnemann et al., 2019).

The cross-cultural study of music preferences has developed into a separate field, *ethnomusicology*. One finding from this field is that African music has rhythmic structures different from those in Western music (Agawu, 1995), possibly because of the important role of dancing and drumming in many African cultures. Because musical preferences differ across cultures, some psychologists have noted that attitudes about outgroup members can color perceptions of their musical styles. For example, researchers from the United States and the United Kingdom found that societal attitudes toward rap and hip-hop music revealed subtle prejudicial attitudes against Black people and a greater willingness to discriminate against them (Reyna et al., 2009).

Combining the levels of analysis usually provides more insights than working within only one level. Psychologists may also collaborate with researchers from other scientific fields, such as biology, computer science, physics, anthropology, and sociology. Such collaborations are called *interdisciplinary*. For example, psychologists interested in understanding the hormonal basis of obesity might work with geneticists exploring the heritability of obesity as well as with social psychologists studying human beliefs about eating. Throughout this book, you will see how this multilevel, multidisciplinary approach has led to breakthroughs in understanding psychological activity.

Suppose a research study explores people's memory for song lyrics. At what level of analysis are the researchers working?

Answer: the individual level

Glossary

biopsychosocial model
: An approach to psychological science that integrates biological factors, psychological processes, and social-contextual influences in shaping human mental life and behavior.

1.12 Psychological Education Embraces the Science of Learning

The study of how people learn and retain new information is one of the oldest and most robust areas of research in psychology. It is only appropriate, then, that psychologists would apply this knowledge when teaching students about their field. Throughout this book, we highlight some of the tips and tricks that psychologists have discovered to improve how people study and learn. The learning-science principles identified in psychology research can be effective in many contexts in and out of the classroom, so you should put them to good use in all of your courses and in whatever career you ultimately choose. These topics and the science behind them are covered in depth in Chapter 6.

Despite a long history of studying learning in the lab, psychologists have only recently found ways to translate those results into the world of education (Roediger, 2013). However, some of the most effective learning strategies are easy to deploy and have been put to use in classrooms, benefiting students of all ages (Dunlosky et al., 2013). The following are among the most effective strategies, and they are put into practice in this text where possible.

DISTRIBUTED PRACTICE At some point in their college career, most students learn by experience that cramming for an exam is an ineffective way to study (**FIGURE 1.21**). Distributed practice—learning material in bursts over a prolonged time frame—is the opposite of cramming and is one of the best ways to learn (Benjamin & Tullis, 2010). Why does distributed practice work? It might be that the extra work it takes to remember material you learned before switching to something else is beneficial. It might also be the case that after the initial study period, each time you study the material you are reminded of that first time. Distributed practice might also promote better learning because every time you pull up a memory and then remember it again, it gets stronger.

FIGURE 1.21

Distributed Practice

Distributing practice sessions across time is one of the proven ways to increase memory. The student shown cramming in this photo is missing an opportunity to benefit from distributed practice.

RETRIEVAL, OR TESTING It turns out that tests are not only good for figuring out whether you know something. Being tested on material can actually help you learn that material better, an effect known as retrieval-based learning. Repeatedly recalling content from memory makes that content stick in your mind better and longer (Karpicke, 2012). Part of the reason is that getting information into your head is only the first part of learning. You then need to *retrieve* that information to be able to make use of it. Testing and other forms of retrieval-based learning are ways to practice that second part, thereby teaching yourself how to call up the information stored in memory. The questions and practice tests throughout this book and online are there to help you practice retrieval.

ELABORATIVE INTERROGATION Asking "Why?" can help you learn, especially when the material to be learned is factual knowledge, such as many of the psychological phenomena described in this book. Elaborative interrogation—thinking through why a fact is true, or why it is true in some cases but not others—helps you link the new fact to existing knowledge in your mind and integrate it into your understanding of the world. In this book, we frequently describe why something is true of human psychology or behavior, but elaborative interrogation is even more effective when the learner (you!) reasons through why something might be true. This process is the inspiration for the "You Be the Psychologist" feature in each chapter.

The features in this book have been shown to facilitate learning in other ways. For instance, the "You Be the Psychologist" feature will also engage you in self-explanation—reflecting on your learning process and trying to make sense of new material in your own terms. Another beneficial technique is interleaved practice, or switching between topics during studying instead of completing one topic before moving on to the next. Interleaving is one way to distribute study time, and it is additionally helpful because it forces you to compare and contrast different topics. This textbook is organized into chapters by topic, but research on interleaved practice suggests that you might consider jumping between topics in a couple of chapters as you go.

You might be surprised that some common techniques—including summarizing, rereading, and highlighting—do not usually improve learning (Dunlosky et al., 2013). If you find yourself reading this passage for a second time, we recommend taking a practice test instead or, better yet, taking a break for a day or two and coming back to test your knowledge then.

What learning technique would explain why teachers give quizzes that are not worth many points?

Answer: retrieval-or testing-based learning

Glossary

distributed practice
: Learning material in several bursts over a prolonged time frame.

retrieval-based learning
: Learning new information by repeatedly recalling it from long-term memory.

elaborative interrogation
: Learning by asking yourself why a fact is true or a process operates the way it does.

self-explanation
: Reflecting on your learning process and trying to make sense of new material in your own words.

interleaved practice
: Switching between topics during studying.

1.13 How Will Psychology Benefit You in Your Career?

Some students take introductory psychology courses because of a long-standing interest in people and the desire to learn more about what makes people, including themselves, tick. Others enroll because they wish to fulfill a general education requirement or because the class is a prerequisite for another course they are eager to take. Whatever *your* reason for being in this class, the things you will learn in this book will be highly relevant to multiple aspects of your life, including your chosen career.

Many careers involve interacting with coworkers, customers, clients, or patients (**FIGURE 1.22**). In these cases, understanding what motivates people, how to influence them, and how to support them is essential. For instance, a medical professional with interpersonal skills will create rapport with patients. Good rapport in turn encourages patients to be honest about their health behaviors, and the resulting disclosures may improve the practitioner's ability to accurately diagnose the patients' medical conditions. A rehabilitation nurse who understands the psychological challenges of complying with medical advice is better equipped to help patients respond to those challenges and thus improve. Given the many ways psychology is relevant to the medical field, it is not surprising that the Medical College Admission Test (MCAT), the standardized test required for admission to medical school, now includes an extensive 95-minute section on the psychological, social, and biological foundations of behavior.

(a)

(b)

FIGURE 1.22

Studying Psychology Develops Interpersonal Skills

Dealing with other people is an important part of most careers. **(a)** Medical professionals need to gauge people's moods and their motivations to recover. **(b)** Teachers need to understand people's behavior and how people learn.

Indeed, having a career that involves working with people (which is most careers!) means using psychology every day. Teachers manage their students' behavior and foster their motivation to learn. Police officers gather eyewitness reports, elicit confessions, and monitor the behavior of both individuals and crowds. People in sales, marketing, and branding craft messages, create campaigns, and help manufacturers increase the appeal of their products. Anyone who works on a team benefits from knowing how to play nice, engage in effective problem solving, and focus on the task at hand.

Other workers shape information or technology that will be used by consumers or the public. For the information or technology to be accessible and effective, these workers need to understand how people make sense of information and the psychological barriers to modifying existing beliefs or adopting new technologies. For example, an engineer who designs cockpits for airplanes benefits from knowing how human attention shifts during an emergency. A statistician who understands how people process visual cues is well equipped to create graphs that will help consumers make accurate impressions of the data.

What about someone who works with animals? A solid grasp of psychological topics, such as the biological basis of behavior, can help in the training and retraining of nonhuman creatures. For example, an animal trainer could use reinforcement techniques (discussed in Chapter 6) to motivate an injured animal to engage in physical therapy.

Psychology is even relevant to traditionally solo enterprises. Fiction writers create compelling characters, convey personalities, indicate psychological depth, depict interpersonal struggles, and evoke emotions in readers.

Though you do not need to be a psychology major for the lessons in this book to benefit your career, majoring in psychology is a good career move. The majority of graduating psychology majors go directly into the workforce, with a median starting salary in 2018 of $57,750 (National Association of Colleges and Employers, 2019). According to 2014 data by the U.S. Census Bureau, undergraduate psychology majors are employed in a wide variety of settings and fields. The largest concentrations are in social services, management, education, and health care. Other fields include computer technology, statistics, finance, arts and entertainment, and sales.

Whatever your chosen field, understanding psychology will help you understand yourself and thus help you do your job. And if you are thinking about a career in psychology or a related field, there is good news. According to the U.S. Department of Labor (U.S. Bureau of Labor Statistics, 2015), opportunities for people with graduate degrees in psychology are expected to grow approximately 19 percent by 2024. This outlook is equally positive around the globe. ■

Why would it be useful for a police detective to study psychology?

Answer: Possibilities include understanding people's motives for crime and knowing the limits of human memory

Your Chapter Review

 It's time to complete your study experience! Go to **INQUIZITIVE** to practice actively with this chapter's concepts and get personalized feedback along the way.

Chapter Summary

What Is Psychological Science?

1.1 Psychological Science Is the Study of Mind, Brain, and Behavior *Mind* refers to mental activity, which results from biological processes within the *brain*. *Behavior* describes the totality of observable human (or animal) actions. The term *psychologist* is used broadly to describe someone whose career involves understanding mental life or predicting behavior.

1.2 Psychological Science Teaches Critical Thinking Learning to think critically improves how people process information. Amiable skepticism requires a careful examination of how well evidence supports a conclusion. Using critical thinking skills and understanding the methods of psychological science are important for evaluating research reported in the popular media.

1.3 Psychological Science Helps Us Understand Biased or Inaccurate Thinking People engage in common biases in thinking. These biases probably evolved along with the ability to quickly categorize information and make decisions, but they often result in faulty conclusions. Some common biases in thinking include ignoring evidence (confirmation bias), seeing relationships that do not exist, accepting after-the-fact explanations, and taking mental shortcuts.

1.4 You Be the Psychologist: Why Are People Unaware of Their Weaknesses? People often fail to see their own inadequacies. People sometimes lack the expertise in a domain to know the difference between good and bad performance. Humans are also motivated to think well of themselves, so they might not internalize valid criticism. Thinking like a psychologist involves asking "why" about all aspects of human mental life and behavior.

What Is the Scientific Scope of Psychology?

1.5 Many Psychological Questions Have a Long History The nature/nurture debate questioned whether psychological characteristics are biologically innate or are acquired through education, experience, and culture. Today we know nature and nurture interact and their influences often cannot be separated. The mind/body problem questioned whether the mind and body are separate and distinct or whether the mind is simply the subjective experience of ongoing brain activity. Dualist notions about the separation of the brain and mind have been replaced with the idea that the (physical) brain enables the mind.

1.6 Mental Processes and Behaviors Serve Functions for Individuals and Groups Psychologists study mental activity and behavior using scientific methods. Following initial attempts to understand individual components of the mind, the field coalesced around the idea that the mind is too complex to understand as a collection of individual parts. Functionalism is the idea that the mind evolved to solve specific problems in the environment. Human mental activity, behavior, and even culture are guided by evolution and environmental challenges.

1.7 The Field of Psychology Spans the Range of Human Experience Psychological science now encompasses the breadth of human experience. Developmental psychologists focus on changes in mental activity and behavior across the life span. Cognitive psychologists and cognitive neuroscientists seek to understand the building blocks of thinking using tools that measure specific psychological, behavioral, and neural processes. Clinical psychologists study disorders of the mind, and health psychology examines the bidirectional relationship between mental life and physical health.

What Are the Latest Developments in Psychology?

1.8 Biology Is Increasingly Emphasized in Explaining Psychological Phenomena Tremendous advances in neuroscience have revealed the working brain. New insights into the immune, stress, and metabolic systems have revealed the complex ways that the rest of the body influences the brain and vice versa. These advances are increasing our knowledge of mind, brain, and behavior.

1.9 Psychology Is a Computational and Data Science Advances in computation have dramatically changed how psychological science is conducted. Computational modeling to identify hidden features of cognition is now common in many fields. Big data approaches use very large data sets to identify patterns and predict behavior. The open science reform movement has increased the transparency and accessibility of psychological science using data and information sharing.

1.10 Culture Provides Adaptive Solutions Cultural norms specify how people should behave in different contexts. They reflect solutions to adaptive problems that have been worked out by a group of individuals, and they are transmitted through learning.

1.11 Psychological Science Crosses Levels of Analysis Psychologists examine behavior from various analytical levels: biological (brain systems, neurochemistry, genetics), individual (personality, perception, cognition), social (interpersonal behavior), and cultural (within a single culture, across several cultures).

1.12 Psychological Education Embraces the Science of Learning Research on learning and memory has generated insights into how to improve study habits. Techniques such as distributed practice, retrieval-based learning, and elaborative interrogation have been shown to increase memory for new topics and are used throughout this book to help students learn.

1.13 Psychology Outside the Lab: How Will Psychology Benefit You in Your Career? The study of psychological science is highly relevant to multiple aspects of life, including a chosen career. There are growing opportunities for those with degrees in psychology.

Key Terms

behaviorism, p. 17

big data, p. 18

Practice Exercises

Answers to the Practice Exercises can be found in the back of this ebook.

1. When you mention to your family that you enrolled in a psychology course, your family members share their perceptions of the field. Which of their comments demonstrates the most accurate understanding of psychological science?
    1. "You're going to learn how to get in touch with your feelings."
    2. "The concept of 'psychological science' is such an oxymoron. It is impossible to measure and study what goes on in people's heads."
    3. "You may be surprised by the range of questions psychologists ask about the mind, the brain, and behavior, and the scientific methods they use to answer those questions."
    4. "By the end of the class, you'll be able to tell me why I am the way I am."
2. Match each definition with one or more of the following biological methods of psychology: epigenetics, immunology, electroencephalography.
    1. a technique that measures changes in electrical activity near the scalp to infer neural activity
    2. the study of factors that influence gene expression without being part of the inherited genetic code
    3. the study of the bidirectional interactions between the immune system and mental life and behavior
3. Titles of recent research articles appear below. Indicate which of the four levels of analysis—cultural, social, individual, or biological—each article likely addresses.
    1. "Pals, Problems, and Personality: The Moderating Role of Personality in the Longitudinal Association Between Adolescents' and Best Friends' Delinquency" (Yu et al., 2013)
    2. "The Role of Dynamic Microglial Alterations in Stress-Induced Depression and Suppressed Neurogenesis" (Kreisel et al., 2013)
    3. "Culture, Gender, and School Leadership: School Leaders' Self-Perceptions in China" (Law, 2013)

    4. "Anchoring Bullying and Victimization in Children Within a Five-Factor Model-Based Person-Centered Framework" (De Bolle & Tackett, 2013)
4. Match each definition below with the study technique that evidence indicates is effective in supporting learning: distributed practice, retrieval-based learning, elaborative interrogation.
    1. taking tests such as this quiz
    2. asking yourself why a fact is true or why it is true only in certain conditions
    3. learning material in several intervals that are spread over a prolonged period of time
5. Ivy and Nikole are having an argument about the nature of the mind. Ivy claims that the essence of the mind is a continuous series of thoughts that are influenced in complex ways by physical sensations in the body and stimuli in the outside world, whereas Nikole argues that the mind is distinct from the body. In this conversation, Ivy is espousing a theory that the mind is a(n) _____, and Nikole is arguing for _____.
    1. introspection; dualism
    2. stream of consciousness; the nature/nurture distinction
    3. flow state; the nature/nurture distinction
    4. stream of consciousness; dualism
6. Imagine you have decided to seek mental health counseling. You mention this to a few of your friends. Each friend shares an opinion with you. Based on your understanding of psychological science, which friend offers the strongest advice?
    1. "I wouldn't bother if I were you. All therapy is a bunch of psychobabble."
    2. "I know a therapist who uses this really cool method that can fix any problem. Seriously, she knows the secret!"
    3. "That's great! Psychologists do research to figure out which interventions are most helpful for people with different concerns."
    4. "Well, I guess if you like relaxing on couches and talking, you might get a lot out of therapy."
7. Which of the following practices are hallmarks of critical thinking? Check all that apply.
    1. asking questions
    2. considering alternative explanations
    3. considering the possibility that biases are coloring the evidence
    4. keeping an open mind
    5. looking for holes in evidence
    6. skepticism
    7. reasoning logically to see whether information makes sense
    8. accepting statements from an authority
8. Psychologists work in a wide variety of research-related subfields. Match each sample research question with one of the following subfields: industrial/organizational psychology, cognitive psychology, personality psychology, developmental psychology.
    1. How do people make decisions and solve problems?
    2. Do people who are outgoing report being happier?
    3. When do children start to form mental representations of the world?
    4. How does office design influence worker productivity?
9. You attend your friend's piano audition for a position in the student musical and you notice that he frequently misses notes and is off tempo. He does not get the spot. According to research on common biases in how people evaluate their own abilities, which of the following statements is he likely to make?

1. "I'm not surprised, since I didn't play well."
2. "I played as well as the person who got the spot, and so I should have gotten it."
3. "I thought I was good, but now I see that others may have been better."
4. "The judges must be poor interpreters of musical ability."

10. Your brother reads that research shows eating ice cream makes people more intelligent. He starts downing a pint of ice cream every day to increase his intelligence. To help your brother better understand this claim (and avoid a stomachache), which of the following questions would help you evaluate whether to believe the study? Check all that apply.
    1. "Does the article mention how much ice cream people had to eat to become more intelligent?"
    2. "Does the article say how the researchers measured intelligence?"
    3. "Does the article mention whether the person who conducted the research is a famous scholar?"
    4. "How did the researchers design the study? Were they doing good science?"
    5. "Who sponsored the study? Was it paid for and conducted by researchers at the world's largest ice cream company?"

Glossary

behaviorism
: A psychological approach that emphasizes environmental influences on observable behaviors.

big data
: Science that uses very large data sets and advanced computational methods to discover patterns that would be difficult to detect with smaller data sets.

biopsychosocial model
: An approach to psychological science that integrates biological factors, psychological processes, and social-contextual influences in shaping human mental life and behavior.

critical thinking
: Systematically questioning and evaluating information using well-supported evidence.

culture
: The beliefs, values, rules, norms, and customs that exist within a group of people who share a common language and environment.

data ethics
: The branch of philosophy that addresses ethical issues in data sciences, including data accessibility, identifiability, and autonomy.

distributed practice
: Learning material in several bursts over a prolonged time frame.

diversity and inclusion
: The value and practice of ensuring that psychological science represents the experiences of all humans.

elaborative interrogation
: Learning by asking yourself why a fact is true or a process operates the way it does.

epigenetics
: The study of biological or environmental influences on gene expression that are not part of inherited genes.

functionalism
: An approach to psychology concerned with the adaptive purpose, or function, of mind and behavior.

interleaved practice
: Switching between topics during studying.

mind/body problem
: A fundamental psychological issue: Are mind and body separate and distinct, or is the mind simply the physical brain's subjective experience?

natural selection
: In evolutionary theory, the idea that those who inherit characteristics that help them adapt to their particular environments have a selective advantage over those who do not.

nature/nurture debate
: The arguments concerning whether psychological characteristics are biologically innate or acquired through education, experience, and culture.

open science movement
: A social movement among scientists to improve methods, increase research transparency, and promote data sharing.

psychological science
: The study, through research, of mind, brain, and behavior.

replicability
: The likelihood that the results of a study would be very similar if it were run again.

retrieval-based learning
: Learning new information by repeatedly recalling it from long-term memory.

self-explanation
: Reflecting on your learning process and trying to make sense of new material in your own words.

stream of consciousness
: A phrase coined by William James to describe each person's continuous series of ever-changing thoughts.

2 Research Methodology

Big Questions

IN 2003, A CHINESE PHARMACIST named Hon Lik patented a device that used ultrasonic waves to vaporize liquid containing nicotine (**FIGURE 2.1**). Few people had heard of e-cigarettes when Hon's invention hit the U.S. market in 2007. But the use of e-cigarettes increased exponentially in the years since, and by 2019 more than a quarter of U.S. high school students and more than 10 percent of middle school students reported having used them (Cullen et al., 2019). Despite beliefs about their safety, e-cigarettes contain many toxic and cancer-causing substances and are particularly harmful to young people.

FIGURE 2.1

E-cigarettes E-cigarettes have been marketed as an alternative to combustible tobacco cigarettes. But they contain many harmful chemicals and remain largely unregulated.

What factors lead people to start using e-cigarettes? What are effective ways to help them stop? Indeed, can scientists be confident in any claim about human psychology and behavior? This chapter will describe how evidence is gathered and verified in psychology. By understanding how psychologists study human behavior and mental processes, you will learn how to interpret information