SIXTH EDITION

PSYCHOLOGICAL SCIENCE

MICHAEL S. GAZZANIGA

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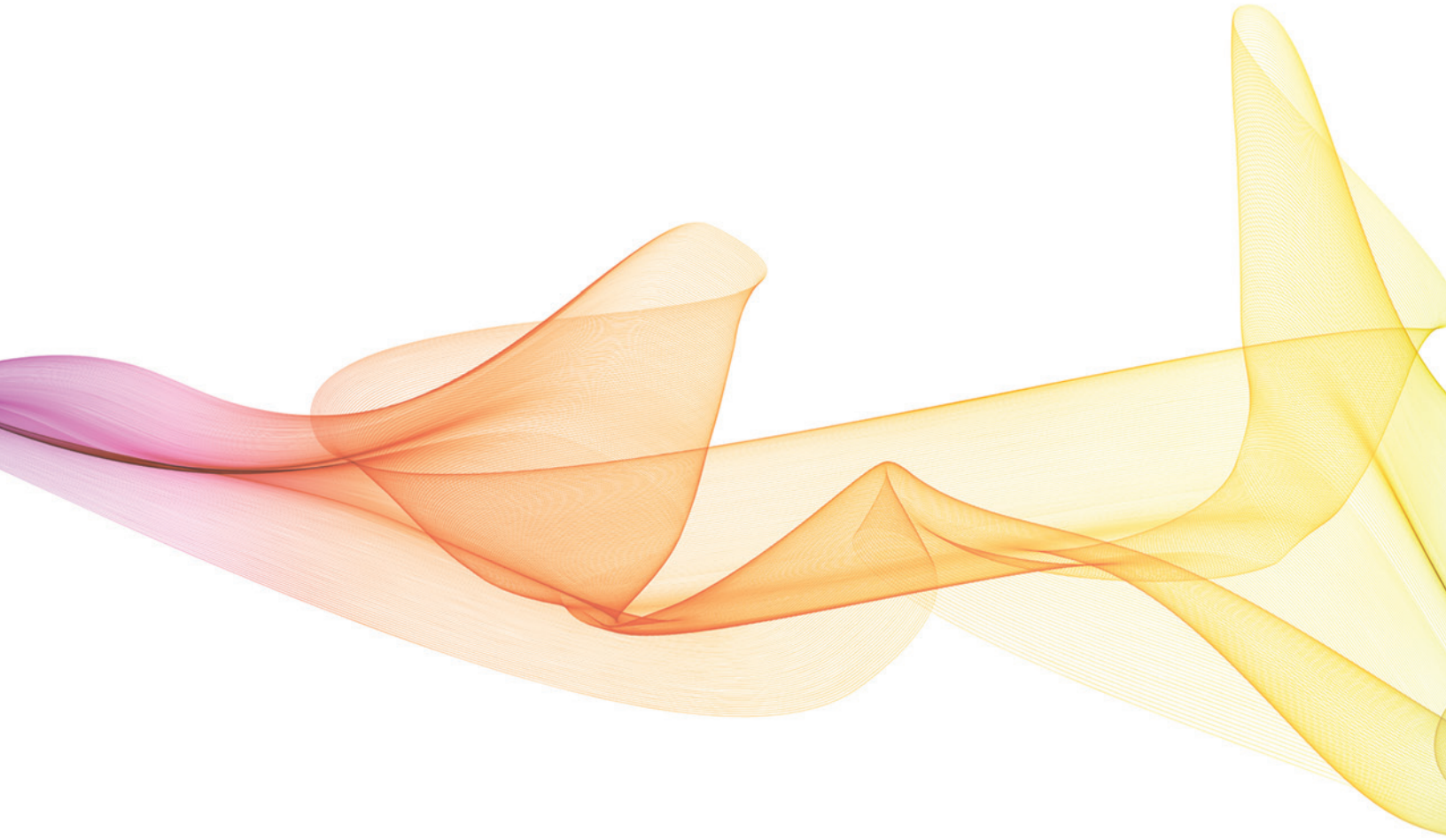

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Psychological Science

MICHAEL S. GAZZANIGA
University of California, Santa Barbara

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This book is dedicated to Lilly, Emmy, Garth, Dante, Rebecca, and Leonardo

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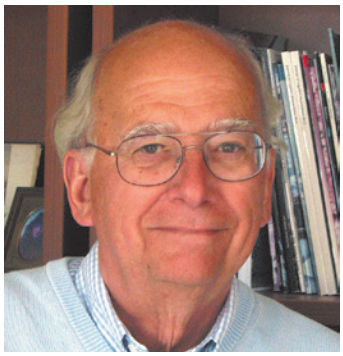
Meet the Author



MICHAEL S. GAZZANIGA is Professor and Director of the Sage Center for the Study of the Mind at the University of California, Santa Barbara. He founded and presides over the Cognitive Neuroscience Institute and is founding editor-in-chief of the *Journal of Cognitive Neuroscience*. He is past president of the Association for Psychological Science and a member of the American Academy of Arts and Sciences, the National Academy of Medicine, and the National Academy of Sciences. He has held positions at the University of California, Santa Barbara; New York University; the State University of New York, Stony Brook; Cornell University Medical College; and the University of California, Davis. In his career, he has introduced thousands of students to psychology and cognitive neuroscience. He has written many notable books, including, most recently, *Tales from Both Sides of the Brain* and *The Consciousness Instinct*.

Preface

WELCOME TO THE SIXTH EDITION OF PSYCHOLOGICAL SCIENCE! Whether you are considering this book for the first time or have been using it since the beginning, you may find it helpful to hear about its approach to introductory psychology. The many instructors who have used previous editions have made countless helpful suggestions for improving the material in this book, and their continued support for the book's overall vision remains an inspiration. At the end of the preface, before the acknowledgments, there is a comprehensive, chapter-by-chapter table of changes to this edition. Here, the focus is on the book's major features.

A Contemporary Science Perspective

As reflected in the title, this book unabashedly embraces the science of psychology. From the beginning, the aim has been to show students how using the scientific method provides important insights about mind, brain, and behavior. This book was the first to integrate research on neuroscience throughout all the chapters.

In the 20 years since then, many things have changed. In the late 1990s, functional brain imaging was still in its infancy, we had not yet mapped out the human genome, and same-sex relationships were illegal in many U.S. states. Students did not have laptops or cell phones, and professors often used real slide or overhead projectors. Google had not yet revolutionized the internet. Our understanding of the mind, the brain, and behavior has also increased dramatically. For example, neuroscientists have developed several new techniques for studying the working brain. Awareness has grown that sports concussions can affect the developing brain. Concern has grown regarding the health and lifestyles of many Americans, some of whom are now dying earlier than in previous generations. Topics such as the effects of poverty on the developing brain and the circumstances surrounding the opioid epidemic have captured psychological scientific attention. Researchers have contributed to a greater understanding of memory reconsolidation, progress in understanding epigenetic consequences of different environmental conditions, new insights into disorders such as ADHD, and evidence for the success of new psychological treatments. They have also provided cautionary notes, such as the lack of progress in long-term prognosis for schizophrenia.

The Sixth Edition of *Psychological Science* keeps up with progress across the breadth of the field. This book documents with great admiration the advances across all subfields of psychology, from our better understanding of brain function to greater recognition of the variations in sexual orientation and identity. The citations refer to more than 250 new articles published in 2016 or 2017.

A Readable Book for All Your Students

Since the First Edition of *Psychological Science,* the primary goal has been to provide students with a readable book that both captures the excitement of contemporary research and respects the rich tradition of prior foundational studies. Newer findings cannot distract us from the general principles that guide human behavior. After all, a major function of this book is to help prepare students for the undergraduate major in psychology, one of the most popular majors at colleges and universities. In 2013, the American Psychological Association updated its guidelines for that major. The APA task force includes the content goal of establishing a firm knowledge base in the field, along with four skill-based goals that are valuable for psychology majors. This book provides a strong foundation for satisfying the guidelines.

Still, not every reader of this book will be a psychology major. The material must speak to students whose primary interest is not psychology, from fine arts majors to engineering majors to nursing majors. And a huge challenge for any instructor of undergraduates is presenting information at a level that is appropriate for students who are less prepared for college-level work, who may not have good study skills, and who may not be native speakers of English, while still challenging the top students in the course. To achieve these aims, this book emphasizes a multidisciplinary approach, includes information about how to study based on cognitive research, and emphasizes active learning. Students will come away from the course with an understanding of why psychology is a science, an appreciation for data and evidence-based arguments, a sense of the discipline's breadth and complexity, and an understanding that the scientific study of brain and mind and behavior relates to most aspects of life.

New Study Unit Format Facilitates Student Learning

No reader, however dedicated, can retain the details of every concept in psychology. Instead of an encyclopedic and homogenized compendium that dutifully covers worn themes and tired topics at the same level, this book presents key concepts in depth and discusses supporting concepts only as necessary. Students should be focusing on the concepts, not struggling to read the text. In this edition, unnecessary terms, examples, and digressions have been eliminated, shortening some chapters by as much as 10 percent. Thanks to the teamwork of advisors, writers, and editors, the Sixth Edition of *Psychological Science* is the most relevant, engaging, and accessible version yet.

Several changes to the chapter format will help students better understand and retain the material they read. Drawing on teaching and learning research, the Sixth Edition provides new tools to improve students' reading, focus, and self-assessment. More than 60 years ago, George Miller introduced the concept of chunking to explain how people are able to recall large amounts of information. Building on this classic idea, each chapter now consists of brief study units. To maximize reading comprehension, these study units create an organizational framework in which related material is presented in a coherent section focusing on a particular topic.

Each chapter has been subdivided into 16–18 study units. While instructors can choose which units to assign in a particular order, these units are not modules intended to stand alone. Background knowledge from earlier study units (e.g., neurotransmitters and synapse processes) is necessary to understand later ones (e.g., how drugs are used to alleviate psychological disorders). However, the units are designed so that students can master the material in one sitting. In this way, students can set goals to study a certain number of units in the amount of time they have available to study.

Based on research, such as the excellent work by Henry "Roddy" Roediger and Jeffrey Karpicke showing that frequent testing aids learning, each study unit ends with a red Q question that tests whether students understand a core concept within the unit. This feature enables students to quickly assess the success of their studying before they move on to the next study unit. Reviewers of this approach agree that breaking the material into meaningful chunks and immediately testing understanding will help students comprehend what they read and focus on key concepts and ideas.

In addition, multiple self-study questions—practice tests—are available at the end of the book and online.

Students Should Apply Their Learning

Even as it delivers new research and fundamentals, *Psychological Science* showcases applications of psychological findings. Throughout the book, the focus is on how psychological research is being used throughout society to improve lives.

PUTTING PSYCHOLOGY TO WORK Many of us cringed when Jeb Bush proclaimed during the 2016 U.S. presidential primaries that he didn't think "people are getting jobs as psych majors." As professionals in the field who follow our graduates, we know Bush was flat-out wrong. For this edition, Ines Segert, at the University of Missouri, joined the team to remedy this misperception. Each chapter of *Psychology Science* features a new feature, "Putting Psychology to Work," coauthored by Ines. Each piece in this series explores how the knowledge and skills gained from the particular chapter can help prepare readers for their future careers. At the end of the final chapter, a summary of the series presents data from the U.S. Census Bureau study of STEM fields. These data document where those with psychology degrees work. As the evidence indicates, psychology is useful across a broad spectrum of occupations. Like other STEM fields, psychology serves as a strong foundation for career success. Thanks go out to Dana S. Dunn, at Moravian College, and Jane S. Halonen, at the University of West Florida, for their campaign to connect psychological concepts more fully to the workplace and graduate school. They provided important early advice regarding the "Putting Psychology to Work" feature and helpfully reviewed the finished manuscripts.

USING PSYCHOLOGY IN YOUR LIFE As engaged readers, students will learn more deeply, understand themselves and others more fully, and become better critical thinkers and decision makers. To help students apply what they learn in this course to their daily lives, the "Using Psychology in Your Life" features make clear how psychological concepts can have real-time usefulness.

Students Should Think Scientifically

This book has always emphasized a research-based approach to the discipline with the goal of helping students think critically and scientifically about psychology. Because so many findings in psychology are counterintuitive, students need to apply critical thinking skills to evaluate research claims they encounter in their everyday lives. Applying these principles also will help students better understand puzzling human thoughts and actions. Psychological science has studied the situations and contexts that tend to befuddle otherwise intelligent people and lead them to erroneous beliefs and faulty conclusions.

THINK LIKE A PSYCHOLOGIST Each chapter of *Psychological Science* includes a "Think like a Psychologist" feature, which describes research examining commonly held but misinformed beliefs. For example, Chapter 14 tackles the difficult topic of the claimed link between vaccines and autism. The feature walks students through the thought processes that lead people to perceive relationships that do not actually exist (such as between vaccines and autism) and then through the confirmation biases that sustain these false perceptions. The feature also discusses practical consequences of faulty psychological reasoning—for example, the global increase in infectious diseases, such as measles, due to the decline in vaccination rates.

Teaching students how to think like psychologists contributes an important weapon to their critical thinking and reasoning arsenal. This understanding builds on standard critical thinking skills, such as being skeptical, but it also provides practical rules for seeing when people are likely to believe things that simply are not true. They will help students recognize "fake news."

THE METHODS OF PSYCHOLOGY A new feature in each chapter, "The Methods of Psychology," presents examples of classic research studies. The layout of this feature is similar to that of an academic poster. Many of our students will conduct and present research (e.g., honors work), and this feature will familiarize them with the kind of material they will encounter at academic conferences.

The Content Reflects a Global, Multicultural Society

Psychological Science has always sought to represent the world in its diversity. The evidence indicates that this effort has succeeded. A research team led by Sheila Kennison, at Oklahoma State University, examined 31 major psychology textbooks for their coverage of diversity. The team's findings, presented at several meetings (including the 56th Meeting of the Southwestern Psychological Association; Tran, Curtis, Bradley, & Kennison, April 2010), made clear that *Psychological Science* had the greatest representation of diversity among all books. Indeed, this book had more than twice the average of the other 30 books. The Sixth Edition further increases coverage of many groups relatively neglected in psychological texts, including Latinos (Hispanic Americans), those who are transgendered, and those who face socioeconomic challenges, such as living in poverty.

Psychological Science also emphasizes the global nature of our field. Many psychology textbooks focus almost completely on research from North America, but a

tremendous amount of exciting psychological research takes place around the world. Students should learn about the best psychological science, and this book presents the best psychological research, no matter where it originates. The Sixth Edition includes research from dozens of countries beyond North America, describing hundreds of global studies conducted during the past decade. Becoming aware of research from outside North America will not only help students learn more about psychology, it will also bring them new perspectives, encouraging a sense of themselves as global citizens.

The Book Will Prepare Students for the MCAT

Psychology has also become a popular major for premed students. Beginning in the 1980s, medical schools recognized that contemporary physicians need a holistic understanding of their patients, including their lifestyles, ways of thinking, and cultural values. As students will learn in the "Health and Well-Being" chapter, the vast majority of modern health problems are related to peoples' behavioral choices. Psychological factors influence how people think about and react to the world, and sociocultural influences influence behavior and behavioral change. In short, cognition and self-perception profoundly affect health.

In 2015, reflecting this new understanding, the Medical College Admissions Test (MCAT) began including a section that examines psychological, social, and biological foundations of behavior, along with a new section on critical analysis and reasoning skills. As a result of revisions that focus attention on psychology, psychological content now comprises nearly 25 percent of the MCAT score.

Available online is a comprehensive chart that links the specific MCAT material to be covered with the relevant page numbers in *Psychological Science.* As this chart illustrates, students using this textbook will be at a significant advantage for completing the section of the MCAT on critical analysis and reasoning skills.

Major Changes in the Sixth Edition

Chapter 1 **THE SCIENCE OF PSYCHOLOGY**	The new brief opener focuses on why studying psychology is relevant to students regardless of their chosen occupation. The discussion of how psychological science helps people understand biased or inaccurate thinking now focuses on four major examples: confirmation bias, seeing relations that do not exit, accepting after-the-fact explanations, and taking mental shortcuts. Humanistic psychology is now discussed as a school of thought. A new table lists the major schools of thought. Examples have been updated of the contributions of brain imaging to a wide range of psychological phenomena. A new figure showing employment settings for psychologists has been added. "Putting Psychology to Work" discusses the employability of psychology majors and the value of the degree.

Chapter 2 **RESEARCH METHODOLOGY**	The new brief opener describes the consequences of texting and driving. The figure showing the scientific method has been modified to better show what happens after research supports or fails to support a theory. The discussion of the scientific method has been reorganized to clarify the steps. Additional content addresses how to frame a good research question based on a theory and how to then develop a hypothesis to test the research question. A new figure shows students presenting posters at a poster session. The discussion of replication has been significantly expanded, including the need for critical thinking when designing replication studies. A new figure demonstrates the importance of considering context when designing a replication study. A new study unit covers the need to guard against bias for all descriptive studies. A new figure shows the relation between independent and dependent variables. "Putting Psychology to Work" discusses data science skills and their value in various industries.
Chapter 3 **BIOLOGY AND BEHAVIOR**	The new brief opener links brain activity to the enjoyment of eating (specifically a slice of pizza). The relation between epinephrine and norepinephrine has been clarified in terms of their effects in the brain and body. The section on the interpreter has been moved here from Chapter 4 to consolidate all the split-brain information in one location. A more detailed figure on the divisions of the nervous system has been added to the study unit on the peripheral nervous system. "Putting Psychology to Work" focuses on the clinical and consumer applications of neuroscience.
Chapter 4 **CONSCIOUSNESS**	The new brief opener encourages the reader to try a few moments of meditation. A major new section has been added on traumatic brain injuries and concussion. A new figure refers to the movie *Concussion*. A new "Think like a Psychologist" feature considers whether people are affected by subliminal messages. Avoidance of electronic devices (especially blue light) has been added as another good strategy for getting a good night's sleep. A brief discussion has been added of recent evidence that heavy marijuana use during adolescence may increase the likelihood of significant mental health problems. A major new section has been added on opioid abuse, including the scope of the epidemic (such as the dramatic increase in fatal overdoses) and why Narcan is useful in reversing opioid effects. A new figure shows the increase in overdose deaths compared to traffic accident deaths. A new figure depicts one standard drink for various beverages containing alcohol. A new model has been introduced showing that addiction appears to develop in stages and noting that this progression is due to changes in the brain that accompany drug use. "Putting Psychology to Work" discusses how psychology can be used for substance abuse counseling and prevention.
Chapter 5 **SENSATION AND PERCEPTION**	The new brief opener considers how sensation and perception work when expectations are violated. Information has been updated regarding the debate about whether ESP exists. A new figure shows the brain imaging methods that Moulton and Kosslyn used to test whether ESP exists. A new figure in the "Using Psychology in Your Life" feature shows a person using earbuds. "Putting Psychology to Work" considers how understanding sensation and perception is important for product design and marketing.

Chapter 6 **LEARNING**	The new brief opener describes using nonlethal doses of poison to condition wolves to not kill sheep for food. A new figure shows the adaptive value of stimulus generalization and discrimination. The structure of the section on expectancies and prediction has been changed to help students better understand prediction errors. A new figure shows Albert Barger, the likely Little Albert, as an adult. Information has been updated regarding the percentage of Americans who believe that spanking is sometimes necessary. In addition, new data are included from a recent meta-analysis of over 160,000 children showing that spanking is ineffective in improving child behavior. A new figure differentiates between wanting and liking. "Putting Psychology to Work" discusses using principles of behavioral modification in business settings.
Chapter 7 **MEMORY**	The new brief opener considers how we can misremember people who seem similar, such as the actors Matt Damon and Mark Wahlberg. The section on reconsolidation has been updated and a new figure added to show how memories might change over time. The description of long-term potentiation has been revised and expanded to help students more easily understand the role of the NMDA receptor. A new brief section presents recent work showing that brain training (such as training working memory) does not transfer to new domains. An expanded "Using Psychology in Your Life" feature describes the most recent research that will help students study for exams, such as the importance of attending class and spending time practicing retrieval. New examples have been provided of memory events that lead to posttraumatic stress disorder and methods for reducing unwanted and persistent memories. A discussion has been added of flashbulb memory effects and why people become more confident over time about memories that display typical rates of forgetting over time. "Putting Psychology to Work" discusses applying memory principles to enhance performance.
Chapter 8 **THINKING, LANGUAGE, AND INTELLIGENCE**	The new brief opener considers different ways of being intelligent. In the concepts section, a new paragraph discusses how concepts are represented in the brain and how researchers are using computational methods to recover those concepts. The discussion of the role of gender schemas regarding women and STEM has been increased. It now includes a figure about children drawing a female scientist. The coverage of hindsight bias has been increased with new examples from political outcomes. The discussion of creole languages has been modernized. The discussion of dyslexia and the role of phonemes has been increased. "Putting Psychology to Work" considers the use of decision science to improve people's lives.
Chapter 9 **HUMAN DEVELOPMENT**	The new brief opener encourages the reader to reflect on a younger self. A new section discusses the effects of the Zika virus as a teratogen. A new figure shows birth effects associated with prenatal exposure to Zika. Added material considers the epigenetic effects of stress across future generations. An added section considers intersexuality and its effects on gender identify. A new figure shows biological sex viewed along a continuum.

Chapter 9 **HUMAN DEVELOPMENT** **(*cont.*)**	A new major section discusses transgender, with a figure from the cover of *National Geographic*. A new major section considers bullying and its effects. A new figure shows the tragic effects of the bullying of Amanda Todd. A discussion has been added of the health behaviors of middle-aged adults, especially as they relate to excess body weight, alcohol use, and opioid abuse. The marriage section now includes a discussion of same-sex marriage. "Putting Psychology to Work" looks at using a psychology degree in educational settings.
Chapter 10 **EMOTION AND MOTIVATION**	The new brief opener describes the emotions involved in public speaking. Added information shows that there is specificity for bodily reactions related to different emotions. The discussion of cross-cultural universality of emotion has been expanded. A new figure shows the testing in Cambodia of the universality of emotions. A new figure shows that people differ in their optimal level of arousal. A new section covers grit and life outcomes. The discussion of how hormones influence eating behavior has been completely revised and updated, and a discussion has been added of the role of insulin in diabetes. A new figure shows the biological mechanisms that motivate eating. A major new section discusses the range of sexual orientations. A new figure shows that sexual orientation can be viewed as a continuum. "Putting Psychology to Work" discusses how detecting emotional expressions is important in emotional artificial intelligence.
Chapter 11 **HEALTH AND WELL-BEING**	The new brief opener discusses stress eating and its effect on health. The figure on life expectancy by race and sex has been updated with the most recent data. The figure showing trends in overweight, obesity, and extreme obesity has been updated with the most recent data. The discussion of the effects of overweight on health has been revised, noting that there have been several controversial and conflicting findings on this topic. The eating disorders section has been updated to include data about males. A major new section considers the health consequences of electronic cigarettes. The figure showing fears of terrorism has been updated with the most recent data. "Putting Psychology to Work" considers how health psychology can be employed in various settings.
Chapter 12 **SOCIAL PSYCHOLOGY**	The new brief opener provides an example of how people are affected by a social situation. The recent critiques of the Stanford prison study are now discussed. A new table summarizes the three ways of inducing compliance, with examples of each. A major new section considers various criticisms of the Milgram obedience studies, including ethical considerations as well as new perspectives on the factors other than obedience driving behavior among Milgram's participants. The section on the Implicit Association Test has been revised to better explain how the test works (including a new figure) and to discuss the recent concerns that the predictive power of the IAT has been exaggerated in the media and in public perception. A discussion has been added of new methods for combatting prejudice, including reframing and self-labeling.

Chapter 12 **SOCIAL PSYCHOLOGY** **(*cont.*)**	The section on modern prejudice has been revised to note that it is most people, not all people, who try not to express racist, sexist, or homophobic comments. "Putting Psychology to Work" discusses how understanding social psychology is important for political campaigns.
Chapter 13 **PERSONALITY**	The new brief opener considers how people can be very different in personality from their siblings. A new figure shows how psychologists can describe the personality of an individual. The "Methods of Psychology" feature focuses on inhibition and social anxiety. The discussion of social-cognitive theories of personality has been substantially revised. Reciprocal determinism is now included. A new figure illustrates reciprocal determinism. A new figure shows Rogers's person-centered approach to raising children. A new figure shows personality traits on a continuum. A major new section discusses the dark triad personality traits: narcissism, Machiavellianism, and psychopathy. A new figure shows an American psychopath (from the movie *American Psycho*). "Putting Psychology to Work" discusses industrial/organization psychology and how understanding personality traits is useful in the workplace.
Chapter 14 **PSYCHOLOGICAL DISORDERS**	The new brief opener considers bipolar disorder and celebrities who have the disorder. A new table shows NIMH Research Domain Criteria (RDoC). New information is included on the growing prevalence of anxiety disorders among college students. A new figure shows the differences between major depressive disorder and persistent depressive disorder. A revised and updated section considers the roles of culture and gender in depressive disorders. A new figure depicts disorganized behavior as a symptom of schizophrenia. New material discusses the genetic and environmental contributors to schizophrenia. A new section in the psychopathy section considers young people who have callous-unemotional traits. The section on attention-deficit/hyperactivity disorder has been significantly revised, including its growing prevalence among females and minorities. The section on the biological basis of ADHD has been updated. "Putting Psychology to Work" looks at forensic psychology.
Chapter 15 **TREATMENT OF PSYCHOLOGICAL DISORDERS**	The new brief opener speaks directly to readers about great progress in identifying successful treatments for many psychological disorders. Behavior therapy is now discussed separately from cognitive therapy. The use of exposure in behavioral treatment has been updated. The discussion of why the context of therapy matters has been expanded and now includes more information on group therapy. A discussion has been added of the debate regarding evidence-based treatments. A new figure shows the use of exposure and response prevention to treat obsessive-compulsive disorder. A new section considers novel use of antibiotics to enhance the effects of exposure therapy. The figure for the "Think like a Psychologist" feature on trusting drug companies has been revised to show the conflict between money and research.

Chapter 15 TREATMENT OF PSYCHOLOGICAL DISORDERS (*cont.*)	The section on the prognosis of schizophrenia has been revised to show that in spite of increasing scientific evidence regarding the causes of the disorder, treatment outcomes have not improved substantially over time. A new figure shows the process of treating borderline personality disorder using dialectical behavior therapy. New information has been added regarding the treatment of adolescent depression. A new figure shows treatment outcomes in the treatment for adolescents with depression (TADS) study. "Putting Psychology to Work" looks at clinical and counseling psychology.

Acknowledgments

Thanks go out to the many colleagues who supplied responses and advice. Some individuals deserve special recognition. Foremost is Ines Segert, who provided invaluable advice regarding the revision plan, brought her extensive knowledge and keen eye to each chapter, and coauthored the "Putting the Psychology to Work" features. Ines understands what psychology instructors care about most for their students. Rebecca Gazzaniga, M.D., reviewed all the chapters and aided the effort to speak directly to students. As a physician, she made sure the coverage of health-related issues was accurate, and she coauthored MCAT assessment questions for each chapter. Patrick Ewell, at the University of Alabama, provided counsel on educating students about how using electronic devices can interfere with sleep.

Students are now firmly digital natives. Dennis Miller, at the University of Missouri, provided expert feedback on seeing the text from a digital perspective. Dennis also suggested media that will engage students and improve their learning, and he made helpful observations that have improved the InQuizitive and Prospero platforms.

Debra Mashek has been an invaluable member of the team for several editions. For the Fourth Edition, Debra coauthored the "Using Psychology in Your Life" features. Because they were so well received, new or updated versions appeared in the Fifth Edition and have been revised as appropriate for this edition. Thanks in large part to Debra's engaging, insightful voice, students love applying the findings of psychological science to their own lives.

THE NORTON EDITORIAL TEAM In the modern publishing world, where most books are produced by large multinational corporations that focus primarily on the bottom line, W. W. Norton stands out as a beacon to academics and authors, both for remaining committed to the best-quality publications and for providing outstanding team members to help ensure that quality. Norton's employees own the company, and therefore every individual who worked on this book has a vested interest in its success; that personal connection shows in the great enthusiasm the team members brought to their work.

Sheri Snavely took over as editor during the Third Edition and played a central role in shaping each subsequent edition. Sheri brings this not only many years of expertise in science editing, but also a profound dedication to spreading the message about this book. There is not a more talented or insightful editor in psychology, and Sheri has lavished attention on this book even as she has built one of the best overall lists in

psychology today. Thanks go to Roby Harrington, director of Norton's college division, for hiring Sheri and for his support of this book.

For the Sixth Edition, senior developmental editor and project editor Kurt Wildermuth continued to be wordsmith extraordinaire, making sure the writing was crisp and accessible. But Kurt does more and more in every edition. He really cares about this book, and it shows.

The innovative media and ancillaries team, led by media editor Scott Sugarman, was instrumental in producing a first-rate media and support package that provides instructors with the high quality support they need and helps students learn more effectively. Scott also moved mountains and more to develop a new Norton psychology videos program that helps students quickly master the most challenging concepts in each chapter. As every instructor knows, a well-conceived test bank is crucial to a successful course. Inadequate test banks with uneven or ambiguous items can frustrate students and instructors alike. Associate media editor Victoria Reuter worked tirelessly to create the best test bank available for introductory psychology (see p. xxiv for more details). Victoria also pulled together the coursepack material and quizzes, content that can easily be assigned within your own course management system. Assistant media editor Alex Trivilino skillfully managed the Interactive Instructors' Guide and a multitude of lecture presentation tools.

Many others also provided crucial support. Editorial assistant Eve Sanoussi helped by creating art manuscripts, recruiting reviewers, keeping track of pages, and keeping things organized as all the details came together. Photo editor Trish Marx did a wonderful job of researching and editing all the photos in the book and finding the captivating faces that begin each chapter. Production manager Sean Mintus made sure all the trains ran on time so the book and its ancillaries were ready for instructors to consider for their courses. Talented designers Rubina Yeh and Lissi Siglio worked with FaceOut to design the excellent new study unit format and new "Putting Psychology to Work" feature.

THE NORTON SALES AND MARKETING TEAM Thanks to the book's marketing manager, Ashley Sherwood, for rallying the troops, analyzing the market, and putting together a cutting-edge and informative marketing campaign. Ashley 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 the psychological science sales team—travelers, managers, science specialists, media specialists and institutional sales group. Indeed, the entire sales force, led by director of sales Michael Wright, has supported this book and is distinguished by their knowledge of psychology and consultative partnerships with instructors.

Finally, thanks go to the new president of Norton, Julia Reidhead, for inspiring a workforce that cares so deeply about publishing "books that live" and for having continued faith in this ongoing project.

PSYCHOLOGICAL SCIENCE, 6E, 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 a book and resources that greatly benefit instructors and students alike.

Julie A. Alvarez, *Tulane University*
Cheryl Armstrong, *Fitchburg State University*
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David Bilkey, *University of Otago*
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To help you build exams, all 2,600+ questions in the Test Bank for *Psychological Science*, including 150 questions new to this edition, have been carefully crafted and thoroughly reviewed to ensure that they are as good as the textbook they support. Features of the Sixth Edition Test Bank include:

- extensive revisions to reflect the advice of subject-matter experts and star teachers for each chapter;
- higher question *quality* across all chapters;
- increased question *quantity*, with each chapter offering 170–200 multiple-choice questions, including 10-15 new questions per chapter;
- questions tagged by Bloom's taxonomy level, APA 2.0 learning goal, chapter, section, and difficulty.

Video Resources

Psychological Science offers instructors a variety of original videos as well as URLs to YouTube and other web-based videos depicting psychological concepts in everyday life and in popular culture. These URLs are usually accompanied by advice for using them in lecture, including discussion questions about the videos.

There are also two types of original videos—Demonstration Videos and Concept Videos:

- **Demonstration Videos** show students enacting 20+ important concepts in a classroom setting and are offered in two formats: *Student versions* are suitable for showing in class or online, whereas *instructor versions* show you how to re-create the demonstrations in your class.

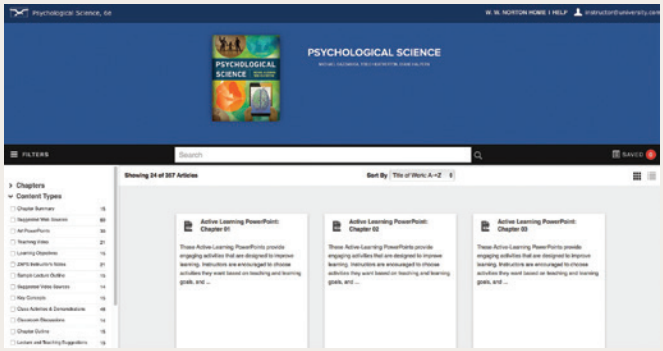
"Classical Conditioning" Demonstration Video for Chapter 6.

- **Concept Videos** feature 20+ course concepts that students traditionally struggle to understand. The videos show scenarios to help students master these concepts as well as to see how they relate to their everyday lives.

PowerPoint® Sets

Create your lecture files to suit your specific course needs using this rich variety of PPT slides, which support each chapter of *Psychological Science:*

- **Art PPTs** provide every figure, photo, and table from the textbook, optimized for projection in lecture halls (in JPEGs as well as PPTs). **Supplemental Photo PPTs** feature art not found in the book.
- **Lecture PPTs** use outlines, key images from the text, and videos to thoroughly summarize the book's presentation.
- **Active Learning PPTs** provide you with examples and ideas for in-class participation activities, including clicker questions.



Interactive Instructor's Guide

Using our **Interactive Instructor's Guide** (IIG) website (iig.wwnorton.com/psysci6/full), you can easily find and quickly download hundreds of teaching tools created for *Psychological Science.* An invaluable tool for novice and veteran instructors alike, the IIG offers all of our Video Resources and PPT sets, as well as these resources for each chapter:

- chapter outlines and summaries;
- class activity ideas and handouts;
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Norton Coursepacks work with your existing Learning Management System to add rich, book-specific digital materials to your course—at no cost to you or your students. The *Psychological Science* expanded Coursepack includes:

- **Pre-Lecture Quizzes**, **Chapter Quizzes**, **Post-Study Quizzes**, and **NEW Learning Objective Quizzes**;
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Norton's **NEW** online assignment platform makes it easier than ever to weave together Norton's book content, assessment, and interactive media with your own course materials and make it accessible to students all in one place.

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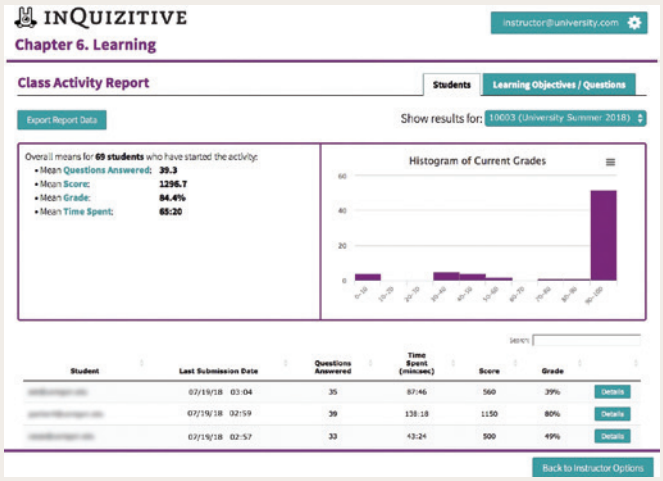
Psychological Science offers two great student review tools: InQuizitive, Norton's new online formative, adaptive learning tool, and **ZAPS: The Norton Online Psychology Labs.** Both of these resources, fully described inside the front cover of this book, offer special capabilities that enable you to integrate them into your course. These resources can be accessed through the Digital Landing Page: digital.wwnorton.com/psychsci6.

INQUIZITIVE

InQuizitive helps your students learn through a variety of question types, answer-specific feedback, and gamelike elements such as the ability to wager points. It is assignable and gradable, and—since all InQuizitive questions are assigned to the Big Questions in each chapter—gives you insights into the areas where your students need more help so you can adjust your lectures and class time accordingly. The Sixth Edition revision of InQuizitive for *Psychological Science* targeted questions and subjects that students struggled with most in the Fifth Edition, and also added APA goals to each question.



Class Activity Reports in InQuizitive allow you to quickly learn how well your students are doing.

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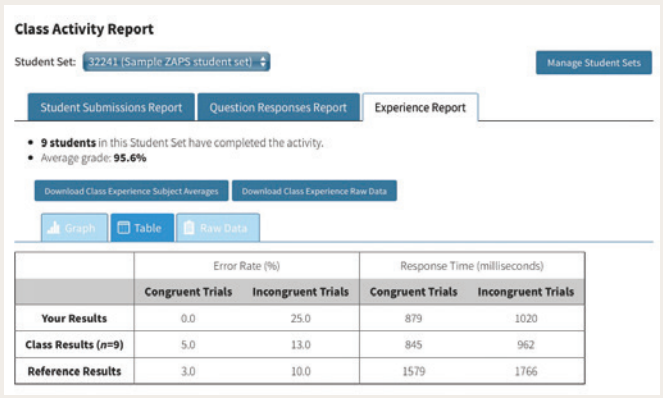
The Norton Online Psychology Labs

With ZAPS labs, your students interactively explore key psychological concepts to gain a deeper understanding of the concepts as well as of the scientific process. You can choose from one to three ZAPS labs for each chapter in *Psychological Science*. You will receive summaries of your students' performance for each lab assigned, so credit can be given. You will also receive all the data your students generate in ZAPS, which you can share with the class to help them better understand the concepts. Instructor-only notes and activity ideas for each ZAPS lab are offered on the For Instructors tab of each ZAPS lab and through the *Psychological Science* Interactive Instructor's Guide.



Class Activity Reports in ZAPS show data generated by your entire class and each student, as well as submitted answers to each question, for all labs.

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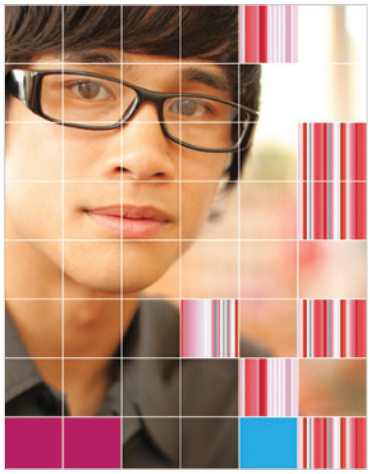

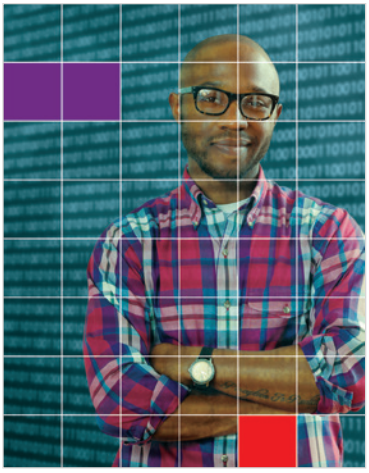

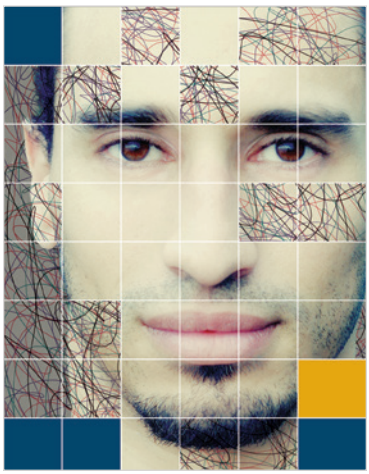

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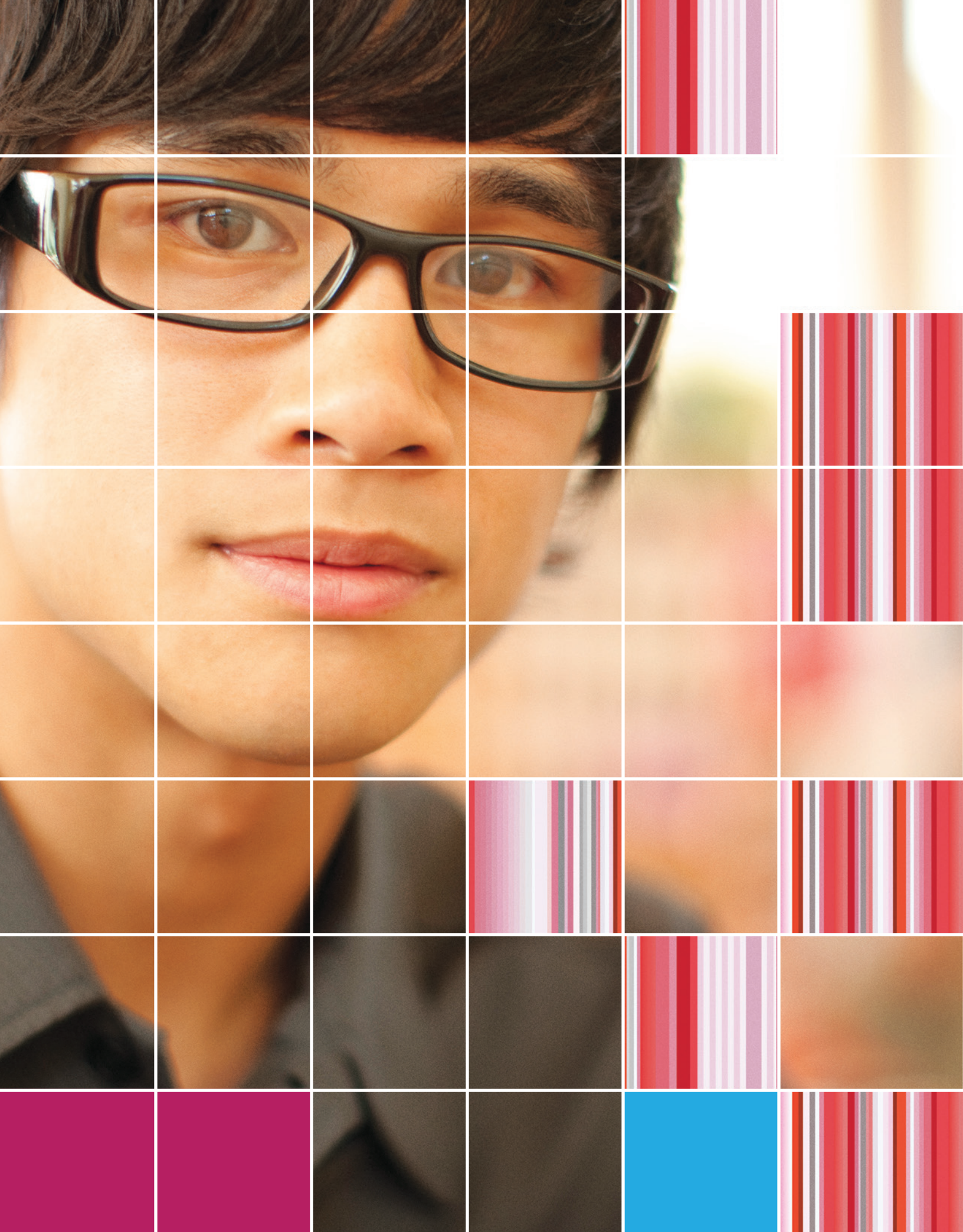


1 The Science of Psychology

Big Questions

- What Is Psychological Science? 4
- What Are the Scientific Foundations of Psychology? 9
- What Are the Latest Developments in Psychology? 17

WHY IS PSYCHOLOGY ONE OF THE MOST POPULAR MAJORS at many colleges? The simple answer is that people want to understand mental activity and behavior. The subject material of psychology is not just fascinating but personally relevant. It can help you understand your motives, your personality, even why you remember some things and forget others. In addition, psychology serves as excellent training for many professions. For instance, physicians need to know a lot more than anatomy and chemistry. They need to know how to relate to their patients, how the patients' behaviors are linked to health, and what motivates or discourages patients from seeking medical care or following treatment protocols. Much of the psychological research you read about in this book is being used today to make people's lives better.

Around the globe, psychological researchers are providing new insights into the nature of being human. Their findings will benefit you whether you're studying environmental science (e.g., how do you encourage people to recycle?), anthropology (e.g., how does culture shape behavior?), biology (e.g., how do animals learn?), or philosophy (e.g., do people have free will?). Whatever your major, this class will help you succeed in your academic work and your private life, now and in the future.

In this introductory chapter, the big questions about psychology are: What is psychological science? What are the scientific foundations of psychology? And what are the latest developments in psychology?

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.

What Is Psychological Science?

Psychology involves the study of mental activity and behavior. The term *psychologist* is used broadly to describe someone whose career involves understanding mental life or predicting behavior. We humans are intuitive psychologists. That is, we try to understand and predict others' behavior. For example, defensive drivers rely on their intuitive sense of when other drivers are likely to make mistakes. People choose relationship partners they expect will best meet their emotional, sexual, and support needs. People try to predict whether others are kind, are trustworthy, will make good caretakers, will make good teachers, and so on. But people too often rely on apparent common sense or their gut feelings. They cannot intuitively know if many of the claims related to psychology are fact or fiction. For example, will taking certain herbs increase memory? Will playing music to newborns make them more intelligent?

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

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

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

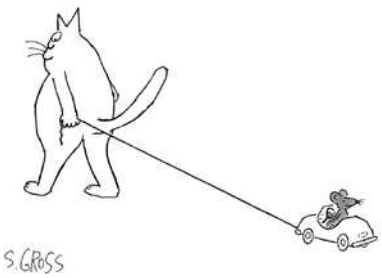
The science of psychology is not simply about intuitions or common sense. **Psychological science** is the study, through research, of mind, brain, and behavior. But what exactly does each of these terms mean, and how are they all related?

Mind refers to mental activity. Examples of the mind in action include the perceptual experiences (sights, smells, tastes, sounds, and touches) we have while interacting with the world. The mind is also responsible for memories, thoughts, and feelings. Mental activity results from biological 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, drinking, and mating. 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 psychologists make important contributions to understanding and treating mental disorders, most psychological science has little to do with therapeutic clichés such as couches and dreams. Instead, psychologists generally seek to understand mental activity (both normal and abnormal), the biological basis of that activity, how people change as they grow older, how people vary in response to social settings, and how people acquire healthy and unhealthy behaviors.

Q What produces mental activity?

ANSWER: biological activity in the brain



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

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

for which *Psychological Science* is the textbook, you will become psychologically literate. With a good understanding of the field's major issues, theories, and controversies, you will also avoid common misunderstandings about psychology. You will learn how to separate the believable from the incredible. You will learn to spot poorly designed experiments, and you will develop the skills necessary to critically evaluate claims made in the popular media.

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 the Internet and thousands of new research findings available for searches 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 1.2**).

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. The ability to think in this way—to systematically question and evaluate information using well-supported evidence—is called **critical thinking.**

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. It also requires considering whether the information might be biased, such as by personal or political agendas. Critical thinking demands healthy questioning and keeping an open mind. 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 us to reevaluate and update our 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.

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. The integration of critical thinking in psychological science adds to our understanding of how people typically think when they encounter information. Many decades of psychological research have shown that people's intuitions are often wrong.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The quiz that makes over-60s better cooks: Computer brain games 'stave off mental decline'

- **Computer brain games can help elderly perform better at everyday tasks**
- **Firms selling the gadgets and games consoles say they boost memory**
- **British research suggests brain exercises may delay onset of dementia**

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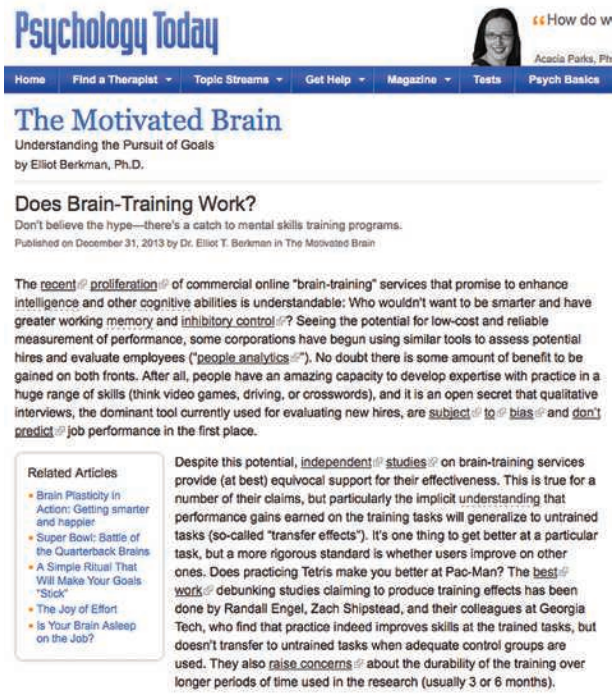
Computer brain games can help the elderly perform significantly better at everyday tasks, scientists have found.

Firms selling the handheld gadgets and games consoles say they boost memory and thinking power.

And the British research backs this claim, even suggesting that the brain exercises may delay the onset of dementia – although much more evidence would be needed to confirm this link.

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.


Psychology Today "How do w

Acacia Parks, Ph

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The Motivated Brain
Understanding the Pursuit of Goals
by Elliot Berkman, Ph.D.

Does Brain-Training Work?
Don't believe the hype—there's a catch to mental skills training programs.
Published on December 31, 2013 by Dr. Elliot T. Berkman in The Motivated Brain

The recent proliferation of commercial online "brain-training" services that promise to enhance intelligence and other cognitive abilities is understandable: Who wouldn't want to be smarter and have greater working memory and inhibitory control? Seeing the potential for low-cost and reliable measurement of performance, some corporations have begun using similar tools to assess potential hires and evaluate employees ("people analytics"). No doubt there is some amount of benefit to be gained on both fronts. After all, people have an amazing capacity to develop expertise with practice in a huge range of skills (think video games, driving, or crosswords), and it is an open secret that qualitative interviews, the dominant tool currently used for evaluating new hires, are subject to bias and don't predict job performance in the first place.

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Despite this potential, independent studies on brain-training services provide (at best) equivocal support for their effectiveness. This is true for a number of their claims, but particularly the implicit understanding that performance gains earned on the training tasks will generalize to untrained tasks (so-called "transfer effects"). It's one thing to get better at a particular task, but a more rigorous standard is whether users improve on other ones. Does practicing Tetris make you better at Pac-Man? The best work debunking studies claiming to produce training effects has been done by Randall Engel, Zach Shipstead, and their colleagues at Georgia Tech, who find that practice indeed improves skills at the trained tasks, but doesn't transfer to untrained tasks when adequate control groups are used. They also raise concerns about the durability of the training over longer periods of time used in the research (usually 3 or 6 months).

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.

Intuitions also tend to be wrong in predictable ways. Indeed, human thought is often biased in 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.

Q **What is amiable skepticism?**

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

1.3 Psychological Science Helps Us Understand Biased or Inaccurate Thinking

FIGURE 1.3
Patterns That Do Not Exist
People often think they see faces in objects. When the owner 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.

Psychologists have cataloged numerous ways that noncritical thinking can lead to erroneous conclusions (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.

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 get things wrong. Sometimes we see patterns that do not really exist (**FIGURE 1.3**). We look at the clouds and see images in them—clowns, faces, horses, what have you. 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? The psychologist Thomas Gilovich answers this question insightfully in his book *How We Know What Isn't So: The Fallibility of Human Reason in Everyday Life* (1991). He points out that more Americans believe in extrasensory perception (ESP) than in evolution and that there are twenty times more astrologers than astronomers. Followers of ESP and astrology may base important life decisions on beliefs that are wrong. False beliefs can sometimes lead to dangerous actions. Some people hunt endangered animals because they believe the animals' body parts provide magical cures. Some people rely on fringe therapies to provide what they think is real medical or psychological treatment.

Knowing about biases in thinking will also help you do better in your classes, including this one. Before they have taken a psychology course, many students have false beliefs, or misconceptions, about psychological phenomena. 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 are discussed. You

can apply these skills in your other classes, your workplace, and your everyday life.

Each chapter of the book draws your attention to at least one major example of biased or erroneous thinking and how psychological science has provided insights into them, in a feature called "Think like a Psychologist." Following are a few of the major biases you will encounter.

- *Ignoring evidence (confirmation bias).* People show a strong tendency to place great importance on evidence that supports their beliefs. They 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 Web sites 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 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. Believing that events are related when they are not can lead to superstitious behavior. For example, an athlete thinks she must eat a certain meal before a game in order to win, or a fan believes that wearing his favorite team's jersey helps the team win. But many times events that appear related are just coincidence. Consider a humorous example. Over the last 200 years, the mean global temperature has increased. 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 (**FIGURE 1.4**)?
- *Accepting after-the-fact explanations.* Because people expect the world to make sense, they often come up with explanations for why events happen. They do so even when they have incomplete information. One form of this reasoning bias is known as *hindsight bias.* We are wonderful at explaining why things happened, but we are much less successful at predicting future events. Think about the woundings and fatal shootings in 2016 at the Pulse gay nightclub, in Orlando, Florida. In hindsight, we know that there were warning signs that the shooter, Omar Mateen, might become violent (**FIGURE 1.5**). 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. Likewise, when political pundits predict an election outcome and get it wrong, they later come out with all sorts of explanations for the election result. If they had really seen those factors as important before the election, they should have made a different prediction. We need to be wary of after-the-fact explanations because they tend to distort the evidence.
- *Taking mental shortcuts.* People often follow simple rules, called heuristics, to make decisions. These mental shortcuts are valuable because they often produce

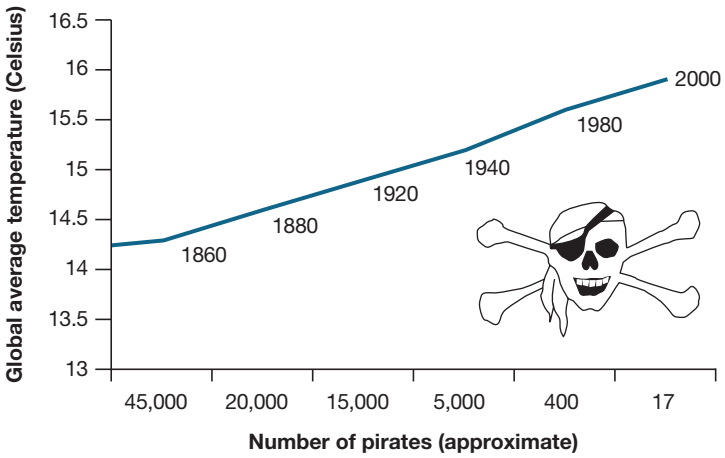

FIGURE 1.4
A Humorous Example
Sometimes things that appear related are not.

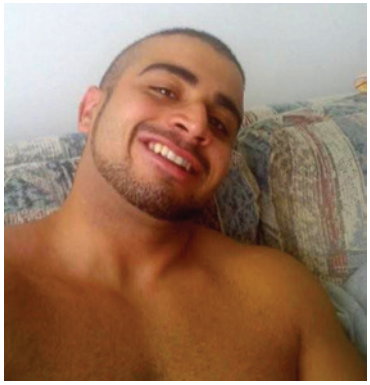

FIGURE 1.5
Orlando Pulse Shootings
In hindsight, there were warning signs that the shooter, Omar Mateen, was troubled. But it is very difficult to predict violent behavior in advance.

FIGURE 1.6
Judging a Performance
Judges react to an audition.

reasonably good decisions without too much effort (Kahneman, 2011). Unfortunately, many 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. After hearing a series of news reports about child abductions, people overestimate how often such abductions happen. Parents become overly concerned that their children might be abducted. As a result, people may underestimate other dangers facing children, such as bicycle accidents, food poisoning, or drowning. Child abductions are much more likely to be reported in the news than these much more common dangers. The vivid nature of the abduction reports makes them easy to remember. 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.

THINK LIKE A PSYCHOLOGIST

1.4 Why Are People Unaware of Their Weaknesses?

Another bias in thinking is that people fail to see their own inadequacies. People are motivated to feel good about themselves, and this motivation affects how they think (Cai et al., 2016). For example, many people believe they are better than average on any number of dimensions. More than 90 percent of people think they are better-than-average drivers, but this percentage is illogical because only 50 percent can be above average on any dimension. People use various strategies to support their positive views, such as crediting personal strengths for their successes and blaming outside forces for their failures. In general, people interpret information in ways that support their positive beliefs about themselves. One factor that promotes overconfidence is that people often have difficulty recognizing their own weaknesses. Consider the following.

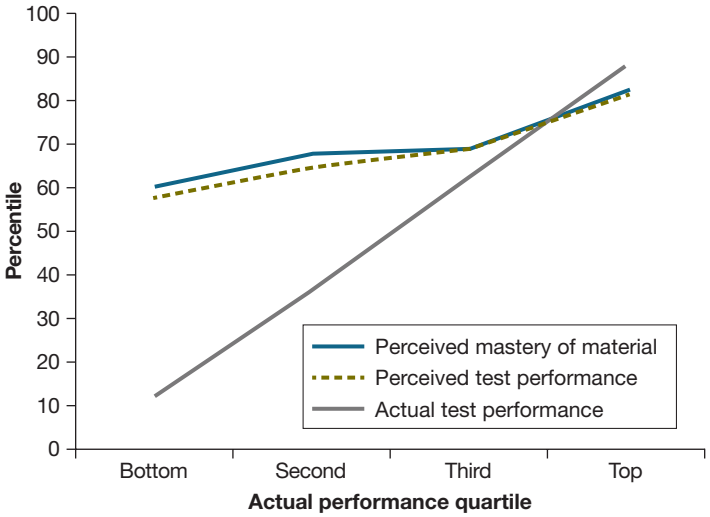

FIGURE 1.7
Personal Ratings Versus Actual Performance
Students rated their mastery of course material and test performance. Points on the Y-axis reflect how the students perceived their percentile rankings (value on a scale of 100). Points on the X-axis reflect these students' actual performance rank (*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.

You are judging an audition for a musical, and the singer, while passionate, is just awful (**FIGURE 1.6**). 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?*

Such moments make us cringe. We feel deeply uncomfortable about them, even as we tune in to watch them on television shows such as *America's Got Talent*. The German language has a word for how we feel, *Fremdschämen*. This term refers to times when we experience embarrassment for other people in

part because they do not realize that they should be embarrassed for themselves. Comedies such as *The Office* owe much of their success to giving us this feeling of *Fremdschämen*.

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?

To judge whether someone is a good singer, you need to be able to tell the difference between good and bad singing. You need to know the difference even if you are judging your own singing. The same is true for most other activities. A lack of skill not only prevents people from producing good results, it also prevents those people from knowing what good results are. As noted by these researchers, "Thus, if people lack the skills to produce correct answers, they are also cursed with an inability to know when their answers, or anyone else's, are right or wrong" (Dunning et al., 2003, p. 85).

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 1.7**). 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." The protest may simply show that the student lacks the ability to evaluate performance in those areas where she is weakest. To make matters worse, people who are unaware of their weaknesses fail to make any efforts at self-improvements to overcome those weaknesses. They do not try to get better because they already believe they are performing well.

Kruger and Dunning (1999) have shown that teaching people specific skills helps them to be more accurate in judging their performance. This finding implies that people might need help in identifying their weaknesses before they can fix those weaknesses. But why are people so inaccurate in the first place? The likely answer is that they generally start with extremely positive views about their abilities. In Chapter 12, you will learn more about why most people believe they are better than average in many things. Such beliefs influence how people judge their talents and skills across multiple areas. Knowing about these beliefs helps us understand the driver who claims to be very skilled in spite of numerous car accidents and the singer who brags about an awesome vocal ability in spite of a train-wreck performance on national television. ■

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

ANSWER: because people often fail to see their personal weaknesses

FIGURE 1.8
Confucius
Ancient philosophers such as Confucius studied topics that remain important in contemporary psychology.

Learning Objectives

- Trace the development of psychology since its formal inception in 1879.
- Define the nature/nurture debate and the mind/body problem.
- Identify the major schools of thought that have characterized the history of experimental psychology.

What Are the Scientific Foundations of Psychology?

Psychology originated in philosophy, as the great thinkers sought to understand human nature. For example, the ancient 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 1.8**). As you will learn, in the 1800s psychologists began to use scientific methods to investigate mind, brain, and behavior.