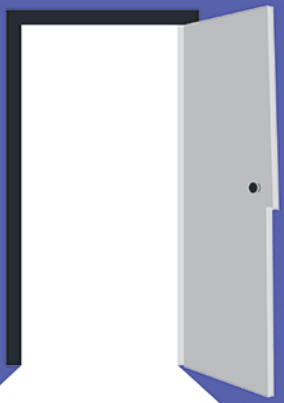
Eighth Edition

Invitation to Psychology

Carole Wade
Carol Tavris
Samuel Sommers
Lisa Shin



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Eighth Edition

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For Howard
—Carole Wade

For Ronan
—Carol Tavris

For Abby & Sophie
—Sam Sommers

For Gianna
—Lisa Shin

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Brief Contents

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Contents

About This Course

From the Authors

From the very first edition of this text, our primary goal has been to weave critical and scientific thinking into the fabric of our writing, and today, in this era of fake news and "alternative facts"—not to mention in the face of societal crisis and turmoil—this goal is more important than ever. Students must negotiate the Internet and social media, which contain vast amounts of information but which are also full of conspiracy theories and nonsense, on topics ranging from how to study most effectively to how best to cope with a global pandemic. Psychological science can offer students the tools they need to separate fact from fiction and pseudoscience—and to distinguish wishful thinking from thinking wisely. Therefore, a good text should not be a laundry list of definitions and studies, and its writers cannot simply be reporters. For us, the most important job of any text is to help students learn to think like psychologists and to motivate them to enjoy the process.

In our own experience, Introduction to Psychology is often a team-taught course. Given that psychology is such a diverse field, this team-based approach is an ideal way to introduce students to a wide range of perspectives with expertise as well as balance. It is the approach we adopt in this text as well, as your author team includes researchers with expertise in clinical neuroscience, cognitive psychology, and social psychology. We believe that this provides our text with important representation across the spectrum of psychological science. Of course, an effective team also needs to share a common set of principles, and in our case it is a commitment to writing a text that is precise and critical and that makes science accessible to a wide range of readers. Our primary goals are to maintain a solid research base and promote critical thinking, all the while offering engaging prose and analysis of contemporary events. This text is designed to be accessible to students learning psychology at any institution. It is a text intended to reveal to readers that psychology is the scientific study of their daily lives. These, too, have been our objectives in our years of classroom teaching.

For those of you who have used previous editions of this text—whether in its Wade & Tavris form or more recently as Wade, Tavris, Sommers, & Shin—we trust that you will find its calling cards still intact: detailed reviews of study design and findings, an emphasis on critical thinking and active learning, the willingness to confront controversial topics, and themes of culture, gender, and diversity infused throughout. We're confident that returning as well as new users will find benefit in our additional strategies for making science accessible. For example:

- Each chapter in our interactive Revel text opens with a survey question that prompts students to explore the applicability of the topic at hand to their own lives.
- We've punched up the current events and popular culture analyses, enabling readers to consider the ways in which broader cultural forces both shape and reflect individual cognitive and behavioral tendencies.
- Embedded directly into the Revel text is a video series in which Sam Sommers and Lisa Shin try to bring the details of research to life through study reenactments, clinical interviews, and engaging demonstrations.
- Available in the Revel text is a ***new*** **chapter-ending feature called Critical Thinking Illustrated**, in which we make use of animation and interactive questions to guide readers through the steps of critical thinking necessary to interrogate provocative claims related to a topic from each chapter.

Finally, it is our firm belief that a critical thinker's job is never complete. Critical thinkers always find additional questions to ask, and must learn to tolerate uncertainty. Indeed, no research study is perfect and no finding—no matter how many textbooks it appears in—should be immune from continued scrutiny. Accordingly, you will note infused throughout this new edition an even more explicit focus on efforts to critically interrogate and replicate previous findings in psychology. Two *new features* in particular speak to these goals. First, you will find in every chapter a **Revisiting the Classics feature**, in which we critically examine, in narrative form, the methods, conclusions, and continuing implications of a particularly well-known study or approach from "classic" psychology. Second, our **Replication Check feature** appears in each chapter (often multiple times), highlighting research findings that replication efforts—in many cases, multi-site endeavors with pre-registered methods and analyses—have identified as particularly robust. We believe that these new features are important additions to our text's long-standing emphases on critical thinking and research transparency.

Goals and Principles

Five goals and principles have guided the writing of this text from the first edition. Here they are:

1. Thinking Critically About Critical Thinking

True critical thinking cannot be reduced to a set of rhetorical questions or a formula for analyzing studies; it is a process that must be woven seamlessly into the narrative. The primary way we "do" critical and creative thinking is by applying a three-pronged approach: We *define* it, we *model* it, and we give students a chance to *practice* it.

The first step is to define what critical thinking is and what it is not. Chapter 1 introduces specific **Critical Thinking Steps**,

which we draw on throughout the text as we evaluate research and popular ideas.

The second step is to model these guidelines in our evaluations of research and popular ideas. Throughout the text, you'll find discussions of these critical-thinking guidelines as we challenge the reader to evaluate what the evidence reveals—and, importantly, does not reveal—about a particular phenomenon. Photo captions, writing prompts, interactives, and of course the narrative itself offer opportunities for students to sharpen their critical-thinking skills to become active readers (and active learners) of psychology.

The third step is to give students opportunities to practice what we've preached in the form of end-of-module and end-of-chapter assessments. These tests require more than memorization of definitions; they help students check their progress, measure their understanding of the material, and encourage them to go back and review what they don't recall or comprehend. Many quiz questions include critical-thinking items that invite the students to reflect on the implications of findings and consider how psychological principles might illuminate real-life issues.

2. Exploring New Research in Biology and Neuroscience

Findings from the Human Genome Project, studies of behavioral genetics and epigenetics, discoveries about the brain, technologies such as functional magnetic resonance imaging (fMRI) and transcranial magnetic stimulation (TMS), and the proliferation of medications for psychological disorders—all of these developments have had a profound influence on our understanding of human behavior and on interventions to help people with chronic problems. We report new findings from biology and neuroscience wherever they are relevant throughout the book: in discussions of neurogenesis in the brain, memory, emotion, stress, child development, aging, mental illness, personality, and many other topics.

Although we caution students about the dangers of ignoring biological research, we also caution them about the dangers of reducing complex behaviors solely to biology by overgeneralizing from limited data, failing to consider other explanations, and oversimplifying solutions. Our goal is to provide students with a structure for interpreting research they will hear or read about to an ever-increasing degree in the future.

3. Focus on Culture, Gender, and Diversity

At the time of this text's first edition, some considered the goal of incorporating research on culture, gender, and diversity into introductory psychology to be quite radical, either a bow to political correctness or a passing fad. Today, the issue is no longer whether to include these topics, but how best to do it. From the beginning, our own answer has been to include studies of gender and culture throughout the text. We discuss gender and culture differences—and similarities—in many areas, from the brain, emotion, and motivation to heroism, sexuality, love, and eating disorders. Over the years, most psychologists have come to appreciate the influence of identity and culture on all aspects of life, from nonverbal behavior to the deepest attitudes about how the world should be.

Throughout the text, we also strive for a representative depiction of the world in which our students live. If students can't recognize themselves and their own surroundings in the examples, stories, and images provided, then we as authors have failed them. This text is intended as a literal *Invitation to Psychology* for each and every one of our students, and we strive to write it accordingly. It is our intent that every aspect of this text, from its visual and video programs to the names used in its examples and assessments, be designed in such a way as to promote an inclusive (and, yes, *inviting*) learning environment. And we seek to do this honestly, with frank consideration of the ways in which the field of psychology—past as well as present—has failed to live up to principles of equity and diversity. For example, in Chapter 1 we review the specific obstacles faced by the first women and Black scientists to seek to enter the field, as well as current demographic trends among psychologists by career type and rank.

4. Facing the Controversies

Psychology has always been full of lively, sometimes angry, debates, and we feel that students should not be sheltered from them. They are what make psychology so interesting! In this book, we candidly address controversies in the field of psychology, try to show why they are occurring, and suggest the kinds of questions that might lead to useful answers in each case. For example, we discuss the controversies about oversimplification of brain-scan technology (Chapter 2), the disease versus learning models of addiction (Chapter 13), the extent of parents' influence on their children's personality development (Chapter 10), and conflicts of interest in research on medication for psychological disorders (Chapter 14).

5. Applications and Active Learning

Finally, throughout this text, we have kept in mind one of the soundest findings about learning: It requires the active encoding of material. Several pedagogical features in particular encourage students to become actively involved in what they are reading, including **chapter opening survey questions** that allow students to compare their own perceptions about psychological topics with those of other students taking the course; a **Taking Psychology with You** feature in each chapter that illustrates the practical implications of psychological research for individuals, groups, institutions, and society; our *new* **Revisiting the Classics** and **Replication Check** features; **interactive review tables**; a **running glossary** that defines boldfaced technical terms where they occur for handy reference and study; carefully selected **videos** in each chapter, including a *new* interactive animated series created by the authors called **Critical Thinking Illustrated** that comes at the end of each chapter; **chapter outlines**; and **chapter summaries** in paragraph form to help students review.

The Importance of Testing Yourself on What You've Studied

In our years of teaching, we have found that certain study strategies can greatly improve learning, and so we'd like to offer you, our reader, the following suggestions. Do not try to read this text the way you might read a novel, taking in large chunks at a sitting. If you are like most students, your favorite strategy is to read the text and your notes, and then simply read them again, but this is not really the best way to learn.

If you could do just one thing that would improve your learning and improve your grades, it is this: Test yourself early, often, and repeatedly on what you've studied. Ask yourself questions, answer them, and then go back and restudy what you didn't know. Test yourself again and again until you learn the material. Even when you have learned it, you need to keep testing yourself regularly over the semester so that what you've learned stays learned. Within Chapter 1, we provide you with some other proven techniques to help you learn.

To get the most from your studying, we recommend that you read only part of each chapter at a time. Instead of simply reading silently, nodding along saying "hmmmmm" to yourself, try to restate what you have read in your own words at the end of each section. At specific points in each chapter, you will find **Journal Writing Prompts** that challenge you to not just recall what you've learned, but to actively develop your understanding of the material. These exercises will help you to discover what you know or still don't understand.

We have never gotten over our own initial excitement about psychology, and we have done everything we can think of to make the field as lively and absorbing for you as it is for us. However, what you bring to your studies is as important as what we have written. This text will remain only a collection of paragraphs unless you choose to read actively, using the many active-learning and critical-thinking features we have provided.

Psychology can make a real difference in your own life, and we hope you will enjoy studying it in this text. Welcome to the field! Thank you for accepting our *Invitation to Psychology*.

Carole Wade

Carol Tavris

Sam Sommers

Lisa Shin

Content Highlights

Changes in the 8th Edition

In the 8th edition of *Invitation to Psychology*, we have retained the core concepts that characterized previous editions—an emphasis on critical thinking, applications to culture and human diversity, insights from research ranging from the biological and neuroscientific to the more clinically and social science oriented—and added opportunities for students to test themselves on the material as they're learning it. We have also added several new features to this edition:

- At the end of each chapter, our new **Critical Thinking Illustrated** feature uses the steps of critical thinking to analyze a claim related to a topic from each chapter using short animated video clips and interactive activities.
- Each chapter includes a new **Revisiting the Classics** feature, in which we critically examine the methods, conclusions, and continuing implications of a well-known study from the past.
- Also new to this edition is our **Replication Check** feature, which appears as a brief paragraph multiple times in each chapter, highlighting research findings that replication efforts have identified as particularly robust.

We've taken care to present the chapters in such a way that they can be easily reordered in Revel or however you teach your course. Each chapter continues to include a Taking Psychology with You section devoted to various lessons that we hope readers will be able to apply to their own lives. As always, in every chapter, we have updated the research to reflect progress in the field and cutting-edge discoveries. Here are a few highlights:

- Application of psychology to understanding the phenomenon of "fake news."
- New information on computer-based cognitive training and the recent controversy concerning whether such training can improve cognition and prevent brain aging or dementia.
- New coverage of the effects of cannabidiol (CBD), a cannabis-derived compound that has been appearing in skincare and dietary supplement products in the last few years.
- Data on the nature and impacts of "sexting" among young people.
- New coverage on the relationship between stress, inflammation, and heart disease.
- Analysis of psychological perspectives related to police racial bias and the #MeToo movement.
- New coverage of how media depictions shape people's attitudes and feelings toward mental illness.
- Expanded focus on recent real-world events and popular culture to illustrate psychological principles and spark students' curiosity. In particular, new examples throughout related to the COVID-19 crisis, including implications for learning, memory, sleep, social connection, and mental health.

In addition, all content is mapped to revised **learning objectives**, which highlight the major concepts throughout each chapter. The complete list of learning objectives for each chapter can be found in the *Instructor's Resource Manual*. Test Bank items are also keyed to these learning objectives.

Teaching and Learning Resources

As valuable as a good text is, it is one element of a comprehensive learning package. We have made every effort to provide high-quality instructor and student supplements that will save you preparation time and enhance the classroom experience.

Revel: Educational Technology Designed for the Way Today's Students Read, Think, and Learn

When students are engaged deeply, they learn more effectively and perform better in their courses. This simple fact inspired the creation of Revel: an immersive learning experience designed for the way today's students read, think, and learn. Built in collaboration with educators and students nationwide, Revel is the newest, fully digital way to deliver respected Pearson content.

Revel enlivens course content with media interactives and assessments—integrated directly within the authors' narrative—that provide opportunities for students to read about and practice course material in tandem. This immersive educational technology boosts student engagement, which leads to better understanding of concepts and improved performance throughout the course.

Learn more about Revel

www.pearsonhighered.com/revel/

Foster Critical Thinking Through Writing

Writing Solutions in Revel enable educators to integrate writing—among the best ways to foster and assess critical thinking—into the course without significantly impacting their grading burden. With more flexible grading options, instructors can create and grade their own prompts. Or they can use a Pearson-created

prompt, grade the first batch of assignments, and let the assisted auto-scoring functionality in Revel do the rest.

Supplements

The following instructor supplements can be downloaded from the Instructor's Resource Center website **(www.pearsonhighered.com/irc)** or accessed from the Resources tab in the Revel course.

Test Bank (ISBN 9780135177884)

This test bank contains over 3,000 multiple-choice, true/false, short-answer, and essay questions. An additional feature for the test bank is the inclusion of *rationales for the multiple-choice questions*. The rationales help instructors evaluate the questions they are choosing for their tests and give instructors the option to use the rationales as an answer key for their students.

A Total Assessment Guide chapter overview makes creating tests easier by listing all of the test items in an easy-to-reference grid. All questions (categorized at the skill levels of remember the facts, understand the concepts, apply what you know, and analyze it) are assigned difficulty levels and correlated to the chapter's learning objectives and the American Psychological Association (APA) **learning objectives**.

Pearson MyTest (ISBN 9780135179383)

The 8th edition test bank is also available through Pearson MyTest (**www.pearsonmytest.com**), a powerful assessment-generation program that helps instructors easily create and print quizzes and exams. Instructors can write questions and tests online, allowing them flexibility and the ability to efficiently manage assessments at any time, anywhere. Instructors can easily access existing questions and edit, create, and store using simple drag-and-drop and Word-like controls. Data on each question provide answers and question types, mapped to the appropriate learning objective.

Instructor's Resource Manual (ISBN 9780135177853)

The *Instructor's Resource Manual* includes a chapter summary, a detailed Chapter Lecture Outline, Lecture Launcher suggestions that draw on classic and current research findings, classroom-tested Student Activities, learning objectives for each chapter, and more resources to improve your classroom presentations.

Video PowerPoint Slides (ISBN 9780137391776)

Bring design into the classroom, drawing students into the lecture and providing appealing interactive activities, visuals, and videos. The slides are built around the text's learning objectives and offer direct links to interactive exercises, simulations, and activities.

Standard Lecture PowerPoint Slides (ISBN 9780135177877)

These accessible, standard Lecture PowerPoint slides provide an active format for presenting concepts from each chapter and feature relevant figures and tables from the text.

Art PowerPoint Slides (ISBN 9780135179468)

These slides contain only the photos, figures, and line art from the text.

Psychobabble and Biobunk Using Psychological Science to Think Critically About Popular Psychology, 3rd edition (ISBN 9780205015917)

By Carol Tavris: This updated collection of book reviews and essays is tailored to the critical thinking guidelines described in this text.

About the Authors

Carole Wade earned her Ph.D. in cognitive psychology at Stanford University. She began her academic career at the University of New Mexico, where she taught courses in psycholinguistics and developed the first course at the university on the psychology of gender. She was professor of psychology for 10 years at San Diego Mesa College and then taught at College of Marin and Dominican University of California. Dr. Wade has written and lectured widely on critical thinking and the enhancement of psychology education. In addition to this text, she and Carol Tavris have written *Psychology; Psychology in Perspective*; and *The Longest War: Sex Differences in Perspective*.

Carol Tavris earned her Ph.D. in the interdisciplinary program in social psychology at the University of Michigan. She writes and lectures extensively on diverse topics in psychological science and critical thinking. Dr. Tavris is co-author with Elliot Aronson of *Mistakes Were Made (But Not by Me): Why We Justify Foolish Beliefs, Bad Decisions, and Hurtful Acts*. She is also author of *The Mismeasure of Woman* and *Anger: The Misunderstood Emotion*. Many of her book reviews and opinion essays have been collected in *Psychobabble and Biobunk: Using Psychology to Think Critically About Issues in the News*.

Samuel R. Sommers earned his Ph.D. in psychology at the University of Michigan and has been a professor of psychology at Tufts University since 2003, where he currently serves as Department Chair. He is a social psychologist whose research focuses on issues related to racial equity and diversity, with a frequent focus on the intersection of psychology and law. Dr. Sommers teaches courses in Experimental Psychology, Social Psychology, and Psychology and Law, and team-teaches Introduction to Psychology and a course on Psychological Lessons for Coping with COVID-19 with Dr. Shin. In addition to this text, he is a co-author of the Aronson et al. *Social Psychology* textbook and has written two general audience books, *Situations Matter: Understanding How Context Transforms Your World*, and *This Is Your Brain on Sports: The Science of Underdogs, the Value of Rivalry, and What We Can Learn from the T-Shirt Cannon*.

Lisa M. Shin earned her Ph.D. in psychology at Harvard University, and completed a postdoctoral fellowship in the Department of Psychiatry at The Massachusetts General Hospital/Harvard Medical School. She has been on the faculty at Tufts University since 1998, where she is currently Director of Undergraduate Studies in the Department of Psychology. Dr. Shin's research involves examining brain function and cognitive processing in patients with anxiety disorders, particularly posttraumatic stress disorder (PTSD). Dr. Shin teaches courses in Research Methods in Clinical Psychology, Biological Bases of Psychopathology, and Emotion and Memory, and team-teaches Introduction to Psychology and a course on Psychological Lessons for Coping with COVID-19 with Dr. Sommers.

Authors' Acknowledgments

Like any cooperative effort, writing a book requires a support system. We are indebted to the reviewers of this and previous editions of this text for their many insightful and substantive suggestions and for their work on supplements.

We are also grateful to the members of our superb editorial and production teams at Pearson, who have unfailingly come through for us on every edition of this complex project. With regard to this edition, from our first meeting in Hoboken to every virtual meeting that has followed since, this collaboration has been a distinct pleasure and one that we look forward to for many years to come. We recognize and appreciate how lucky we are to be part of such a nonpareil team; thank you for that.

Thank you to our editors: Kelli Strieby and Matt Summers, for bringing together this configuration of authors and always giving us what we needed to produce a great book; and Marita Sermolins-Bley, who kept things running smoothly, helped shaped the content and all of the text's features, and never drowned in our email barrage. Consider this: It's been terrific working with you and the entire Pearson family, including (but not limited to) Pamela Chirls, Debi Henion, Lisa Mafrici, Heather Taylor, and Lacey Vitetta. We look forward to getting to see you again in person someday soon; we're overdue for a few dinners out by now. We also thank those colleagues who were generous enough to serve as reviewers for the previous edition of this textbook:

Steven Alessandri, Rosemont College
Martha Knight-Oakley, Warren Wilson College
Anjana Patel, Rowan University
Edison Perdomo, Central State University
Elfie Neber, Great Falls College–Montana State University
Megan St. Peters, Ferrum College

We would also like to thank all those individuals whose contributions to this endeavor were more personal than professional. They know who they are, but they should still be reminded of our appreciation in print. From all four of us, the deepest of thanks and appreciation to the following motley crew: Abigail, Dee, Gianna, Howard, Jeff, Lou, Luisa, Lynn, Marilyn, Pat, Ronan, and Sophia. Thanks to our colleagues for their support, stimulation, and welcomed diversions (yes, we're talking to you, Heather and Keith). And last but not least, we recognize several decades of students, for making it fun for us to come to work each day (or connect via webcam these days) and for teaching us just as much as we teach them.

Carole Wade
Carol Tavris
Sam Sommers
Lisa Shin

Learning Outcomes and Assessment

Goals and Standards

In recent years, many psychology departments focus on core competencies and how methods of assessment can better enhance students' learning. In response to this need, in 2008, the American Psychological Association (APA) established ten recommended goals for the undergraduate psychology major. These goals were revised in 2013 and currently cover five goals. Specific learning outcomes have been established for each goal, and suggestions are provided on how best to tie assessment practices to these goals. In writing this text, we have used the APA goals and assessment recommendations as guidelines for structuring content and integrating the teaching and homework materials. For details on the APA learning goals and assessment guidelines, please see www.apa.org/.

Based on APA recommendations, each chapter is structured around detailed learning objectives. All of the instructor and student resources are also organized around these objectives, making the text and resources a fully integrated system of study. The flexibility of these resources allows instructors to choose which learning objectives are important in their courses as well as which content they want their students to focus on.

APA Correlation for Wade Tavris Sommers Shin 8e

The APA Guidelines for the Undergraduate Psychology Major, Version 2.0

APA Learning Outcomes and Objectives	Text Learning Objectives and Features
Goal 1: Knowledge Base in Psychology	
1.1	*Learning Objectives: 1.1a, 1.1b, 1.1c, 1.1d, 1.2a, 1.2b, 1.3a, 1.3b, 1.4a, 1.4b, 1.5a, 1.5b, 1.5c, 1.6a, 1.6b, 2.1a, 2.1b, 2.2a, 2.2b, 2.2c, 2.2d, 2.2e, 2.3a, 2.3b, 2.4a, 2.4b, 2.4c, 2.4d, 2.4e, 2.4f, 2.4g, 2.5a, 2.5b, 2.6a, 2.6b, 2.6c, 3.1a, 3.1b, 3.1c, 3.1d, 3.2a, 3.2b, 3.2c, 3.2d, 3.2e, 3.3a, 3.3b, 3.3c, 3.4a, 3.4b, 3.4c, 3.4d, 4.1a, 4.1b, 4.2a, 4.2b, 4.3a, 4.3b, 4.4a, 4.4b, 4.5a, 4.5b, 4.5c, 5.1a, 5.1b, 5.1c, 5.3a, 5.3b, 5.4a, 5.4b, 5.5a, 5.5b, 5.6a, 5.6b, 6.1a, 6.1b, 6.2a, 6.2b, 6.2c, 6.3a, 6.3b, 6.4a, 6.5a, 6.5b, 6.5c, 6.6a, 6.6b, 6.6c, 7.1a, 7.1b, 7.1c, 7.1d, 7.2a, 7.2b, 7.2c, 7.2d, 7.3a, 7.3b, 7.3c, 7.3d, 7.4a, 7.4b, 7.4c, 8.1a, 8.1b, 8.1c, 8.1d, 8.2a, 8.2b, 8.2c, 8.3a, 8.3b, 8.3c, 8.3d, 8.4a, 8.4c, 9.1a, 9.1b, 9.1c, 9.2a, 9.2b, 9.2c, 9.3a, 9.3b, 9.4a, 9.4b, 9.4c, 9.5a, 9.5b, 9.5c, 10.1a, 10.1b, 10.1c, 10.2a, 10.2b, 10.3a, 10.3b, 10.4a, 10.4b, 10.5a, 10.5b, 10.6a, 10.6b, 10.6c, 11.1a, 11.1b, 11.1c, 11.1d, 11.2a, 11.2b, 11.2c, 11.3a, 11.3b, 11.3c, 11.3d, 11.4a, 11.4b, 11.4c, 11.4d, 11.5a, 11.5c, 12.1a, 12.1b, 12.1c, 12.2a, 12.2b, 12.3a, 12.3b, 12.4a, 12.4b, 12.4c, 12.5a, 12.5b, 12.6a, 12.6b, 12.6c, 13.1a, 13.1b, 13.1cc, 13.2a, 13.2b, 13.2c, 13.3a, 13.3b, 13.4a, 13.4b, 13.5a, 13.5b, 13.5c, 13.6a, 13.6b, 13.7a, 13.7b, 13.8a, 13.8b, 14.1a, 14.1b, 14.2a, 14.2b, 14.2c, 14.2d, 14.3a, 14.3b, 14.3c, 14.3d*
1.2	*Learning Objectives: 1.1a, 1.1b, 1.1c, 1.2b, 1.3a, 1.3b, 1.4a, 1.4b, 1.5a, 1.5b, 1.5c, 1.6a, 1.6b, 1.6c, 2.1a, 2.1b, 2.2e, 2.3a, 2.3b, 2.5a, 2.6b, 3.1a, 3.1b, 3.1c, 3.1d, 3.2a, 3.2b, 3.2c, 3.2d, 3.2e, 3.3a, 3.3b, 3.3c, 3.4a, 3.4b, 3.4c, 3.4d, 4.1a, 4.2a, 4.2b, 4.3a, 4.3b, 4.4a, 4.4b, 4.5a, 4.5b, 4.5c, 5.1a, 5.1b, 5.1c, 5.3a, 5.3b, 5.4a, 5.4b, 5.5a, 5.5b, 5.6a, 5.6b, 6.1a, 6.1b, 6.2a, 6.2b, 6.2c, 6.3a, 6.3b, 6.4a, 6.5a, 6.5b, 6.5c, 6.6a, 6.6b, 7.1a, 7.1b, 7.1c, 7.1d, 7.2a, 7.2b, 7.2c, 7.2d, 7.3a, 7.3b, 7.3c, 7.3d, 7.4a, 7.4b, 7.4c, 8.1a, 8.1d, 8.2c, 8.3a, 8.3b, 8.3c, 8.3d, 9.1a, 9.1b, 9.1c, 9.2a, 9.2b, 9.2c, 9.3a, 9.3b, 9.4a, 9.4b, 9.4c, 9.5a, 9.5b, 9.5c, 10.1a, 10.1b, 10.1c, 10.2a, 10.2b, 10.3a, 10.3b, 10.4a, 10.4b, 10.5a, 10.5b, 10.6a, 10.6b, 10.6c, 11.1a, 11.1b, 11.1c, 11.1d, 11.2a, 11.2b, 11.3a, 11.3b, 11.3c, 11.3d, 11.4a, 11.4b, 11.4c, 11.5a, 11.5c, 12.1a, 12.1b, 12.1c, 12.2a, 12.2b, 12.3a, 12.3b, 12.4a, 12.4b, 12.4c, 12.5a, 12.5b, 12.6a, 12.6b, 12.6c, 13.2a, 13.2b, 13.2c, 13.3a, 13.3b, 13.4a, 13.4b, 13.5a, 13.5b, 13.5c, 13.6a, 13.6b, 13.7a, 13.7b, 13.8a, 13.8b, 14.1a, 14.1b, 14.2a, 14.2b, 14.2c, 14.2d, 14.3a, 14.3b, 14.3c, 14.3d*

1.3	*Learning Objectives: 1.2a, 1.2b, 2.6a, 3.1b, 3.1c, 3.2a, 3.2b, 3.2c, 3.4d, 4.2a, 4.2b, 4.3b, 4.4a, 4.4b, 4.5a, 4.5b, 4.5c, 5.1a, 5.2a, 5.2b, 5.2c, 5.2d, 5.3b, 5.5a, 5.5b, 5.6a, 5.6b, 6.3a, 6.3b, 6.3c, 6.5c, 6.6b, 6.6c, 7.1c, 7.1d, 7.2a, 7.2b, 7.2c, 7.2d, 7.3b, 7.3c, 8.1b, 8.1c, 8.1d, 8.2a, 8.2b, 8.2c, 8.3a, 8.3b, 8.3d, 8.4a, 8.4b, 8.4c, 9.1a, 9.1b, 9.2a, 9.2b, 9.2c, 9.3a, 9.3b, 9.3c, 9.4a, 9.4b, 9.4c, 9.5a, 9.5b, 9.5c, 10.1a, 10.2b, 10.3a, 10.4a, 10.5a, 10.5b, 10.6c, 11.1b, 11.1c, 11.1d, 11.2a, 11.2c, 11.3c, 11.3d, 11.5c, 12.1c, 12.6c, 13.1b, 13.6a, 13.6b, 13.7b, 14.1a, 14.2a, 14.2b, 14.2c, 14.2d, 14.3b, 14.3c, 14.3d*

Goal 2: Scientific Inquiry and Critical Thinking

2.1	*Learning Objectives: 1.1c, 1.2a, 1.2b, 1.6b, 2.6b, 2.6c, 3.2c, 4.3a, 4.3b, 4.4b, 5.1c, 5.5a, 6.2b, 6.3a, 6.6a, 7.2a, 7.2b, 7.2c, 7.2d, 7.3b, 7.4a, 7.4b, 7.4c, 8.1b, 8.1c, 8.2a, 8.3b, 9.1a, 9.1b, 9.1c, 9.2a, 9.2b, 10.2a, 10.4a, 11.1a, 11.1d, 11.2d, 11.3d, 12.1a, 12.1b, 12.1c, 12.3b, 12.4b, 12.4c, 13.2a, 13.3a, 13.3b, 13.4a, 13.5a, 13.5b, 13.6a, 13.6b, 13.7a, 13.7b, 13.8b, 14.3a, 14.3c*
2.2	*Learning Objectives: 1.6a, 2.5b*
2.3	*Learning Objectives: 1.2a, 1.2b, 5.2a, 5.2b, 5.2c, 5.2d*
2.4	*Learning Objectives: 1.1d, 1.3a, 1.3b, 1.4a, 1.4b, 1.5a, 1.5b, 1.5c, 1.6a, 1.6b, 1.6c, 2.3a, 2.3b, 3.1b, 7.3b, 10.2a, 12.1c, 12.6c, 14.3a, 14.3c*
2.5	*Learning Objectives: 1.1b, 1.1c, 1.6b, 2.6b, 5.4b, 6.5c, 7.3b, 8.2b, 8.3a, 8.3b, 9.2a, 9.2b, 9.2c, 10.1b, 10.2a, 10.3a, 10.6a, 11.2b, 12.1c, 12.5a, 12.5b, 13.7a, 14.2a, 14.3d*

Goal 3: Ethical and Social Responsibility

3.1	*Learning Objectives: 6.5c, 11.2b, 14.3c*
3.2	*Learning Objectives: 9.4a, 9.4b, 11.4a, 14.3c, 14.3d*
3.3	*Learning Objectives: 4.5a, 4.5b, 4.5c, 6.6c, 7.3b, 8.1d, 8.3b, 8.4a, 9.2a, 9.2b, 9.3a, 9.3b, 10.6c, 11.4a, 11.4b, 11.4c, 11.5a, 11.5b, 11.5c, 12.5a, 13.1a, 13.1b, 14.3a, 14.3b, 14.3d*

Goal 4: Communication

4.1	*Learning Objectives: 1.6a, 1.6b*
4.2	
4.3	

Goal 5: Professional Development

5.1	*Learning Objectives: 1.1d, 1.2a, 1.2b, 2.2c, 2.6a, 3.4d, 4.5a, 4.5b, 4.5c, 5.2a, 5.2b, 5.2c, 5.2d, 6.4a, 6.5a, 6.6c, 7.1c, 7.1d, 7.3a, 7.3b, 7.3c, 8.1b, 8.1c, 8.1d, 8.3b, 9.3b, 9.4a, 9.4b, 9.4c, 9.5a, 9.5b, 9.5c, 11.4a, 11.4b, 13.1a, 13.1b, 14.1a, 14.3a, 14.3b*
5.2	*Learning Objectives: 8.4a*
5.3	*Learning Objectives: 11.3a, 11.3b*
5.4	*Learning Objectives: 11.3a, 11.3b*
5.5	

APA Goals are reinforced throughout the program with Learning Tools: Journal Prompts, Shared Writing, Essays to Assign, Experiment Simulations, Video Quizzes, and the instructor's teaching and assessment package.

Source: Based on APA Guidelines for the Undergraduate Psychology Major, Version 2.0.

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Chapter 1

What Is Psychology?

Courtesy of Mark Bussell

Learning Objectives

LO 1.1.A Define psychology, describe how it addresses daily life from a scientific perspective, and differentiate it from pseudoscience and common sense.

LO 1.1.B Discuss some of the early perspectives and individuals that were influential forerunners of modern psychology.

LO 1.1.C List and describe four major perspectives in modern psychology.

LO 1.1.D Describe the roles that psychologists play in research, practice, and the community.

LO 1.2.A Explain why critical thinking applies to all scientific pursuits and why it should also guide everyday judgments and decision-making.

LO 1.2.B Identify important steps to critical thinking, and give an example of how each applies to the science of psychology.

LO 1.3.A Describe the ways participants are selected for psychological studies and how the method of selection can influence interpretations of a study's outcomes.

LO 1.3.B Discuss the advantages and disadvantages of using different descriptive methods such as case studies, observational methods, tests, and surveys.

LO 1.4.A Illustrate with an example how a correlation coefficient gives both the size and direction of the relationship between two variables.

LO 1.4.B Explain why a correlation between two variables does not establish a causal relationship between those variables.

LO 1.5.A Distinguish an independent variable from a dependent variable, and give an example of each.

LO 1.5.B Explain how random assignment helps create conditions in an experiment, and explain the difference between an experimental group and a control group.

LO 1.5.C Discuss the methodological advantages, limitations, and ethical considerations related to experimental research design.

LO 1.6.A Explain how descriptive statistics can be used to compare the performance of groups of research participants.

LO 1.6.B Explain what a statistically significant research result does and does not mean.

LO 1.6.C Describe why openness and replication are important qualities of the scientific enterprise.

What About You?

Interactive

Psychology is the scientific study of how we think, feel, and act on a daily basis. As we begin this chapter, we have a question for you about your own life. We hope that this will be just the first of several times you think about your own life experiences when reading this chapter.

Do you consider yourself good at predicting how people around you will behave and react under different circumstances?

Every day, the world witnesses tales of cowardice and heroism, triumph and failure, playfulness and terror, creativity and folly, love and hate. Human nature runs a broad continuum, from the terrific to the horrific. And the scientific study of why we think, feel, and act the way we do?

That's psychology.

When your authors tell people that we are psychologists, the first response is usually a variation on, "Ooh, are you analyzing me right now?" (We always say yes.) Sometimes this is followed by, "Are you reading my mind?" (Again, just for fun, we always say yes.) While it is true that some psychologists see patients (and only a subset of these professionals make use of psychoanalysis), many of us do not. And when we're being honest, we ultimately have to admit that we can't read minds either.

Even though people often associate psychology with mental disorders, personal problems, and psychotherapy, psychologists take as their subject the entire spectrum of beautiful and brutish things that human beings do—the kinds of things you see and read and hear about every day. Psychologists want to know why some people seem to be outgoing extraverts, whereas others prefer to blend in quietly. They ask why some people cheat and lie in the pursuit of success, and how those who do so rationalize their dishonesty to themselves and others. They explore the reasons that nations and ethnic groups so often see the world in terms of "us versus them" and resort to armed conflict to settle their differences. They investigate the mysteries of human memory, from people who can learn in mere minutes the sequence of an entire deck of playing cards to why it is that some of us can't remember the four things we need to buy at the grocery store.

In short: Psychologists are interested in how ordinary human beings learn, remember, solve problems, sense and interpret the world, feel emotion, and get along (or fail to get along) with friends and family members. They are therefore as likely to study commonplace experiences—raising children, gossiping, the stress of rush-hour traffic, daydreaming, making love, making a living—as exceptional ones.

If you have ever wondered what makes people tick, or if you want to gain insight into your own behavior, then you are in the right course. We will begin every chapter with a survey question to prompt you to think about your own life and how it relates to the topics we are about to explore. In this chapter, we asked if you are good at predicting how people around you will behave. A majority of students in our classes typically say yes to this question. That's great! But we promise that after taking this course, you'll be even better at it. And we also

promise that by the end of this text, at least one—and probably more!—assumption about human nature that you've previously relied upon will be proven to be more myth than truth.

1.1 Psychology, Pseudoscience, and Popular Opinion

To get a clear picture of the field, you need to know about its methods, its findings, and its ways of interpreting information. We will get to all this; we promise. But first, let's look more closely at what psychology is, and equally importantly, what it is *not*.

We have (another) question for you: When you hear *psychology*, what is the first word you think of? We asked this question of hundreds of our own students, over email, before the very first day of our introductory psychology course. Their responses can be found in the word cloud below; the bigger a word in this image, the greater the number of students who gave that response. We will revisit this question (and this word cloud) at the end of the text, to see how students' responses do and don't change as they experience their own introduction to psychology.

1.1.A What Psychology Is and Is Not

LO 1.1.A **Define psychology, describe how it addresses daily life from a scientific perspective, and differentiate it from pseudoscience and common sense.**

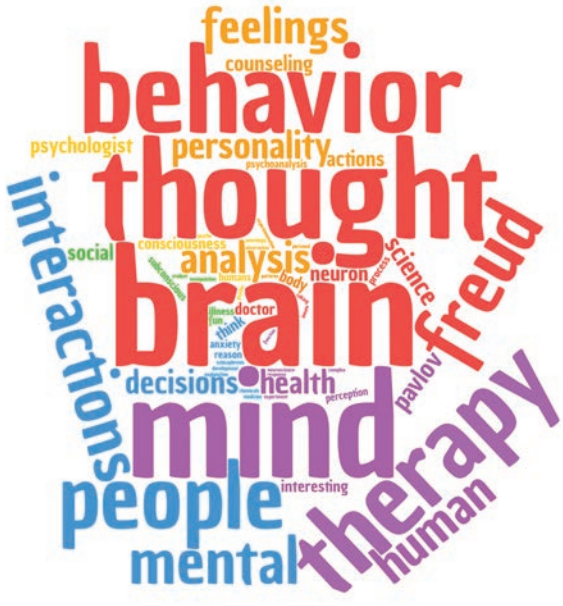
Psychology can be defined generally as the scientific discipline concerned with behavior and mental processes and how they are affected by an organism's physical state, mental state, and external environment. Perhaps just as informatively, let's consider what psychology is *not*. First, the psychology that you are about to study bears little relation to the popular psychology ("pop psych") often found in self-help books or on talk shows. In recent decades, the public's appetite for psychological information has created a huge market for "psychobabble": pseudoscience covered by a veneer of psychological language. Pseudoscience (*pseudo* means "false") promises quick fixes to life's problems, such as resolving your unhappiness as an adult by "reliving" the supposed trauma of your birth or becoming more creative on the job by "reprogramming" your brain. Serious psychology is more complex, more informative, and far more helpful than such psychobabble because it is based on rigorous research and **empirical** evidence—evidence gathered by careful observation, experimentation, or measurement.

Because so many pop-psych ideas have filtered into the media, education, the law, and politics, it is important to develop an ability to distinguish between psychobabble and serious psychology and between unsubstantiated popular opinion and scientific findings based on research evidence. Such skills will serve you well in your introductory psychology class, but also in other courses and in your efforts to become a more informed citizen and consumer in an era teeming with infomercials, self-proclaimed experts on YouTube, "fake news," and a variety of other dubious sources of information. Indeed, we will focus on the importance of critical thinking in psychology throughout this text, starting with the journal prompt that you will find at the end of each section of each chapter.

Second, serious psychology differs radically from nonscientific competitors such as fortune-telling, numerology, and astrology. Yes, promoters of these systems—like psychologists—try to explain people's problems and predict or guide their behavior: If you are having romantic problems, an astrologer may advise you to choose an Aries instead of an Aquarius as your next love. Yet, whenever the predictions of psychics, astrologers, and the like are put to the test, they turn out to be so vague as to be

psychology
The scientific discipline concerned with behavior and mental processes and how they are affected by an organism's physical state, mental state, and external environment.

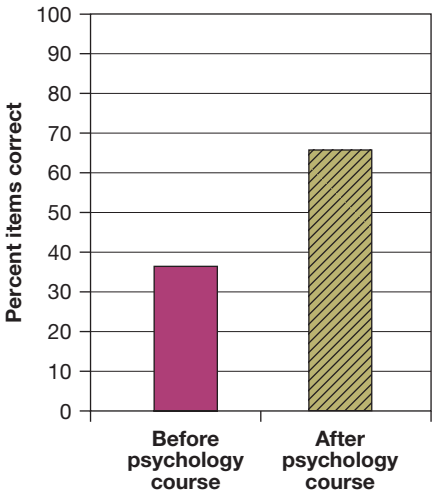
empirical
Relying on or derived from observation, experimentation, or measurement.



Courtesy of Samuel Sommers

What do you think of when you hear the word *psychology*? Give us a semester and a dozen or so chapters, and let's see if your answers to this question change at all . . . .

Figure 1.1 Psychology: It's Not Just "Common Sense"



On the first day of class, students in an introductory psychology course actually did worse than chance on a true/false psychological information questionnaire. But by the end of the semester, after they had learned to examine the scientific evidence for their beliefs, their performance had improved.

Source: Adapted from Taylor & Kowalski, 2004.

meaningless (e.g., "Your spirituality will increase next year") or just plain wrong, as in the case of the doomsday predictions that have occurred for centuries, especially during times of great social change and anxiety (Shaffer & Jadwiszczok, 2010). Contrary to what you might think from watching TV shows or going to psychic websites, psychics don't regularly find missing children, identify serial killers, or help police solve crimes (Radford, 2011).

Third, psychology is not just another name for common sense. Often, psychological research produces findings that directly contradict prevailing beliefs, and throughout the chapters that follow, you will discover many of them. Are unhappy memories really repressed and then accurately recalled years later, as if they had been recorded in perfect detail in the brain? Do policies of abstinence from alcohol reduce rates of alcoholism? If you play Beethoven to your infant, will your child become smarter? Can hypnosis help you accurately remember your third birthday or allow you to perform feats that would otherwise be impossible? Many people would answer these questions with a "yes," but they would be wrong. In Revel, watch the video *Debunking Myths 1* to see other common but mistaken beliefs.

At the start of an introductory psychology course, many students hold beliefs that have been promoted in the popular culture, or are based on "common sense," but that are not scientifically supported. When two instructors gave their introductory psychology students a list of such misconceptions in a true/false questionnaire on the first day of class—a questionnaire consisting entirely of false statements—the students accurately detected the false statements only 38.5 percent of the time, which is actually worse than chance (Taylor & Kowalski, 2004). By the last week of class, however, when the students took a test containing all of the earlier items, their overall accuracy was much better: 66.3 percent (see Figure 1.1). Although there was still room for improvement, the students had also lost confidence in their remaining misconceptions, suggesting that they had learned one of the most important lessons in science: Uncertainty about untested assumptions and beliefs is a good thing.

Psychological findings need not be surprising to be important. Sometimes they validate common beliefs and then explain or extend them. Like all scientists, psychological researchers strive not only to discover new phenomena and correct mistaken ideas, but also to deepen our understanding of an already familiar world—for example, by identifying the varieties of love, the origins of violence, the reasons different people can hear the same recorded sound in different ways, and why it is that a catchy musical rhythm can lift our hearts. Fully understanding basic human processes that most people take for granted often involves examining them in a new light, turning common wisdom on its head for a different perspective, or shaking up cherished beliefs to see why and when they hold true. In fact, psychology has this potential not only to shape how ordinary people view human nature, but also to influence the thinking of researchers in other fields. We learn from analyses of how often scientists in one discipline cite the work of scientists in other disciplines, that psychology is a "hub science," in that it serves as central link to surrounding research in many other fields (Cacioppo, 2013).

If you don't want to take our word for the importance and potential influence of psychology—after all, we might be just a tad biased here—maybe you'll be more persuaded by former U.S. president Barack Obama, who wrote in an executive order in 2015 that "research findings from fields such as behavioral economics and psychology . . . can be used to design government policies to better serve the American people." You can learn more about the many ways psychology impacts daily lives in Revel with the video *Asking the Tough Questions*.

1.1.B The Birth of Modern Psychology

LO 1.1.B **Discuss some of the early perspectives and individuals that were influential forerunners of modern psychology.**

Many of the great thinkers of history, from Aristotle to Zoroaster, raised questions that today would be called psychological. They wanted to know how people take in information through their senses, use information to solve problems, and become motivated to act in

brave or villainous ways. They wondered about the elusive nature of emotion, and whether it controls us or is something we can control. Like today's psychologists, they wanted to *describe*, *predict*, *understand*, and *modify* behavior to add to human knowledge. But unlike modern psychologists, scholars of the past did not rely heavily on empirical evidence. Often, their observations were based on anecdotes or descriptions of individual cases.

This does not mean that psychology's forerunners were always wrong. Hippocrates (c. 460–377 B.C.E.), the Greek physician known as the founder of modern medicine, observed patients with head injuries and inferred that the brain must be the ultimate source of "our pleasures, joys, laughter, and jests as well as our sorrows, pains, griefs, and tears." Indeed, it is. In the 17th century, the English philosopher John Locke (1643–1704) argued that the mind works by associating ideas arising from experience, and this notion continues to influence many psychologists today.

But without empirical methods, the forerunners of psychology also committed terrible blunders. One was **phrenology** (Greek for "study of the mind"), which became wildly popular in Europe and the United States in the early 1800s. Phrenologists argued that different brain areas accounted for specific personality traits, such as stinginess and religiosity. Moreover, they said, such traits could be read from bumps on the skull. Thieves supposedly had large bumps above the ears. So how to account for people who had these "stealing bumps" but who were not thieves? Phrenologists explained this away by saying that the person's thieving impulses were being held in check by *other* bumps representing positive traits. In this manner, the so-called data could be used to support any conclusion. But phrenology was a classic pseudoscience—sheer nonsense.

At about the time that phrenology was peaking in popularity, several pioneering men and women in Europe and the United States were starting to study psychological issues using scientific methods. In 1879, Wilhelm Wundt [VIL-helm Voont] officially established the first psychological laboratory in Leipzig, Germany. Wundt (1832–1920), who was trained in medicine and philosophy, promoted a method called *trained introspection*, in which volunteers were taught to carefully observe, analyze, and describe their own sensations and emotional reactions. Wundt's introspectors might take as long as 20 minutes to report their inner experiences during a 1.5-second experiment. The goal was to reduce behavior to its most basic elements, much as a chemist might break down water into hydrogen and oxygen. Most psychologists eventually rejected trained introspection as too subjective, but Wundt is still usually credited for formally initiating the movement to make psychology a science.

Another early approach to scientific psychology, called **functionalism**, emphasized the purpose (or function) of behavior, as opposed to its description. One of its leaders was William James (1842–1910), an American philosopher, physician, and psychologist. Attempting to grasp the nature of the mind through introspection, wrote James (1890/1950), is "like seizing a spinning top to catch its motion." Inspired in part by the evolutionary theories of British naturalist Charles Darwin (1809–1882), James and other functionalists instead asked how various actions help a person or animal adapt to the environment. This emphasis on the causes and consequences of behavior was to set the course of psychological science.

The 19th century also saw the development of psychological therapies. The one that would have the greatest impact had roots in Vienna, Austria. While researchers were at work in their laboratories, struggling to establish psychology as a science, Sigmund Freud (1856–1939), an obscure physician, was in his office listening to his patients' reports of depression, nervousness, and obsessive habits. Freud became convinced that many of these symptoms had mental, not bodily, causes. His patients' distress, he concluded, stemmed from childhood conflicts and traumas that were too threatening to be remembered consciously, such as forbidden sexual feelings for a parent. Freud's ideas were not exactly an overnight sensation. His first book, *The Interpretation of Dreams* (1900/1953), sold only 600 copies in the eight years following its publication. Eventually, however, his ideas evolved into a broad theory of personality and a method of psychotherapy, both of which became known as **psychoanalysis**.

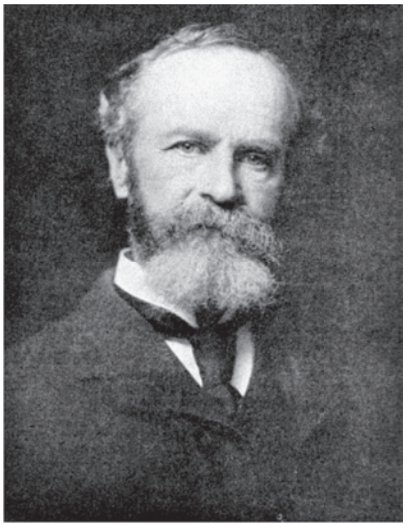
phrenology
The now-discredited theory that different brain areas account for specific character and personality traits, which can be "read" from bumps on the skull.

functionalism
An early psychological approach that emphasized the purpose of behavior and consciousness.

psychoanalysis
A theory of personality and a method of psychotherapy, originally formulated by Sigmund Freud, that emphasizes unconscious motives and conflicts.

Pictorial Press Ltd/Alamy Stock Photo

Wilhelm Wundt



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William James

Revisiting the Classics

Sigmund Freud

It is easy, when reading an introductory text, to confuse famous with flawless. Just because researchers, studies, or particular theoretical viewpoints become well known enough to be cited or even **written in bold** in your book does not mean they are immune from careful scrutiny and criticism. Accordingly, once per chapter in this text, you will find a feature like this one, titled *Revisiting the Classics*, in which we will review through a critical lens some of the most famous studies in all of psychology.

In this opening chapter, we turn our critical attention to not a single study, but rather a looming legend of the early decades of psychology, Sigmund Freud. Freud argued that conscious awareness is merely the tip of a mental iceberg. Beneath the visible tip, he said, lies the unconscious part of the mind, containing unrevealed wishes, passions, guilty secrets, unspeakable yearnings, and conflicts between desire and duty. Many of these urges and thoughts are sexual or aggressive in nature, according to Freud. We are not aware of them as we go about our daily business, yet they make themselves known in dreams, slips of the tongue, apparent accidents, and even jokes. Freud (1905a) wrote, "No mortal can keep a secret. If the lips are silent, he chatters with his fingertips; betrayal oozes out of him at every pore."

Freud's perspectives have had an unsurpassed influence on philosophy, popular culture, and public awareness of psychology. Defense mechanisms, dream analysis, Freudian slips, the Oedipal Complex, phallic symbols, the battle of id versus superego . . . these are all concepts that continue to influence popular discourse and depictions of human nature. Today, Freud is as much of a household name as Einstein, even if the two men placed vastly different emphases on the importance of the scientific method.

Indeed, even in his own day, Freudian concepts were far from embraced by empirically oriented scientists. Karl Popper, a fellow Austrian and a famous early 20th century philosopher of science, considered psychoanalysis to be the height of pseudoscience, a conclusion echoed by various critics today as well. Scientific theories, after all, are supposed to have testable predictions and conclusions based on objective empirical data. Freud's ideas, his critics have suggested, exhibit "fundamental departures from the scientific ethos" (Crews, 1996, p. 66).

Why, then, devote attention to Freud in this opening chapter? (And again in later chapters on *Sleep & Consciousness* and *Personality*?) Because few if any early psychologists have had the amount and longevity of impact on both the field and general public. Some practitioners of psychotherapy continue to draw on psychoanalytic ideas today. And a variety of contemporary research areas continue to emphasize unconscious forces and conflicts within individuals—though they do so via a reliance on empirical observation and the scientific method that would have been largely unfamiliar to Freud in his own time.

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Sigmund Freud (1856–1939)

Courtesy of Dr. James Maas, Cornell University

Eleanor Gibson

To this point, our review has included multiple photographs of famous and influential early psychologists. Looking at these photos, what do we learn? For one, it is apparent that in the late 19th century—much as is the case again today—beards were "in." Far more importantly, we should note that these photos of pioneering psychologists are all of men—more specifically, White men.

Progress would come to psychology, as to other scientific fields, albeit slowly and incompletely. Throughout this text, you will learn about women and people of color who made important contributions as psychological scientists and clinicians. For example, consider Eleanor Gibson (1910–2002), who in the late 1950s developed an innovative paradigm known as the visual cliff, a glass-topped surface with a visible drop-off underneath that allowed developmental psychologists to study depth perception among newly mobile infants. Or Mamie Phipps Clark (1917–1983), the second Black student to receive a psychology Ph.D. from Columbia University (her husband, Kenneth, was the first), who went on to become the driving force behind the "doll studies," a series of experiments that

investigated internalized racism among Black children and was cited by the U.S. Supreme Court's historic *Brown v. Board of Education* decision in 1954 that ruled school segregation unconstitutional.

It is encouraging to celebrate the contributions of psychologists such as Gibson and Clark, but it is also important to bear in mind the serious obstacles they had to overcome throughout their careers. Imagine Gibson's excitement as a young woman in her 20s, arriving on campus at Yale University, recently having been accepted into a prestigious Ph.D. program. Imagine her working up the nerve to approach a well-known faculty member, Robert Yerkes, to ask if she could work in his comparative psychology lab, conducting experiments with chimpanzees. And then imagine how it must have felt to have been told by Yerkes, thanks but no thanks: "I have no women in my laboratory" (Rodkey, 2011). Clark's career path as a Black woman was even more daunting. As she once explained in her own words, "Although my husband had earlier secured a teaching position at the City College of New York, following my graduation it soon became apparent to me that a Black female with a Ph.D. in psychology was an unwanted anomaly in New York City in the early 1940s" (Clark, 1983).

Arty Pomerantz/New York Post Archives/© NYP Holdings, Inc./ Getty Images

Mamie Phipps Clark

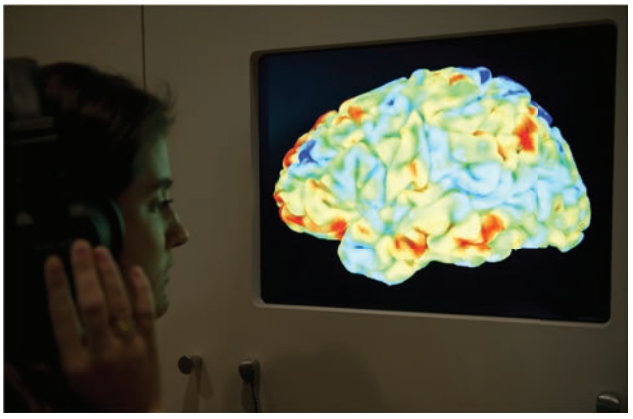
Where does psychology stand today when it comes to diversity? In 1985, only 22 percent of psychology faculty at graduate-degree granting institutions were women. Three decades later, that number was up to 46 percent (American Psychological Association, 2014). Looking at newly hired assistant professors of psychology across *all* types of academic institutions, 58 percent are now women and 44 percent identify as racial minorities (American Psychological Association, 2017). Alas, these numbers continue to be less representative at more senior faculty ranks. And while psychology has made a great deal of progress with regard to diversity and representativeness, when one educational website published its list of the "50 Most Influential Living Psychologists" in 2018, only 13 out of 50 were women and none—zero!—were people of color. In response, some psychologists used their critical-thinking skills to recognize these omissions on social media and to create their own, more representative lists in the effort to celebrate the accomplishments of those colleagues whose work too often goes unrecognized.

In sum, like many disciplines, the early track record of psychology was bleak when it came to diversity. The field has come a long way since then, with contemporary psychological science representing a wide range of perspectives, identities, and demographics, and with careers in psychology open to all individuals regardless of background. And yet, more work remains to be done. Indeed, from its early beginnings in philosophy, natural science, and medicine, psychology has grown into a complex discipline encompassing many specialties, perspectives, and methods. The history of psychology continues to be written on a daily basis; you can explore this history in the interactive timeline in Revel.

1.1.C Major Perspectives in Psychology

LO 1.1.C **List and describe four major perspectives in modern psychology.**

If you had a noisy and rude neighbor, and you asked a group of psychologists to explain why he was such a miserable jerk, you would likely get different answers: It's because of his biological makeup, his belligerent attitude toward the world, the way he has learned to use his nasty temper to get his way, an unhappy family situation, or the customs of his culture. Modern psychological scientists typically approach their investigations from one of four different, although overlapping, approaches: *biological*, *learning*, *cognitive*, and *sociocultural*. Each perspective reflects different questions about human behavior, different assumptions about how the mind works, and, most important, different ways of explaining why people do what they do.



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Psychologists increasingly adopt a biological perspective in understanding behavior, drawing on tools that provide a glimpse into the human body.

biological perspective
A psychological approach that emphasizes bodily events and changes associated with actions, feelings, and thoughts.

evolutionary psychology
A psychological approach emphasizing evolutionary mechanisms that may help explain human commonalities in cognition, development, emotion, social practices, and other areas of behavior.

learning perspective
A psychological approach that emphasizes how the environment and experience affect an individual's actions.

cognitive perspective
A psychological approach that emphasizes mental processes in perception, memory, language, problem solving, and other areas of behavior.

sociocultural perspective
A psychological approach that emphasizes social and cultural influences on behavior.

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Childrearing looks very different in different parts of the world. Cultures vary with regard to how much time young children spend in close physical contact with a caregiver, whether they sleep alone or in a family bed, how many family members they tend to live with, and a wide range of other factors. Psychologists seeking to study the influence of early childhood experiences would want to take into consideration such cultural differences in devising and answering their research questions. Indeed, culture provides an important lens for almost any psychological investigation.

The **biological perspective** focuses on how bodily events affect behavior, feelings, and thoughts. Electrical impulses shoot along the intricate pathways of the nervous system. Hormones course through the bloodstream, telling internal organs to slow down or speed up. Chemical substances flow across the tiny gaps that separate one microscopic brain cell from another. Psychologists who take a biological perspective study how these physical events interact with events in the external environment to produce perceptions, memories, emotions, and vulnerability to mental disorder. They also study how the mind and body interact in illness and health and investigate the contributions of genes in the development of abilities and personality traits. One popular specialty, **evolutionary psychology**, follows in the footsteps of functionalism by focusing on how genetically influenced behavior that was functional or adaptive during our evolutionary past may be reflected in many of our present behaviors, mental processes, and traits. The message of the biological approach is that we cannot really know ourselves if we do not know our bodies.

The **learning perspective** is concerned with how the environment and experience affect the behavior of human beings (and other animals). Within this perspective, *behaviorists* focus on the environmental rewards and punishments that maintain or discourage specific behaviors. Behaviorists do not invoke the mind or mental states to explain behavior. They prefer to stick to what they can observe and measure directly: acts and events taking place in the environment. For example, do you have trouble sticking to a schedule when studying? A behaviorist would identify the environmental factors that might account for this common problem, such as the pleasure you get from hanging out with your friends instead of hitting the books. *Social-cognitive learning theorists* combine elements of behaviorism with research on thoughts, values, expectations, and intentions. They believe that people learn not only by adapting their behavior to the environment, but also by imitating others and by thinking about the events happening around them.

The **cognitive perspective** emphasizes what goes on in people's heads—how people reason, remember, understand language, solve problems, explain experiences, and acquire moral standards. (The word *cognitive* comes from the Latin for "to know.") Using clever methods to infer mental processes from observable behavior, cognitive researchers have been able to study phenomena that were once only the stuff of speculation, such as emotions, motivations, insight, and the kind of "thinking" that goes on without awareness. They design computer programs that model how humans perform complex tasks, discover what goes on in the mind of an infant, and identify types of intelligence not measured by conventional IQ tests. The cognitive approach has inspired an explosion of research on the intricate workings of the mind.

The **sociocultural perspective** focuses on social and cultural forces outside the individual, forces that shape every aspect of behavior. Most of us underestimate the impact of other people, the social context, and cultural rules on nearly everything we do: how we perceive the world, express joy or grief, and treat our friends and enemies. We are like fish that are unaware they live in water, so obvious is water in their lives. Sociocultural psychologists study the water—the social and cultural environments that people "swim" in every day.

Of course, not all psychologists feel they must swear allegiance to one approach or another; many draw on what they take to be the best features of diverse schools of thought. In addition, many psychologists have been affected by social movements and intellectual trends, such as humanism and feminism, that do not fit neatly into any of the major perspectives or that cut across all of them (Eagly et al., 2012). Moreover, despite the diversity of psychological approaches, most psychological scientists agree on basic guidelines about what is and what is not acceptable in their discipline. Nearly all reject supernatural explanations of events—evil spirits, psychic forces, miracles, and so forth. Most believe in the importance of gathering empirical evidence and not relying on hunches or personal beliefs. This insistence on rigorous standards of proof is what sets psychology apart from nonscientific explanations of human experience.

1.1.D What Psychologists Do

LO 1.1.D **Describe the roles that psychologists play in research, practice, and the community.**

What About You?

Interactive

When you hear the word *psychologist*, do you first think of someone who sees patients?

Now you know the main viewpoints and perspectives that guide psychologists in their work. But how do psychologists actually spend their time each day?

If we asked people on the street the preceding survey question, the majority would answer yes. Many psychologists do in fact fit this image, but others do not. The professional activities of psychologists generally fall into three broad categories: (1) teaching and doing research in colleges and universities; (2) providing mental health services, often referred to as *psychological practice*; and (3) conducting research or applying its findings in nonacademic settings such as business, sports, government, law, and the military (see Table 1.1). Some psychologists move flexibly across these areas. A researcher might also provide counseling services in a mental health setting, such as a clinic or a hospital; a university professor might teach, do research, and serve as a consultant in legal cases.

Most psychologists who do research have a doctoral degree (Ph.D.) or doctorate in education (Ed.D.). Some, seeking knowledge for its own sake, work in **basic psychology**. Others, concerned with the practical uses of knowledge, work in **applied psychology**. A psychologist doing basic research might ask, "How does peer pressure influence people's attitudes and behavior?" An applied psychologist might ask, "How can knowledge about peer pressure be used to get college students to quit binge drinking?" The two approaches are complementary, and a researcher or research program can have both basic and applied objectives. Indeed, most basic psychology has the potential for application, and applied research is most effective when grounded in basic psychological principles. Psychologists doing basic and applied research have made important scientific contributions in areas as diverse as health, education, child development, criminal justice, conflict resolution, marketing, industrial design, and urban planning.

basic psychology
The study of psychological issues for the sake of knowledge rather than with a particular practical application in mind.

applied psychology
The study of psychological issues intended to have direct practical significance or application.

Psychological practitioners, whose goal is to understand and improve people's physical and mental health, work in mental hospitals, general hospitals, clinics, schools, counseling centers, the criminal justice system, and private practice. Since the late 1970s, the proportion of psychologists who are practitioners has steadily increased; practitioners now account for more than two-thirds of new psychology doctorates and members of the American Psychological Association. (The APA, despite its name, is international.)

Table 1.1 What Is a Psychologist?

Interactive

Not all psychologists do clinical work. Many do research, teach, work in business, or consult. The professional activities of psychologists fall into three general categories:

Academic/Research Psychologists	Clinical Psychologists	Psychologists in Industry, Law, or Other Settings
Specialize in areas of pure or applied research, such as: • Human development • Cognition • Education • Industrial/organizational psychology • Physiological psychology/ neuroscience • Sensation and perception • Social psychology	Do psychotherapy and sometimes research; may work in any of these settings: • Private practice • Mental health clinics • General hospitals • Mental hospitals • Research laboratories • Colleges and universities • Criminal justice system	Do research or serve as consultants to institutions on such issues as: • Sports • Advertising and consumer issues • Organizational problems • Environmental issues • Public policy and legal issues • Opinion polls • Military training

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Psychological practitioners typically work closely with an individual to address physical or mental health needs.

Some practitioners are *counseling psychologists*, who generally help people deal with problems of everyday life, such as test anxiety, family conflicts, or low job motivation. Others are *school psychologists*, who work with parents, teachers, and students to enhance students' performance and resolve emotional difficulties. The majority, however, are *clinical psychologists*, who diagnose, treat, and study mental or emotional problems. Clinical psychologists are trained to do psychotherapy with severely disturbed people, as well as with those who are troubled or unhappy or who want to learn to handle their problems better.

In almost all states, a license to practice clinical psychology requires a doctorate. Most clinical psychologists have a Ph.D., but some have an Ed.D. or a Psy.D. (doctorate in professional psychology, pronounced *sigh-dee*). Clinical psychologists typically do four or five years of graduate work in psychology, plus at least a year's internship under the direction of a licensed psychologist. Clinical programs leading to a Ph.D. or Ed.D. are usually designed to prepare a person both as a scientist and as a practitioner; they require a dissertation, a major research project that contributes to knowledge in the field. Programs leading to a Psy.D. do not usually require a dissertation, although they typically require the student to complete an extensive theoretical paper or literature review.

People often confuse *clinical psychologist* with three other terms: *psychotherapist*, *psychoanalyst*, and *psychiatrist*. But these terms mean different things:

- A *psychotherapist* is someone who does any kind of psychotherapy. The term is not legally regulated. In fact, believe it or not, in most states, anyone can say that he or she is a therapist without having any training at all.
- A *psychoanalyst* is a person who practices one particular form of therapy, psychoanalysis. To call yourself a psychoanalyst, you must have an advanced degree, get specialized training at a psychoanalytic institute, and undergo extensive psychoanalysis yourself.
- A *psychiatrist* is a medical doctor (M.D.) trained to diagnose and treat mental disorders. Like some clinical psychologists, some psychiatrists conduct research on mental problems, such as depression or schizophrenia, instead of, or in addition to, working with patients. Psychiatrists and clinical psychologists do similar work, but psychiatrists are more likely to focus on possible biological causes of mental disorders and to treat these problems with medication. (Unlike psychiatrists, most clinical psychologists at present cannot write prescriptions.)

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Psychologists work in all sorts of settings with all sorts of clients.

Psychologists also contribute to their communities in a variety of ways. They advise utility companies on ways to get customers to conserve energy. They consult with companies to improve worker satisfaction and productivity. They do basic and applied research on ways of reducing conflict and prejudice, locally and internationally. They strive to understand and prevent acts of terrorism. They advise commissions on how pollution and noise affect mental health. They do rehabilitation training for people with physical or mental disabilities. They educate judges and juries about eyewitness testimony. They conduct public opinion surveys. They run suicide-prevention hotlines. They advise zoos on the care and training of animals. They help coaches improve the athletic performance of their teams. And those are just for starters. Is it any wonder that people are a little fuzzy about what a psychologist is?

JOURNAL 1.1 THINKING CRITICALLY—DEFINE YOUR TERMS

Your friend Casey is a Chemistry major who likes to give you a hard time for enrolling in a Psychology course. "Psychology isn't a science," he claims. "It's all just common sense anyway." Why is Casey wrong about Psychology? What does it mean for a field to be scientific? Can you think of a specific example of a so-called common-sense assumption that you would like to see tested by psychological research?

In Revel, you can find Quiz 1.1 to test your knowledge.

1.2 Thinking Critically and Scientifically About Psychology

The primary goal of this text is to introduce you to the basic methods, theories, and findings of psychology. But our hope (and, we're sure, the hope of your course instructor as well) is that your introduction to psychology will also provide you with thinking and analytical skills that transcend a particular academic discipline. Throughout this text, you will gain practice in distinguishing scientific psychology from pseudoscience by thinking critically. As an approach to science, critical thinking forms the basis for all research methodologies. It can also serve as an excellent starting point for the way you approach the world in general, including your efforts to be the best student you can be. Separating fact from fiction, knowing what to believe and what to discard, and understanding how to evaluate evidence are important skills to have handy in your mental toolkit. So, let us now ask: What does it mean to think critically, and how can you become skilled at it?

1.2.A What Is Critical Thinking?

LO 1.2.A **Explain why critical thinking applies to all scientific pursuits and why it should also guide everyday judgments and decision-making.**

One of the greatest benefits of studying psychology is that you learn not only how the brain works but also how to use yours in particular—by thinking critically. **Critical thinking** is the ability and willingness to assess claims and make objective judgments on the basis of well-supported reasons and evidence, rather than emotion or anecdote. Critical thinkers look for flaws in arguments and resist claims that have no support. They realize that criticizing an argument is not the same as criticizing the person making it, and they are willing to engage in vigorous debate. Critical thinking, however, is not the same as negative thinking. It includes the ability to be creative and constructive—the ability to come up with alternative explanations for events, think of implications of research findings, and apply new knowledge to social and personal problems (Halpern, 2014; Levy, 2010; Stanovich, 2010).

critical thinking
Assessing claims and making objective judgments on the basis of well-supported reasons and evidence rather than emotion or anecdote.

Most people know that keeping your body in shape requires exercise, but they may not realize that clear thinking also requires effort and practice. All around us, we can see examples of flabby thinking. Sometimes people justify their mental laziness by proudly telling you they are open-minded. It's good to be open-minded, but open-mindedness does not mean that all opinions are created equal and that one person's beliefs are as good as everyone else's (Hare, 2009). On matters of personal preference, that is true; if you prefer the look of a Chevy truck to the look of a Honda Accord, no one can argue with you. But if you say, "The Chevy truck is safer than a Honda and gets better mileage too," you have uttered more than mere opinion. Now you have to support your belief with evidence of the vehicle's safety record and mileage (Ruggiero, 2011). And if you say, "Chevy trucks are the best in the world and Hondas do not exist; they are artifacts of government conspiracy," you forfeit the right to have your opinion taken seriously. Your opinion, if it ignores reality, is *not* equal to any other.


David Castillo Dominici/123RF

Unfortunately, we often stop asking "why" questions as we get older. If you remember only one critical thinking tip from this chapter, make it be that we should all ask "why?" more often.

Critical thinking can also help you use the Internet better. You may pride yourself on being able to find things quickly online, but a team of researchers found that most college students are less skilled than they think at distinguishing credible material from unreliable or biased information (Pan et al., 2007; Thompson, 2011). Instead, many students tend to rely on whatever comes up

Douglas Christian/ZUMA Press/Newscom

In 2018, Mark Zuckerberg, CEO and co-founder of Facebook, testified before a joint Senate commission on the spread of fake news via social media, particularly during the 2016 U.S. presidential election. According to some analyses, fake news stories about that election and its two leading candidates were shared more than 37 million times in the final three months of the campaign alone (Allcott & Gentzkow, 2017). The role of social media fact-checking in political discourse continued to be a major source of debate throughout the 2020 election cycle as well.

first at the top of the search results list or social media news feed. But students aren't alone! In the past few years, there has been a rapid spike in concern surrounding "fake news"—fabricated or uncorroborated information that takes the form of more traditional and reliable sources of content. Millions of adults have read or reposted this sort of misleading information about politics, crime, vaccination, nutrition, the spread of COVID-19, and other topics. Indeed, scientists have begun calling for more research to study how, when, and why such misinformation spreads (Lazer et al., 2018; Mayo, 2019).

Of course, critical thinking is not only indispensable in ordinary life, it is fundamental to all science. When the American Psychological Association (APA) published its guidelines for how best to educate undergraduate Psychology majors, the second major goal identified—right after building a knowledge base in psychology—focused on critical thinking and scientific inquiry (APA Board, 2012). Specific objectives in this report include asking relevant questions to gather more information about claims, describing common fallacies that impair accurate conclusions, and using psychological concepts to explain personal experiences. You will get ample practice developing these and related skills as you read this text.

1.2.B Critical Thinking Steps

LO 1.2.B **Identify important steps to critical thinking, and give an example of how each applies to the science of psychology.**

Let's take a look at five essential critical thinking steps that we will emphasize in this text.

ASK QUESTIONS, BE WILLING TO WONDER What is one kind of question that most exasperates parents of young children? "Why" questions: "Why is the sky blue?" "Why is ice cold?" "Why is a cactus prickly?" Unfortunately, as children grow up, they tend to stop asking "why" questions. (Why do you think this is?) But critical and creative thinking begins with wondering why. This crime prevention program isn't working; why not? I want to stop smoking or lose weight or improve my grades; why can't I seem to do it? Is my way of doing things the best way, or just the most familiar way? Critical thinkers are willing to question received wisdom—"We do it this way because this is the way we have always done it around here"—and ask, in essence, "Oh, yeah? But . . . why?"

In psychological science, knowledge begins with asking a question. What is the biological basis of consciousness? How are memories stored and retrieved? Why do we sleep and dream? How do children learn complex rules of grammar? Why do people seem to behave differently when they're on their own versus in a crowd? What causes schizophrenia? Critical thinkers are not discouraged by the fact that questions like these have not yet been fully answered and, indeed, don't lend themselves to easy answers; they see them as exciting challenges.

DEFINE YOUR TERMS Once you have raised a general question, the next step is to frame it in clear and concrete terms. "What makes people happy?" is a fine question for a late-night conversation with friends, but it will not lead to answers until you have defined what you mean by "happy." Do you mean being in a state of euphoria most of the time? Do you mean feeling pleasantly contented with life? Do you mean being free of serious problems or pain? Vague or poorly defined terms in a question can lead to misleading or incomplete answers. For example, are people becoming less prejudiced against other groups? The answer may depend in part on how you define "prejudice." Is conscious dislike the same as discomfort with a group of people whose rules and beliefs differ from yours?

For scientists, defining terms means being precise about just what it is that they're studying. Researchers often start out with a **hypothesis**, a statement that attempts to describe

hypothesis
A statement that attempts to predict or to account for a set of phenomena, specifying relationships among events or variables that can be empirically tested.

or explain a given behavior. Initially, this hypothesis may be stated quite generally, as in, say, "Misery loves company." But before any research can be done, the hypothesis must be made more precise. "Misery loves company" might be rephrased as "People who are anxious about a threatening situation tend to seek out others facing the same threat."

A hypothesis, in turn, leads to predictions about what will happen in a particular situation. In a prediction, terms such as *anxiety* or *threatening situation* are given **operational definitions**, which specify how the phenomena in question are to be observed and measured. "Anxiety" might be defined operationally as a score on an anxiety questionnaire, and "threatening situation" as the anticipation of an electric shock. The prediction might be, "If you raise people's anxiety scores by telling them they are going to receive electric shocks, and then you give them the choice of waiting alone or with others in the same situation, they will be more likely to choose to wait with others than they would be if they were not anxious." The prediction can then be tested using systematic methods.

operational definition
A specification of precisely how to observe and measure a variable in a hypothesis.

ANALYZE ASSUMPTIONS AND BIASES *Assumptions* are beliefs that are taken for granted. Critical thinkers try to identify and evaluate the unspoken assumptions on which claims and arguments may rest—in the books they read, the political speeches they hear, and the ads that bombard them daily. In science, some of the greatest scientific advances have been made by those who dared to doubt widespread assumptions: that the sun revolves around the earth, that illness can be cured by applying leeches to the skin, that madness is a sign of demonic possession.

Critical thinkers are willing to analyze and test not only other people's assumptions, but also their own, which is much harder to do. Researchers put their own assumptions to the test by stating a hypothesis in such a way that it can be *refuted*, or disproved by counterevidence. This principle, known as the **principle of falsifiability**, does not mean that the hypothesis *will* be disproved, only that it *could be* if contrary evidence were to be discovered. Another way of saying this is that a scientist must risk disconfirmation by predicting not only what will happen, but also what will *not* happen if the hypothesis is correct. In the misery-loves-company study, the hypothesis would be supported if most anxious people sought each other out, but disconfirmed if most anxious people went off alone to sulk and worry, or if anxiety had no effect on their behavior

principle of falsifiability
The notion that a scientific theory must make predictions that are specific enough to expose the theory to the possibility of disconfirmation.

When an assumption or belief keeps us from considering the evidence fairly, it becomes a *bias.* A bias often remains hidden until someone challenges our belief and we get defensive and angry (Tavris & Aronson, 2007). Indeed, another important guideline for critical thinking is to avoid relying too much on emotional reasoning. The fact that you *really, really* feel strongly that something is true—or that you want it to be true—doesn't make it so. Critical thinkers separate emotion from the data. You probably hold strong feelings about many topics of psychological interest, such as drug use, racism, sexual orientation, the origins of intelligence, gender differences, what makes people fat or thin, and what the most effective way is to study for an exam. As you read this text, you may find yourself quarreling with findings that you dislike. Disagreement is great! It means that you are reading actively and are engaged with the material. All we ask is that you think about *why* you are disagreeing: Is it because the evidence is unpersuasive or because the results make you feel anxious, threatened, or defensive? Bias—and the emotional responses often associated with it—creates intellectual blinders.

One bias emerges in everyday life when we violate the principle of falsifiability. All of us are vulnerable to the **confirmation bias**: the tendency to look for and accept evidence that supports our pet theories and assumptions and to ignore or reject evidence that contradicts our beliefs. Thus, if a police interrogator is convinced of a suspect's guilt, they may interpret anything the suspect says, even the person's insistence of innocence, as confirming evidence that the suspect is guilty ("Of course he says he's innocent; that's what all guilty people say"). But what if the suspect *is* innocent? Critical thinkers resist the confirmation bias by seeking and considering counterevidence—by remembering the principle of falsifiability.

confirmation bias
The tendency to look for or pay attention only to information that confirms one's own belief, and ignore, trivialize, or forget information that disconfirms that belief.

EXAMINE THE EVIDENCE Have you ever heard someone in the heat of an argument exclaim, "I just know it's true, no matter what you say"? Accepting a claim or conclusion without evidence is a sure sign of lazy thinking. A critical thinker asks, "What evidence supports

or refutes this argument? How reliable is the evidence?" For example, have you ever received some dire warning or funny "I swear it's true!" story from a friend that you immediately posted on social media, only to learn later that it was a hoax or an urban legend? A critical thinker would ask, "Is this story something I'd better check out on *snopes.com* before I tell thousands of my friends, co-workers, and neighbors (and thousands of *their* friends, co-workers, and neighbors)?"

Sometimes, of course, checking the reliability of the evidence for a claim is difficult. In those cases, critical thinkers consider whether the evidence comes from a reliable source. Sources who are reliable exercise critical thinking themselves. They have education or experience in the field, and they responsibly draw on this expertise in making their claims. They do not pressure people to agree with them. They are trusted by other experts in the field and share their evidence openly. In psychology, they draw on research conducted according to certain rules and procedures. For more tips on distinguishing reliable from less reliable information, in Revel watch the video *Debunking Myths, Part 2*.

WEIGH CONCLUSIONS Critical thinkers ask questions, define terms, check for biases, and examine the evidence. Then, and only then, are they ready to entertain the possibility of drawing conclusions. This means that one of the hardest lessons of learning to think critically is how to live with uncertainty. Sometimes there is little or no evidence available to examine. Sometimes the evidence permits only tentative conclusions. Sometimes the evidence seems strong enough to permit conclusions until, exasperatingly, new evidence throws our beliefs into disarray. Critical thinkers must be willing to *tolerate uncertainty*; they cannot be afraid to say, "I don't know." Critical thinkers know that the more important the question, the less likely it is to have a single simple answer; they must be willing to change their minds when the evidence dictates they should.

For that matter, critical thinkers also *consider other explanations*, generating as many reasonable interpretations of the evidence as they can before settling on the most likely one. Suppose a news magazine reports that people with chronic depression are more likely than nondepressed people to develop cancer. Before concluding that depression causes cancer, you would need to consider alternate possibilities. Perhaps depressed people are more likely to smoke and to drink, and those unhealthy habits increase their cancer risk. Or perhaps early, as yet undetected cancers produce biochemical changes that create the physical and emotional symptoms of depression. Alternative explanations such as these must be ruled out by further investigation before we can conclude that depression is a direct cause of cancer. (It's not, by the way.) For more on why it is so important to sharpen your critical-thinking skills in this manner, watch in Revel the video *Debunking Myths, Part 3.*

theory
An organized system of assumptions and principles that purports to explain a specified set of observations and their interrelationships.

In the end, where do we hope this process of critical thinking will bring us? In science, the ultimate goal is often to arrive at a **theory**, an organized system of assumptions and principles that purports to explain a set of observations and how they are related. A scientific theory is not just someone's personal opinion, as in "It's only a theory" or "I have a theory about why he said that." A scientific theory is grounded in empirical evidence. Whereas some theories, such as the theory of evolution, are accepted by virtually all scientists, many more scientific theories are more tentative—works in progress, pending the results of additional future research. Indeed, a researcher's job is never done.

In short, critical thinking is a process, not an accomplishment. No one ever becomes a perfect critical thinker, entirely unaffected by emotional reasoning and wishful thinking. We are all less open-minded than we think; it is always easier to poke holes in another person's argument than to critically examine our own position. Yet we think the journey is well worth the mental effort because the ability to think critically can help people in countless ways, from saving them money to improving their relationships. As you read this text, keep in mind the steps we have described here, which are illustrated in the following photo gallery. You can get practice applying these critical thinking guidelines by completing the journal writing prompts you'll find throughout this text, as well as in the Critical Thinking Illustrated feature at the end of each chapter that will ask you to step into an animated world to critically evaluate a specific claim.

Interactive

Thinking Critically About Psychological Issues

These critical thinking steps will help you evaluate psychological findings, media claims, and controversies that you encounter in your own life.

Fayaz Aziz/Reuters

ASK QUESTIONS, BE WILLING TO WONDER
Why do some people bravely come to the aid of their fellow human beings, even when it's not their official job? On the other hand, why do people often behave in ways that are selfish, cruel, or violent? Asking "why" questions like these is often the first step in designing research to advance scientific knowledge.

Tom Williams/CQ Roll Call/Newscom

DEFINE YOUR TERMS
People refer to intelligence all the time, but what is it exactly? Does the musical genius of a world-class cellist like Yo-Yo Ma count as intelligence? Is intelligence captured by an IQ score, or does it also include wisdom and practical "smarts"? Scientists and critical thinkers must be precise in how they define their terms.

Janine Wiedel Photolibrary/Alamy Stock Photo

ANALYZE ASSUMPTIONS AND BIASES
Many Americans share a cultural bias that all psychoactive drugs are inevitably harmful. The Rastafarian church, however, regards marijuana as a "wisdom weed." Will Rastafarians who have used the drug with family, during religious ceremonies, and from a young age, react to it in the same way as an adult who buys it on the street for the first time or who smokes it alone? Critical thinkers must always check their assumptions and watch out for biases and the emotional reasoning they often produce.

Sergey Mironov/Alamy Stock Photo

EXAMINE THE EVIDENCE
When demonstrating supposedly magical phenomena, fortune tellers such as this one exploit people's tendency to not engage in a full examination of evidence. Critical thinkers avoid oversimplifying and overgeneralizing, and they realize that accepting a claim without evidence is a symptom of lazy thinking.

Stanislav Fridkin/Shutterstock

WEIGH CONCLUSIONS
Many parents, because they want so badly for their children to turn out well, have trouble accepting uncertainty about how to raise them or considering other interpretations for research conclusions that they read about online. For example, should a parent co-sleep with children, or will that make them too dependent and clingy? Should they allow their baby to "cry it out" sometimes to learn how to sleep, or will that leave emotional scars in the developing little one? Critical thinkers draw the best conclusions they can given the evidence at hand and recognize that important questions rarely have simple answers.

Taking Psychology with You

Using Psychology to Study Psychology

As you are realizing by now, psychologists focus their critical thinking and research attention on a diverse range of issues, and much of this work has useful applications for being more effective and efficient in daily life. In each chapter, we will highlight in a box like this one way in which you can take the lessons of psychology with you beyond this text. And we can think of no better way to begin than by exploring how you can use psychology research findings to more successfully study psychology. Specifically, we'd like to share four winning study strategies that have been tested in scientific laboratories and schools from elementary school to the university level (Dunlosky et al., 2013; McDaniel, Roediger, & McDermott, 2007; Roediger, Putnam, & Smith, 2011):

1. **Pay undivided attention.** You can't be at the top of your cognitive game while texting, playing online, or otherwise multitasking. Focus instead on taking good notes during class, capturing important points rather than transcribing every word you hear. In fact, some research suggests that there are advantages to taking notes by hand because it leads students to process information more deeply and reframe it in their own words (Mueller & Oppenheimer, 2014).
2. **Use the 3R technique: read, recite, review.** Reading and re-reading isn't enough (Karpicke, Butler, & Roediger, 2009). What's essential is that you test yourself on what you've studied: Ask yourself questions, retrieve the answers, and restudy what you didn't know—again and again until you learn the material (Karpicke & Aue, 2015; Karpicke & Roediger, 2007). Recite aloud what you recall about the major concepts you just read about before taking each section-ending quiz. Then review again to correct anything you got wrong or overlooked.
3. **Dig deep.** The mind is not a container or a sponge; you can't just pour information in and assume it will stay there. You have to *process* it until you get it. An excellent way to do this is to connect new information to information you already know. These associations will organize material in your memory, creating new mental pathways that help you retrieve it later.
4. **Forget about cramming.** Staying up all night to study might give you the feeling that you know the material, but if you haven't really *understood* what you've read, it's hardly effective. Rather than cramming all your attempts to test yourself into one giant (and awful) block of time, test yourself regularly throughout the semester, say once a week (Bjork & Bjork, 2011). That way, once you've learned something, it will stay learned. This will also help avoid sleep deprivation, which undermines studying efforts (Huang et al., 2016).

We are confident that these techniques will help you, especially if you remember the ultimate strategy for success: No matter how good they are, no course and no textbook can do your work for you. Now onward!

RF Pictures/Corbis/Getty Images

Binge watching TV can be fun, even if exhausting. But binge studying for class is far less effective, and just as exhausting! Research conclusions are clear: You should space out your studying and practice testing to achieve maximum benefits.

JOURNAL 1.2 THINKING CRITICALLY—ANALYZE ASSUMPTIONS AND BIASES

Whether you've consciously recognized it or not, chances are you've already practiced some of the critical thinking guidelines discussed in this section. Any time you've watched an infomercial and exclaimed, "That's too good to be true!" you've called out for an examination of the evidence. When your roommate claims to be smarter than you, you've probably insisted on defining terms such as "smarter." Think about the critical thinking steps described above. Which ones do you have the most trouble applying in your daily life? Which ones come more naturally to you?

In Revel, you can find Quiz 1.2 to test your knowledge.

1.3 Doing Research: Moving from Questions to Data

What About You?

Interactive

You hear a news story describing the following research finding: The more fast food children eat, the lower their scores on reading, math, and science tests. Even though this study was with kids, does it make you want to cut down on the amount of fast food you eat?

Research suggests. . . According to a recent study. . . Scientists have discovered. . . New findings indicate. . .

Do these phrases sound familiar? We encounter them daily in the news, on television and podcasts, in social media posts, in informal conversations, and in courses like this one. Claims that are backed by scientific data seem to carry an added weight of credibility. The average person might think, *Who am I to argue with the science; don't the scientists know more than I do?* But not all scientific claims are created equal. Sometimes the data one study reports contradict the data from another study. And remember, you're not an "average person" anymore; you're now a student of psychology, training yourself how to think critically, design empirical studies, and evaluate the scientific claims of others.

Trying to practice critical thinking or apply psychological findings to your own life without understanding research methods is like trying to dig a foundation for your house with teaspoons. You could do it, but it would take a *long* time and the result won't be very sturdy. Knowing the difference between claims based on good science and those based on sloppy research or anecdotes can help you make wiser psychological and medical decisions, prevent you from spending money on worthless programs, and sometimes even save lives. Consider the survey question we just asked you—how should we apply research findings we hear described on the news or online to the decisions we make in our own lives? By the time you finish this chapter, you will be well-equipped to think more critically about this question and the various research-based claims you encounter every day.

1.3.A Finding a Sample

LO 1.3.A **Describe the ways participants are selected for psychological studies and how the method of selection can influence interpretations of a study's outcomes.**

One of the first challenges facing all researchers is to select the participants for their study. Ideally, a researcher would prefer to get a **representative sample**, a group of participants that accurately represents the larger population that the researcher is interested in. Suppose you wanted to learn about drug use among first-year college students in the United States. Interviewing or observing every single first-year student in the country would obviously not be practical; instead, you would need to recruit a smaller sample. You could use special selection procedures to ensure that your sample contained the same proportion of women, men, Black people, White people, Asian people, Latino people, poor people, rich people, Catholics, Jews, Muslims, atheists, and so on as are in the general population of new college students. Even then, a sample drawn just from your own school or town might not produce results applicable to the entire country.

representative sample
A group of individuals, selected from a population for study, that matches that population on important characteristics.

A sample's size is less critical than its representativeness. A small but representative sample may yield accurate results, whereas a large study that fails to use proper sampling methods may

yield questionable results. But in practice, psychologists and others who study human behavior must often settle for an unrepresentative sample of people who happen to be available—a "convenience" sample—and often this means undergraduate students. Much of the time, that's fine; many psychological processes, such as basic perceptual or memory processes, are likely to be more or less the same in students as in anyone else. But college students, on average, are also younger and tend to have better cognitive skills than nonstudents.

Moreover, most research participants, whether students or not, are what one group of researchers calls WEIRDos—from Western, Educated, Industrialized, Rich, and Democratic cultures—and thus are hardly representative of humans as a whole (Henrich, Heine, & Norenzayan, 2010). Scientists are now turning to technology to reduce this problem. Various websites allow people across the world to complete online tasks in return for small payments, allowing scientists to quickly recruit a diverse sample of thousands of people (Buhrmester, Talaifar, & Gosling, 2018). Other creative ways of finding data from research participants using technology include examining people's posts on Twitter (Golder & Macy, 2011) and analyzing people's publicly visible Facebook profiles (Kosinski et al., 2015).

1.3.B Descriptive Studies: Establishing the Facts

LO 1.3.B **Discuss the advantages and disadvantages of using different descriptive methods such as case studies, observational methods, tests, and surveys.**

We turn now to the specific methods used most commonly in psychological research. As you read about these methods, you may want to list their advantages and disadvantages so you will remember them better (yes, there *will* be a quiz later on!). We will begin with **descriptive methods**, which allow researchers to describe and predict behavior but not to explain why the behavior happens or which factors influence its emergence. In Revel, the video *How to Answer Psychological Questions* provides a brief overview of what descriptive methods are and how they differ from some of the more sophisticated research types we will review in the sections to follow.

descriptive methods
Methods that yield descriptions of behavior but not direct explanations for why it occurs.

One type of descriptive study is a **case study** (or *case history*), a detailed description of a particular individual based on careful observation or formal psychological testing. It may include information about a person's experiences, cognitive capabilities, symptoms, and relationships—anything that will provide insight into the person's behavior. Case studies are most commonly used by clinicians, but sometimes academic researchers use them as well, especially when they are just beginning to study a topic or when practical or ethical considerations prevent them from gathering information in other ways.

case study
A detailed description of a particular individual being studied or treated.

Suppose you want to know whether the first few years of life are critical for acquiring a first language. Can children who have missed out on hearing speech (or, in the case of deaf children, seeing signs) during their early years catch up later on? Obviously, psychologists cannot answer this question by isolating children and seeing what happens. So, instead, they have studied unusual cases of language deprivation.

One such case involved the very disturbing story of a 13-year-old girl who had been cruelly locked up in a small room since infancy. Her mother, herself the victim of abuse, barely cared for her, and no one in the family spoke a word to her. If the child made the slightest sound, her severely disturbed father beat her. When she was finally rescued, "Genie," as researchers called her, did not know how to chew or stand erect and was not toilet-trained. Her only sounds were high-pitched whimpers. Eventually, she began to understand short sentences and to use words to convey her needs, but even after many years, Genie's grammar and pronunciation remained abnormal. She never learned to use pronouns correctly, ask questions, or use the little word endings that communicate tense, number, and possession (Curtiss, 1977, 1982; Rymer, 1993). This sad case, along with similar ones, suggests that a critical period exists for language development, with the likelihood of fully mastering a first language declining steadily after early childhood and falling off drastically at puberty (Pinker, 1994; Veríssimo et al., 2018).

Case studies illustrate psychological principles in a way that abstract generalizations and statistics never can, and they produce a more detailed picture of an individual than other

Case Studies

Interactive

Bettmann/Getty Images

NASA

Stringer Turkey/DHA/Reuters

(1) In 1970, child welfare authorities discovered "Genie," an abused 13 year old who was living in isolation and had not developed the ability to communicate using language. Linguists, psychologists, and other researchers worked with Genie, but her communication skills remained rudimentary at best. (2) Scott and Mark Kelly are identical twin astronauts. Scott (left) spent one year living on the International Space Station to help NASA understand the effects of long-term space flight; Mark (right) remained here on Earth. This case study offered an unprecedented opportunity to understand how living in a unique environment influences thinking, attention, immune system functioning, and vision. (3) Five siblings in a large Turkish family share an unusual trait; they walk on all fours. Anthropologists, geneticists, biologists, and neurophysiologists began studying the family in 2004. One explanation to emerge is that a genetic mutation coupled with developmental disabilities led to an adaptation to the environment.

methods do. In biological research, cases of patients with brain damage have yielded important clues to how the brain is organized. But in most instances, case studies also have serious drawbacks. Information is often missing or hard to interpret; for example, no one knows whether Genie was born with mental deficits, what her language development was like before she was locked up, or what the effects were of her chronic abuse. The observer who writes up the case may have biases that influence which facts are noticed or overlooked. Most important, because one person is rarely representative of the entire group in which the researcher is interested, this method has only limited usefulness for deriving general principles of behavior. For all these reasons, case studies are usually sources, rather than tests, of hypotheses.

Observational studies are another descriptive method, in which the researcher systematically measures and records behavior, taking care to avoid intruding on those who are being observed. The purpose of *naturalistic observation* is to find out how people or other animals act in their normal social environments. Psychologists use this method wherever people happen to be: on a street corner; on playgrounds; or in schoolrooms, offices, and bars. But they also do observational studies in the laboratory. In *laboratory observation*, they have more control of the situation: They can use cameras and recording devices, determine how many people will be observed at once, minimize disruptions, and so forth.

observational study
A study in which the researcher systematically measures and records behavior (naturalistically or in a laboratory) without interfering with it.

Suppose that you wanted to know how infants of different ages respond when left with a stranger. You might have parents and their infants come to your lab, observe them playing together for a while through a one-way mirror (window on one side, mirror on the other), then have a stranger enter the room and, a few minutes later, have the parent leave. You could record signs of distress, interactions with the stranger, and other outcomes. If you did this, you would find that very young infants carry on cheerfully with whatever they are doing when the parent leaves. However, by the age of about 8 months, children will often burst into tears or show other signs of what child psychologists call "separation anxiety."

One shortcoming of laboratory observation is that the presence of researchers and special equipment may cause participants to behave differently than they would in their usual surroundings. Furthermore, whether they are in natural or laboratory settings, observational studies, like other descriptive methods, are more useful for describing behavior than for explaining it. If we observe infants protesting whenever a parent leaves the room, we cannot be sure why. Is it because they have become attached to their parents and want them nearby, or have they learned from experience that crying brings an adult with a cookie and a cuddle? Observational studies alone cannot answer such questions.

Bill Greene/The Boston Globe/Getty Images

To ensure that their presence doesn't cause a distraction or change the behavior in question, the researchers above are observing the interactions of an experimenter with a child participant from the other side of a one-way mirror.

psychological tests
Standardized procedures used to measure personality traits, emotional states, aptitudes, interests, and abilities.

reliability
The consistency of test scores from one time and place to another.

validity
The ability of a test to measure what it was designed to measure.

Allstar Picture Library/Alamy Stock Photo

Criticisms and reevaluations of psychological tests keep psychological assessment scientifically rigorous. In contrast, the pop-psych tests found in magazines and on the Internet usually have not been evaluated for either validity or reliability. These questionnaires often have inviting headlines, such as "Which Breed of Dog Do You Most Resemble?" or "What's Your Love Profile?," but they are merely lists of questions that someone thought sounded good. Though we must admit, coming up with Buzzfeed quizzes like "Are You Actually a Hipster?" and "Which Ryan Gosling Character Is Your Soulmate?" does sound like a pretty fun job.

Another descriptive method for data collection involves **psychological tests**, which are standardized procedures for measuring and evaluating personality traits, emotional states, aptitudes, interests, and abilities. Typically, tests require people to answer a series of written or oral questions. The answers may then be totaled to yield a single numerical score or a set of scores. *Objective tests*, also called *inventories*, measure beliefs, feelings, or behaviors of which an individual is aware; *projective tests* are designed to tap unconscious feelings or motives (for example, showing participants an inkblot and asking them to report what they see). That a test has been standardized means that uniform procedures are in place for giving and scoring it. Scoring is usually done by referring to established standards of performance that allow for the determination of which scores can be considered high, low, or average.

At one time or another, you no doubt have taken a personality test, an achievement test, or a vocational aptitude test. Hundreds of psychological tests are used in industry, education, the military, and other professions. Some tests are given to individuals, others to large groups. These measures help clarify differences among people, as well as differences in the reactions of the same person on different occasions or at different stages of life. Tests may be used to promote self-understanding; to evaluate treatments and programs; or, in scientific research, to draw generalizations about human behavior. Well-constructed psychological tests are a great improvement over simple self-evaluation because many people have a distorted view of their own abilities and traits. In the workplace, employees tend to overestimate their skills and judgments; people are often blissfully unaware of their own lack of competence (Dunning, Heath, & Suls, 2004).

Test construction presents two central challenges. First, a test must have **reliability**, producing the same results from one time and place to the next. A vocational-interest test is not reliable if it tells Ilana that she would make a wonderful engineer but a poor journalist, and then gives the opposite results when Ilana retakes the test a week later. Nor is it reliable if alternate forms of the test, intended to be comparable, yield different results. Second, the test must have **validity**, measuring what it is designed to measure. A creativity test is not valid if what it actually measures is verbal sophistication. The validity of a test is often measured by its ability to predict other, independent measures, or *criteria*, of the trait in question. The criterion for a scholastic aptitude test might be college grades; the criterion for a test of shyness

might be behavior in social situations. Controversy exists about the validity of even some widely used tests, such as the SAT and standardized IQ tests.

Surveys are questionnaires and interviews that gather information by asking people about their experiences, attitudes, or opinions. Everywhere you go, someone wants your opinion. Political polls want to know what you think of some candidate. Eat at a restaurant, get your car serviced, or stay at a hotel, and you'll get a satisfaction survey five minutes later. Online, readers and users of any product offer their rating. How reliable are all these surveys?

surveys
Questionnaires and interviews that ask people about their experiences, attitudes, or opinions.

Surveys produce bushels of data, but they are not easy to do well. Sampling problems are often an issue. When a talk-radio host or TV personality invites people to send comments about a political matter, the results are not likely to generalize to the population as a whole, even if thousands of people respond. Why? As a group, people who listen to Rush Limbaugh are more conservative than are fans of Trevor Noah. Popular polls and surveys also frequently suffer the potential bias that those people who are willing to volunteer their opinions may differ from those who decline to take part. When you read about a survey (or any other kind of study), always ask who participated. A nonrepresentative sample does not necessarily mean that a survey is worthless or uninteresting, but it does mean that the results may not hold true for other groups.

Yet another problem with surveys, and with self-reports in general, is that people sometimes lie, especially when the survey is about a touchy or embarrassing topic. ("I would never do that disgusting/dishonest/unflattering/illegal thing!") In studies comparing self-reports of illicit drug use with urinalysis results from the same individuals, between 30 and 70 percent of those who test positive for cocaine or opiates deny having used drugs recently (Tourangeau & Yan, 2007). The likelihood of lying is reduced when respondents are guaranteed anonymity and allowed to respond in private. Researchers can also check for lying by asking the same question several times with different wording to see whether the answers are consistent. But not all surveys use these techniques, and even when respondents are trying to be truthful, they may misinterpret the survey questions, hold inaccurate perceptions of their own behavior, or misremember the past.

When you hear about the results of a survey or opinion poll, you also need to consider how the questions were phrased. This aspect of a survey's design may nudge responses in a particular direction, as political pollsters well know ("Do you favor raising your property tax to spend millions of dollars to repair your local schools?" is more likely to evoke a no than "Do you favor rebuilding local schools that are decaying?"). Many years ago, the famed sex researcher Alfred Kinsey made it his practice always to ask, "*How many times have you* (masturbated, had nonmarital sex, etc.)?" rather than "*Have you ever*?" (Kinsey, Pomeroy, & Martin, 1948; Kinsey et al., 1953). The first way of phrasing the question tended to elicit more truthful responses than the second because it removed the respondent's self-consciousness about having done any of these things. The second way of phrasing the question would have permitted embarrassed respondents to reply with a simple but dishonest "no." As you can see, like other descriptive methods, although surveys can be extremely informative, they must be conducted and interpreted carefully.

JOURNAL 1.3 THINKING CRITICALLY—ANALYZE ASSUMPTIONS AND BIASES

Case studies can be enormously compelling, which is why talk-show hosts love them. But what are the dangers in using case studies to draw general conclusions about human nature?

In Revel, you can find Quiz 1.3 to test your knowledge.

1.4 Correlational Studies: Looking for Relationships

Psychologists often want to know more than how to describe a particular variable or outcome. They frequently seek to determine whether two or more phenomena are related and, if so, how strongly. For example, are students' grade point averages related to the number of hours they spend watching television, playing video games, or texting? To find out, a psychologist could conduct a **correlational study**.

correlational study
A descriptive study that looks for a consistent relationship between two or more phenomena.

Wavebreak Media Ltd/123RF

Let's say a researcher conducts this very study, and she finds a negative correlation between students' grade point averages and how much time they spend texting while studying. What exactly does this mean? We'll discuss the ins and outs of correlational findings like this one in the sections that follow.

1.4.A Measuring Correlations

LO 1.4.A **Illustrate with an example how a correlation coefficient gives both the size and direction of the relationship between two variables.**

correlation
A measure of how strongly two variables are related to one another.

variables
Characteristics of behavior or experience that can be measured or described.

positive correlation
An association between increases in one variable and increases in another or between decreases in one and decreases in another.

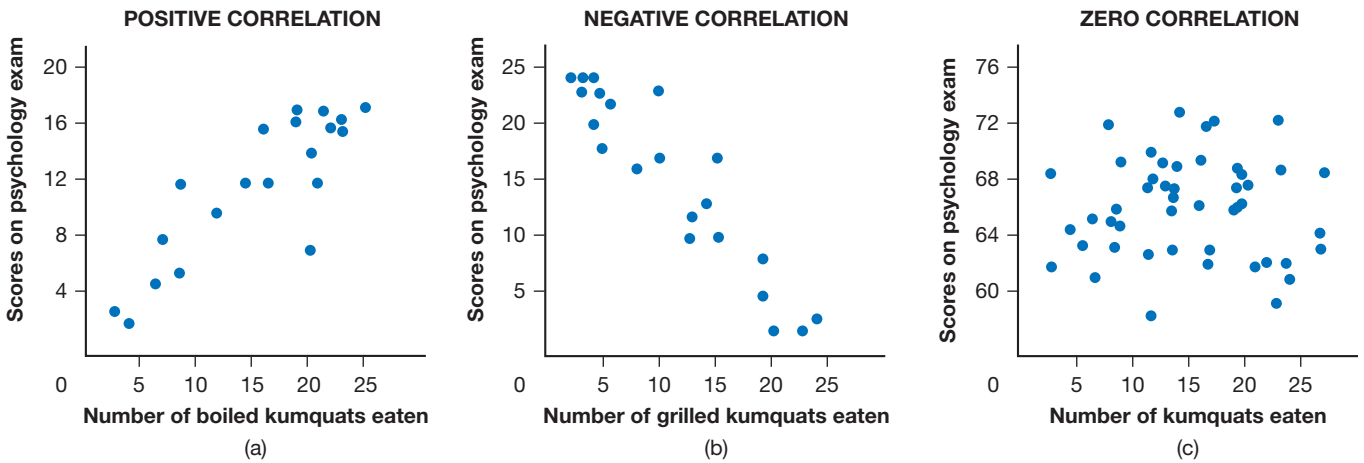
negative correlation
An association between increases in one variable and decreases in another.

The word **correlation** is often used as a synonym for "relationship," which is why a correlational study examines the extent to which two things are related to one another. Technically, however, a correlation is a numerical measure of the *strength* of the relationship between two things. The "things" may be events, scores, or anything else that can be recorded and tallied. In psychological studies, such things are called **variables** because they can vary in quantifiable ways. Height, weight, age, income, IQ score, number of items recalled on a memory test, number of smiles in a given time period—anything that can be measured, rated, or scored can serve as a variable.

A **positive correlation** means that high values of one variable are associated with high values of the other and that low values of one variable are associated with low values of the other. Height and weight are positively correlated; so are IQ scores and school grades. Rarely is a correlation perfect, however. Some tall people weigh less than some short ones; some people with average IQs are academic superstars and some with high IQs get poor grades. Figure 1.2a shows a positive correlation between scores on a psychology exam and the average number of boiled kumquats eaten per month by students. (Obviously, we made this up.) Each dot represents a student. You can find each student's score by drawing a horizontal line from the person's dot to the vertical axis. You can find the number of kumquats a student ate by drawing a vertical line from the student's dot to the horizontal axis. In general, the more kumquats, the higher the score.

A **negative correlation** means that high values of one variable are associated with *low* values of the other. Figure 1.2b shows a hypothetical negative correlation between scores on a psychology exam and number of *grilled* kumquats eaten per month. This time, the more kumquats eaten, the lower the test score. To use a more realistic example: In general, the lower the temperature outside gets, the higher people's heating bills are. How about a person's weight and hours spent exercising each week? You guessed it; they're negatively correlated as well. See whether you can think of other pairs of variables that are negatively correlated. Remember that a negative correlation means that a relationship exists, and the *more* of one thing, the *less* of another. If there is no relationship between two variables, we say that they are *uncorrelated* (see Figure 1.2c). Shoe size and IQ scores are uncorrelated, for example.

Figure 1.2 Correlations



Graph (a) shows a positive correlation between scores on a psychology test and number of boiled kumquats eaten per month: The higher the score, the higher the number of kumquats (and vice versa). Graph (b) shows a negative correlation between test scores and number of grilled kumquats eaten: The higher the scores, the lower the number of kumquats (and vice versa). Graph (c) shows the reality—a zero correlation between kumquat-eating and test scores.

The statistic used to express a correlation is called the **correlation coefficient**. This number conveys both the size and direction of the correlation. A perfect positive correlation has a coefficient of +1.00, and a perfect negative correlation has a coefficient of −1.00. Suppose you weighed 10 people and listed them from lightest to heaviest, then measured their heights and listed them from shortest to tallest. If the names on the two lists were in exactly the same order, the correlation between weight and height would be +1.00. A correlation between two variables of +.70 means that the two variables are strongly, but not perfectly, related. If the correlation is −.70, the relationship is just as strong, but it is negative. Most correlations in psychology studies are not as strong as .70 (in either the positive or negative direction). Correlations in the neighborhood of + or −.50 are thought of as moderately strong; correlations of + or − .30 are sometimes referred to as weak correlations. When there is no association between two variables, the coefficient is zero or close to zero.

correlation coefficient
A measure of correlation that ranges in value from −1.00 to +1.00.

1.4.B Cautions About Correlations

LO 1.4.B **Explain why a correlation between two variables does not establish a causal relationship between those variables.**

Correlational findings are common in psychology and often make the news. But beware: Many supposed correlations reported in the media or on the Internet are based on rumor and anecdote and turn out to be small or unreliable. Some are based on mere coincidence and are meaningless; thus, they are called *illusory correlations*.

The alleged link between vaccines and autism is an illusory correlation, probably a result of the fact that most symptoms of autism emerge at about the same time that children are vaccinated. Some parents think the culprit is thimerosal, a preservative that was used in childhood vaccines until 1999 and is now contained in trace amounts in only a few. However, no convincing evidence exists that thimerosal is involved in autism. After this preservative was removed from most vaccines, the incidence of autism did not decline, as it would have if thimerosal were to blame. And study after study has failed to find any connection whatsoever (Mnookin, 2011; Offit, 2008). In one major study of all children born in Denmark between 1991 and 1998 (more than a half million children), the incidence of autism in vaccinated children was actually a bit *lower* than in unvaccinated children (Madsen et al., 2002). Unfortunately, in various locales, rates of measles, mumps, and whooping cough—which can be fatal—are rising in children whose needlessly frightened parents have declined to vaccinate due to beliefs based on this illusory correlation.

Even when correlations are meaningful, they can still be hard to interpret because *a correlation does not establish causation*. It is often easy to assume that if variable A predicts variable B, A must be causing B, but that is not necessarily so. A positive correlation has been found between the number of hours that children watch television between ages 1 and 3 and their risk of hyperactivity (impulsivity, attention problems, difficulty concentrating) by age 7 (Christakis et al., 2004). Does this mean that watching TV *causes* hyperactivity? Maybe, but it is also possible that children with a disposition to become hyperactive are more attracted to television than those disposed to be calm. Or perhaps the harried parents of distractible children are more likely than other parents to rely on TV as a babysitter. It is also possible that neither variable causes the other directly: Perhaps parents who allow their young kids to watch a lot of TV have attention problems themselves and therefore create a home environment that fosters hyperactivity and inattentiveness.

The moral: When two variables are associated, one variable may or may not be causing the other. We simply can't tell when we're using a correlational design.

Peter Dazeley/Photographer's Choice RF/Getty Images

The number of hours toddlers spend watching TV is correlated with their risk of being hyperactive a few years later. Does that mean TV-watching causes hyperactivity problems? What are the other possible explanations for this finding?

JOURNAL 1.4 THINKING CRITICALLY—EXAMINE THE EVIDENCE

Many studies have documented a positive correlation between temperature and aggression: The hotter the weather, the higher the crime rate. Can you generate three possible causal explanations for this finding?

In Revel, you can find Quiz 1.4 to test your knowledge.

1.5 Experiments: Hunting for Causes

experiment
A controlled test of a hypothesis in which the researcher manipulates one variable to discover its effect on another.

Researchers gain plenty of illuminating information from descriptive and correlational studies, but when they want to track down the causes of behavior, they rely heavily on the experimental method. An **experiment** allows them to control and vary the situation being studied. Instead of simply observing and recording behavior, in most experiments researchers create two or more groups by applying some manipulation or treatment that they believe will affect people's behavior. Then they observe what happens, comparing the responses of the different groups. These procedures allow experimenters to draw conclusions about cause and effect—about what causes what.

For many of us who are research psychologists, one of the most exciting aspects of the field is the creativity that it takes to design an experiment to test an empirical question. Consider, for example, the following hypothesis—one that perhaps you've heard before from parents, teachers, or other adults: *having a smartphone interferes with social connection*. That is, does one person (or multiple people) with a phone out during a get-together come at the expense of having meaningful interaction with others?

There are multiple ways to approach this hypothesis. A descriptive study might tell us that a certain percentage of college students tend to look at their phones during the course of a conversation—an interesting finding, sure, but not one that speaks directly to the hypothesis that phone use interferes with social connection. A correlational study might conclude that the more phones present during a conversation, the less engaged individuals appear to be, but again, we still wouldn't know if phone use causes disengagement or feeling disengaged leads to more phone use. For an example of a creative experiment designed to test this causal hypothesis, watch in Revel the video *Smartphones and Connectedness*.

1.5.A Experimental Variables

LO 1.5.A **Distinguish an independent variable from a dependent variable, and give an example of each.**

Let's stick to the topic of phone use. Imagine that you are a psychologist whose research interest is multitasking. Almost everyone multitasks these days, and you would like to know whether that's a good thing or a bad thing. Specifically, you want to know whether or not using a handheld phone while driving is dangerous. Talking on a phone while driving is associated with an increase in accidents, but maybe that's just for people who are risk takers or lousy drivers to begin with. To pin down cause and effect, you decide to do an experiment.

In a laboratory, you ask participants to "drive" using a driving simulator equipped with a steering wheel, gas pedal, and brake pedal. The goal, you tell them, is to maximize the distance covered by driving on a busy highway while avoiding collisions with other cars. Some of the participants talk on the phone for 15 minutes to a research assistant in the next room about a topic that interests them; others just "drive" without a phone. Your plan is to compare how many collisions the two groups have. The basic design of this experiment is illustrated in Figure 1.3.

independent variable
A variable that an experimenter manipulates.

dependent variable
A variable that an experimenter measures, predicting that it will be affected by manipulations of the independent variable.

The aspect of an experimental situation manipulated or varied by the researcher is known as the **independent variable**. The reaction of the participants—the behavior that the researcher tries to predict and measure—is the **dependent variable**. Every experiment has at least one independent and one dependent variable. In our example, the independent variable is phone use (use versus nonuse). The dependent variable is the number of collisions.

Ideally, everything in the experimental situation except the independent variable is held constant—that is, kept the same for all participants. You would not have those in one group driving a fast sports car and those in the other group drive a slower minivan, unless car type were another independent variable. Similarly, you would not have people in one group go through the experiment alone and those in the other drive in front of an audience. Holding everything but the independent variable constant ensures that whatever happens is due to the researcher's manipulation and not something else. It allows you to rule out other interpretations.

Figure 1.3 Do Phone Use and Driving Mix?

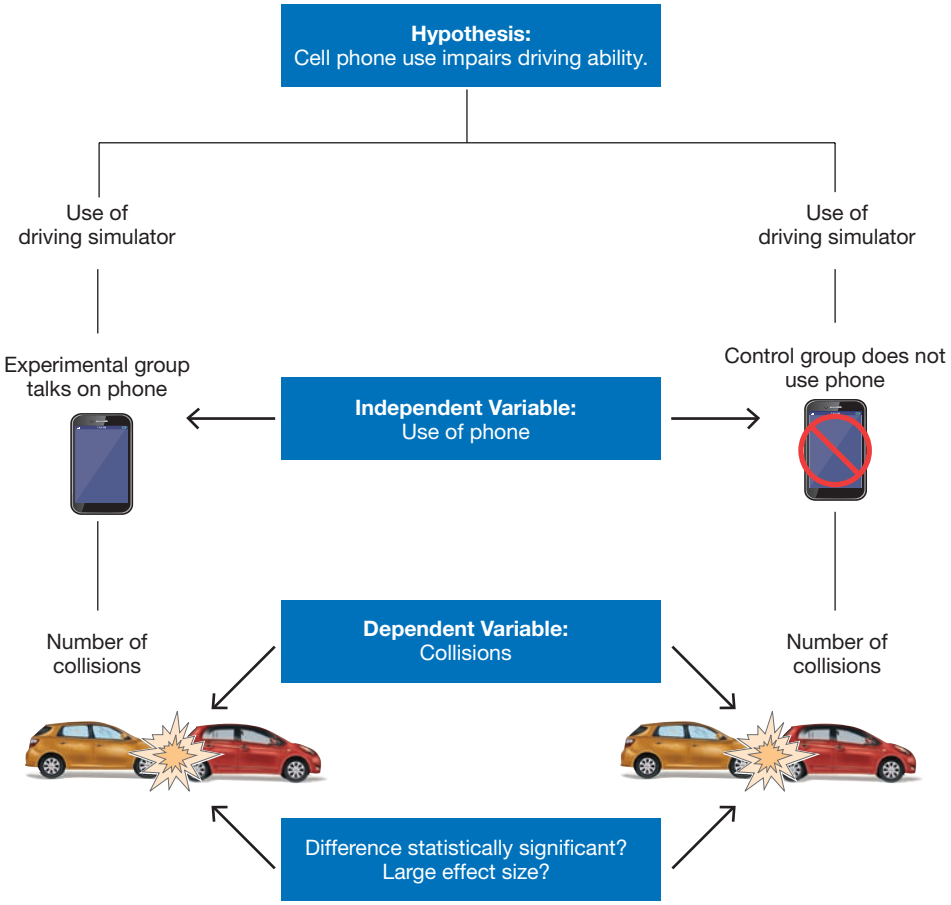
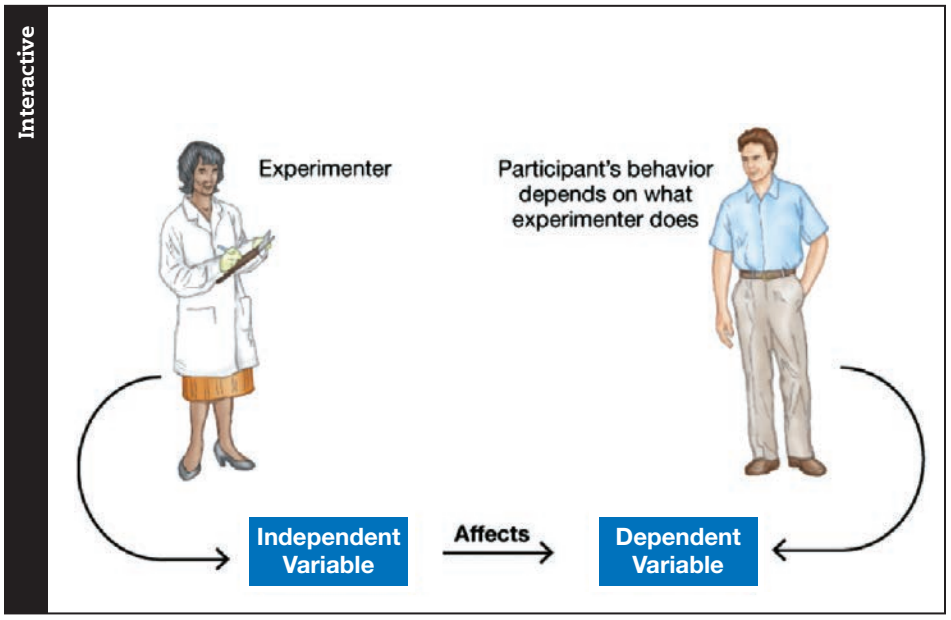


Figure 1.4 Variables in the Experimental Process



Think of it this way: The experimenter is predicting that the dependent variable—the outcome of the study—*depends* on the independent variable (see Figure 1.4). When psychologists set up an experiment, they think, "If I do X, the people in my study may very

well do Y." The "X" represents the independent variable; the "Y" represents the dependent variable. Most variables may be either independent or dependent, depending on what the experimenter wishes to find out. If you want to know whether eating chocolate makes people nervous, then the amount of chocolate eaten is the independent variable. If you want to know whether feeling nervous makes people eat chocolate, then the amount of chocolate eaten is the dependent variable.

1.5.B Experimental and Control Conditions

LO 1.5.B **Explain how random assignment helps create conditions in an experiment, and explain the difference between an experimental group and a control group.**

Consider our phone use and driving study. We are comparing two groups (or conditions) of participants: those who are using a phone while driving and those who are not. We want these two groups to be roughly the same in terms of average driving skill. It would not do to start out with a bunch of reckless red-light runners in one condition and a bunch of lollygagging slowpokes in the other. We also probably want the two groups to be similar in age, education, driving history, and other characteristics so that none of these variables will confound our results. At the end of our study, we want to be able to say that any differences between conditions in driving performance resulted from our manipulation of the independent variable—phone use—rather than any other explanation.

random assignment
In an experiment, the practice of placing participants into conditions at random so as to increase the likelihood that the different conditions are equivalent to begin with.

Psychologists typically accomplish this through **random assignment** of people to one group or the other, perhaps using a coin flip or random number generator. If we have enough participants in our study, individual characteristics that could possibly affect the results are likely to be roughly balanced in randomly assigned groups, so we can safely ignore them. In fact, random assignment is useful for equating conditions even on characteristics that we as researchers cannot easily measure or observe.

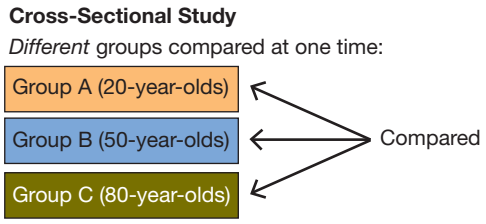
control condition
In an experiment, a comparison condition in which participants are not exposed to the treatment used in the experimental condition.

Experiments often include both an experimental condition and a **control condition** for comparison. Participants in the control condition are treated exactly like those in the experimental condition, except that they are not exposed to the treatment of the independent variable. In our example, participants who talk on the phone while driving make up the experimental group, and those who just drive along without a phone make up the control group. (Not *all* experiments have a control group per se; we could, for instance, compare drivers who are using a handheld phone with drivers who are using a hands-free phone device.)

Sometimes researchers use several experimental or control groups. In our phone and driving study, we might want to examine the effects of short versus long phone conversations or conversations on different topics—say, work, personal matters, and *very* personal matters. In that case, we would have more than one experimental group to compare with the control, no-phone group. In our hypothetical example, though, we just have one experimental group, and all participants in it will drive for 15 minutes while talking about the same topic.

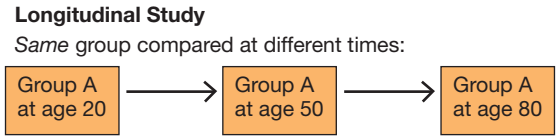
cross-sectional study
A study in which different groups of participants are compared at a given time.

There are also different types of experiments. For example, when psychologists compare the mental test scores of young people and old people, they usually find that younger people outscore older ones. This type of research, in which different groups are compared at the same time, is called a **cross-sectional study**.



Other studies can be used to investigate mental abilities across the lifespan. In a **longitudinal study**, the same people are followed over a period of time and are reassessed at regular intervals.

longitudinal study
A study in which participants are followed and periodically reassessed over a period of time.



In contrast to cross-sectional studies, longitudinal studies find that as people age, they sometimes perform as well as they ever did on certain mental tests. A *general* decline in ability may not occur until people reach their 70s or 80s. Why do results from the two types of studies conflict? Probably because cross-sectional studies measure generational differences: Younger generations tend to outperform older ones in part because they are better educated or are more familiar with the tests used (Brailean et al., 2018). Without longitudinal studies, we might falsely conclude that all types of mental ability inevitably decline with advancing age.

In sum, experimental research design is a favorite of psychologists because it permits conclusions to be drawn about the causal relationship between variables. You now know the basic terminology of the experiment. Independent and dependent variables. Random assignment to condition. Experimental condition and control condition. To review experimental design and put all of these pieces together, in Revel watch the video *Scientific Research Methods.*

1.5.C Advantages and Limitations of Experiments

LO 1.5.C **Discuss the methodological advantages, limitations, and ethical considerations related to experimental research design.**

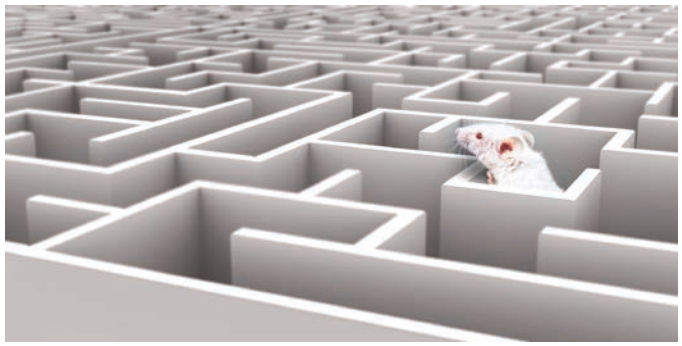
As you have read, experiments allow conclusions about cause and effect. When designed creatively, they allow researchers to investigate a wide range of phenomena and processes. As such, they have long been the method of choice in psychological science. For an experiment to be effective and live up to this potential, a researcher needs to maintain tight control over participants' experiences.

single-blind study
An experiment in which participants do not know which condition they are in (e.g., experimental versus control).

experimenter effects
Unintended changes in participants' behavior as a result of cues that the experimenter inadvertently conveys.

For example, because expectations can influence the results of a study, participants should not know which condition of a study they are in (i.e., whether they are in an experimental or control group). When this is accomplished, the experiment is said to be a **single-blind study**. But participants are not the only ones who bring expectations to the laboratory; researchers do as well. And researchers' expectations, biases, and hopes for a particular result may cause them to inadvertently influence the participants' responses through facial expressions, posture, tone of voice, or some other cue.

Many years ago, Robert Rosenthal and Kermit Fode (1963) demonstrated how powerful such **experimenter effects** can be. They had students teach rats to run a maze. Half of the students were told that their rats had been bred over generations to be "maze bright," and half were told that their rats had been bred to be "maze dull." In reality, there were no genetic differences between the two groups of rats, yet the supposedly brainy rats actually did learn the maze more quickly by the end of the study, apparently because of the way the students were handling and treating them. In other words, the experimenters' expectations about how the rats would behave came to change the way the rats actually behaved. If an experimenter's



Neil Lockhart/Shutterstock

Experimenter effects can bias the results of even studies using animal subjects. Can you think of a strategy a conscientious researcher could use to eliminate the possibility of experimenter effects?

expectations can affect a rodent's behavior, surely they can affect a human being's behavior too, and Rosenthal went on to demonstrate this point in many other studies (Rosenthal, 1994). Even an experimenter's nonverbal behaviors—a friendly smile or cold demeanor—can affect participants' responses.

double-blind study
An experiment in which neither the people being studied nor the individuals running the study know who is in which condition (e.g., experimental versus control) until after the results are tallied.

One solution to the problem of experimenter effects is to conduct a **double-blind study**. In such an experiment, the researcher having actual contact with the participants does not know who is in which group until the data have been gathered; it is called double-blind because *both* the researcher and the participants are similarly in the dark. Double-blind procedures are essential in drug research. Different doses of a drug (and whether it is the active drug or a placebo, a fake treatment that looks, tastes, and smells like the real treatment) are coded in some way, and the person administering the drug is kept in the dark about the code's meaning until after the experiment. To run our phone and driving study in a double-blind fashion, we could use a simulator that automatically records collisions and have the experimenter give instructions through an intercom so they will not know which group a participant is in until after the results are tallied. In this way, there is no chance of experimenter effects emerging.

Despite many potential benefits, the experiment, like all methods, has its limitations. In an experiment, the researcher sets up what is often a rather artificial situation, and the participants try to do as they are told. In their desire to cooperate, advance scientific knowledge, or present themselves in a positive light, they may act in ways that they ordinarily would not. Thus, experimental psychologists confront a dilemma: The more control they exercise over the situation, the more unlike real life it may be. For this reason, many psychologists have called for more **field research**, the careful study of behavior in natural contexts such as schools and the workplace (Cialdini, 2009).

field research
Empirical investigation conducted in a natural setting outside the laboratory.

Yet one more concern to which an experimenter must attend is the issue of research ethics. All psychological studies must conform to ethical guidelines, but such guidelines are especially important in experimental research in which participants are exposed to various manipulations and treatment conditions. Any institution that receives federal funding to conduct research with human participants—that is, essentially any college or university or hospital—must establish a review committee to ensure that all studies conform to federal ethics regulations. Volunteers in a study must consent to participate and know enough about it to make an intelligent decision, a doctrine known as **informed consent**. Researchers must protect participants from physical and mental harm, and if any risk exists, must warn them and give them an opportunity to withdraw at any time.

informed consent
The doctrine that anyone who participates in human research must do so voluntarily and must know enough about the study to make an intelligent decision about whether to take part.

Yerkes Regional Primate Research Center

Psychologists sometimes use animals to study learning, memory, emotion, and social behavior. Here, Frans de Waal observes a group of chimpanzees socializing in an outdoor play area.

Ethical guidelines also require the humane treatment of research animals, which are used in a small percentage of psychological studies, but are crucial to progress in some fields, especially biological psychology and behavioral research. Because of increased concern about the rights and welfare of animals, the APA's guidelines for using animals in research have been made more comprehensive, and federal regulations governing the housing and care of animals have been strengthened (Patterson-Kane, Harper, & Hunt, 2001).

In short, every research method has its strengths and its weaknesses, its benefits, and its challenges. Earlier, we suggested that you may want to list the advantages and disadvantages of each method you read about. If you did so, you can compare your list now with the one in Table 1.2.

Table 1.2 Research Methods in Psychology: Their Advantages and Disadvantages

Interactive

Method	Advantages	Disadvantages
Case study	Good source of hypotheses; provides in-depth information on individuals; unusual examples can shed light on situations or problems that are unethical or impractical to study in other ways	Vital information may be missing, making the example difficult to interpret; the person's memories may be selective or inaccurate; the individual may not be representative or typical
Naturalistic observation	Allows description of behavior as it occurs in the environment; often useful in first stages of a research program	Allows researcher little or no control of the situation; observations may be biased; does not allow firm conclusions about cause and effect
Laboratory observation	Allows more control than other methods; allows use of sophisticated equipment	Allows researcher only limited control of the situation; observations may be biased; does not allow firm conclusions about cause and effect; behavior may differ from behavior in the natural environment
Psychological test	Yields information on personality traits, emotional states, aptitudes, and abilities	Difficult to construct measures that are reliable and valid
Survey	Provides a large amount of information on large numbers of people	If sample is nonrepresentative or biased, it may be impossible to generalize from the results; responses may be inaccurate or untrue
Correlational study	Shows whether two or more variables are related; allows general predictions	Usually does not permit identification of cause and effect
Experiment	Allows researcher to control the situation; permits researcher to identify cause and effect	Situation is artificial, and results may not generalize well to the real world; sometimes difficult to avoid experimenter effects

JOURNAL 1.5 THINKING CRITICALLY—DEFINE YOUR TERMS

Various groups of concerned citizens over the years have argued that listening to various genres of music (rap and heavy metal, in particular) causes people to become more aggressive. Treat that hypothesis as a testable question for one particular type of music. Identify the independent and dependent variables, describe what participants in the different conditions would experience, and note any special considerations you would need to take into account, such as experimenter effects or single- or double-blind designs.

In Revel, you can find Quiz 1.5 to test your knowledge.

1.6 Evaluating the Findings

If you are a psychologist who has just conducted a study—be it descriptive, correlational, or an experiment—your work has really just begun. After you have some data in hand, you must do three things: (1) describe them, (2) assess how reliable and meaningful they are, and (3) figure out how to explain them to other researchers.

1.6.A Describing the Data

LO 1.6.A **Explain how descriptive statistics can be used to compare the performance of groups of research participants.**

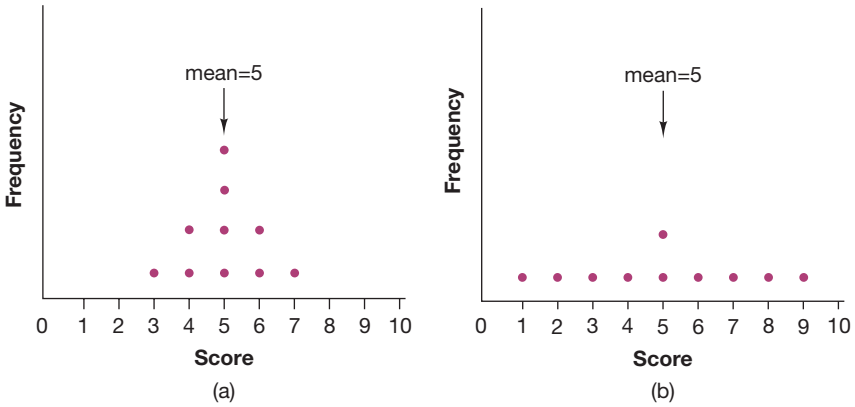
In the experiment we have been using as an example, let's say that 30 people talked on the phone while driving and 30 did not. We have recorded the number of collisions for each person on the driving simulator. Now we have 60 numbers. What can we do with them?

The first step is to summarize the data. The world does not want to hear how many collisions Participant 43 had—that's not the point of an experiment. What's important is what happened in the cell phone group as a whole compared to what happened in the control group as a whole. To provide this information, we need numbers

NAN/Alamy Stock Photo

Psychological scientists must be statistically savvy so that they can analyze and explain their own data, but also so that they can think critically about the findings of other researchers.

Figure 1.5 Same Mean, Different Meaning



In both distributions of scores, the mean is 5, but in (a), the scores are clustered around the mean, whereas in (b), they are widely dispersed, so the standard deviations for the distributions will be quite different. In which distribution is the mean more "typical" of all scores?

that summarize our data. Such numbers, known as **descriptive statistics**, are often depicted in graphs and tables.

A good way to summarize the data is to compute group averages. The most commonly used type of average is the *arithmetic mean*, which is calculated by adding up all the individual scores and dividing the result by the number of scores. We can compute a mean for the cell phone group by adding up the 30 collision scores and dividing the sum by 30. Then we can do the same for the control group. Now our 60 numbers have been boiled down to 2. For the sake of our example, let's assume that the cell phone group had an average of 10 collisions, whereas the control group's average was only 7.

We must be careful, however, about how we interpret these averages. It is possible that no one in our cell phone group actually had 10 collisions. Perhaps half the people in the group were motoring maniacs and had 15 collisions, whereas the others were more cautious and had only 5. Perhaps almost all of the participants had 9, 10, or 11 collisions. Perhaps the number of accidents ranged from 0 to 15. The mean does not tell us about such variability in the participants' responses. For that, we need other descriptive statistics. The *standard deviation* tells us how clustered or spread out the individual scores are around the mean; the more spread out they are, the less "typical" the mean (see Figure 1.5.). Unfortunately, when research is reported in the news, you usually hear only about the mean.

descriptive statistics
Statistical procedures that organize and summarize research data.

1.6.B Interpreting the Data

LO 1.6.B **Explain what a statistically significant research result does and does not mean.**

At this point in our experiment, we have one group with an average of 10 collisions and another with an average of 7. Should we break out the champagne? Hold a press conference? Call mom? Better hold off. Perhaps if one group had an average of 15 collisions and the other an average of 1, we might get excited right off the bat. But rarely does a psychological study hit you between the eyes with a sensationally clear difference between the means. In most cases, there is some possibility that the difference between the two groups was simply the result of chance. Despite all our precautions, perhaps the people in the cell phone group just happened to contain more accident-prone drivers, and their extra 3 collisions had nothing to do with talking on the phone.

To rigorously assess these potential differences or relationships in the data, psychologists use **inferential statistics**. These statistics do not merely describe or summarize the data; they permit researchers to draw conclusions based on evidence (i.e., *inferences*) about how reliable the findings are. Like descriptive statistics, inferential statistics involve the application of mathematical formulas to the data.

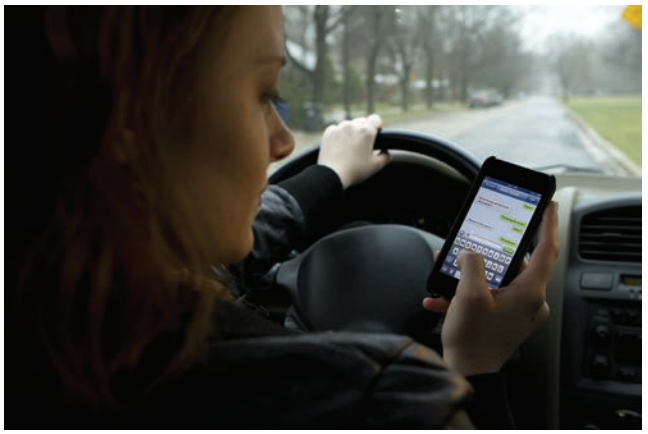
inferential statistics
Statistical procedures that allow researchers to draw conclusions about how statistically reliable a study's results are.

Historically, the most commonly used inferential statistics have been **significance tests**, which tell researchers how probable it is that a study would have turned out the way it did if there weren't a real relationship between the variables in question. A researcher is supposed to be conservative before running a study. By this we mean that a researcher's default assumption must be that there is *no* meaningful effect or relationship between the variables being studied in the real world. There are, after all, many different reasons why we might find an average of 10 collisions in one condition and 7 in the other, including just random fluctuation and chance. Significance tests allow us to ask the question of how likely it is that the means in our study would have turned out this way if there were no differences in the real world between those who are using a phone while driving and those who are not. If that likelihood is quite low—by most conventions, less than 5 percent—we can reject the default assumption that there is no effect between these variables in the real world, and we can say that the result is *statistically significant*: that the difference we found in our study is probably reliable.

significance tests
Statistical tests that assess how likely it is that a study would have turned out the way it did if there weren't really a relationship between the variables in question.

When there is less than a 5 percent chance of finding such a result (given our default assumption of no relationship between the variables), we then report that the result is significant at the .05 ("point oh five") level, or $p \leq .05$. In this terminology, *p* stands for probability and .05 is referred to as the *p value*. If, however, the *p* value is greater than .05, we have little confidence in the study's result, and although we might still want to do further research on the question, we can't budge from that default assumption: We stick by the conclusion that there is no reliable relationship between the variables in the real world.

A statistically significant result provides empirical support for conclusions about human behavior and mental processes—for example: "Talking on a phone while driving increases people's risk of accidents." But these predictions do not tell us with any certainty what a *particular* person will do in a particular situation. And while traditional tests of significance are widely used in psychology, these tests do have some major drawbacks (Cumming, 2014; Cumming et al., 2007; Erceg-Hurn & Mirosevich, 2008). A result may be statistically significant at the "point oh-five" level, yet be small and of little consequence in everyday life because the independent variable only explains a little bit of the variation in people's behavior. Statistical significance tells us about the supposed reliability of a research finding, but not about its importance and potential impact.



Burlingham/Shutterstock

Many actual studies similar to our hypothetical one have confirmed the dangers of talking on a phone while driving. In one study, phone users, whether their phones were handheld or hands-free, were as impaired in their driving ability as intoxicated drivers were (Strayer, Drews, & Crouch, 2006). Still other research has indicated that even pedestrian performance is impaired by texting (Banducci et al., 2016). So next time, put away your phone before you drive or try to cross the street!

To address some of these issues, many journals now encourage the use of alternate methods that yield an **effect size**, which helps us understand how important an effect is. Think of effect sizes as similar to measuring how much something weighs: Regardless of what you're weighing, 100 pounds is weightier than 10 pounds. Effect sizes, then, help us to understand how important—how weighty—an effect is. Because in the end, sure, researchers are interested in whether the effect of an independent variable is reliably significant, but even more important is often the question of how big that effect is, especially when trying to assess how effective a treatment is, whether an educational intervention is worth its cost, or other conclusions tied to the strength of the relationship between variables.

effect size

A standardized way of describing the strength of the relationship between variables.

1.6.C Transparency

LO 1.6.C **Describe why openness and replication are important qualities of the scientific enterprise.**

Science depends on the free flow of ideas and full disclosure of the procedures used in a study. Secrecy is a big "no-no"; scientists must be willing to tell others where they got their ideas, how they tested them, and what the results were. They must do this clearly and in detail so that other scientists can repeat their studies and verify—or challenge—the findings. In fact, in the interest of transparency, many psychological scientists post their materials, data, and analyses online for anyone to see, critique, and modify for their own use (Shrout & Rodgers, 2018; Wicherts et al., 2016). Rigorous and responsible science requires putting all of your work out there for others to review.

This is one of the many reasons why science is a communal activity. Scientists are expected to submit their results to professional journals, which send the findings to experts in the field for evaluation before deciding whether to publish them. This process, called *peer review*, is an effort to ensure that the work lives up to accepted scientific standards. The research community acts as a jury, scrutinizing and sifting the evidence, judging its integrity, and determining whether it meets the lofty threshold for publication as part of the scientific literature. The peer-review process is not perfect, but it does give science a built-in system of checks and balances. In psychology today, peer review begins earlier in the research process than ever before, with many scientists registering their pre-study hypotheses for others to see before they collect data from a single participant.

replication
The process of trying to repeat exactly the procedures of a previous research study to determine whether the results turn out the same way.

Even once a study is done, written up, and published, researchers still have work to do. **Replication**, or repeating, of previous studies is an essential part of the scientific process because sometimes what seems to be a fabulously interesting finding turns out to be only a fluke (Open Science Collaboration, 2015; Spellman, 2015; Wingen, Berkessel, & Englich, 2020). A scientist's work is never actually done because new findings constantly emerge that support, extend, or contradict previous conclusions. Psychological scientists have to keep up with these developments, which inform their own research, teaching, and, yes, textbook authoring. Accordingly, throughout this text you will see reference to research conclusions that have evolved or even changed drastically as replications have failed to confirm the findings of a particular study. We have made it a priority to focus on areas of research that have been replicated (and to point out those cases in which specific findings or interpretations have been called into question later). You can also keep an eye out for the following recurring feature documenting research findings that have proven to be particularly repeatable and robust:

Replication Check ✔

In *Replication Check* features like this one we will elaborate—briefly—on the details of specific findings that have "checked out" upon subsequent replication. With increasing frequency, groups of researchers from labs around the world have come together to pool resources and efforts to try to replicate previous findings. Many of our *Replication Checks* describe just this type of multi-site replication; others examine an individual research team's successful replication of a previous finding. Throughout each chapter, look for these double green checkmarks as indicators of research findings that have held up particularly well to further investigation.

When you think about it, these principles of good science that we've considered in the second half of this chapter correspond closely to the principles of critical thinking we reviewed in its first half. Formulating a prediction with operational definitions allows you to "define your terms." Openness to new ideas and falsification encourages scientists to "ask questions" and "analyze assumptions and biases." Reliance on empirical evidence reminds researchers to "examine the evidence" and "weigh conclusions" in a fair-minded fashion. Do psychologists and other scientists always live up to these lofty standards? Not always. Being only human, they may put too much trust in their personal experiences, be biased by conflicts of interest, or hold fast to their preferred hypothesis even when later data no longer support it; it is far easier to be skeptical about someone else's ideas and findings than about your own (Tavris & Aronson, 2007). Nonetheless, these principles are ones to which we must constantly seek to aspire as psychological scientists, doing so as openly and transparently as possible so that others may replicate and check on our work.

We recognize that we have covered a lot of detail about research designs, statistical analyses, and reporting scientific data. All of this information will prove essential in the chapters that follow as we explore more deeply what researchers have learned about human psychology. These methods of psychological science have overturned some deeply entrenched assumptions about the way people think, feel, act, and adapt, and have yielded information that greatly improves human well-being. These methods illuminate our human errors and biases and enable us to seek knowledge with an open mind. Biologist Thomas Huxley put it beautifully over a century ago: The essence of science, he said, is "to sit down before fact as a little child, be prepared to give up every preconceived notion, follow humbly wherever and to whatever abyss nature leads, or you shall learn nothing" (Huxley, 1900, p. 235).

JOURNAL 1.6 THINKING CRITICALLY—ASK QUESTIONS, BE WILLING TO WONDER

Imagine you and a friend are discussing the cognitive changes people go through between the ages of 18 and 22. Your friend proposes studying the question by testing groups of 18-, 20-, and 22-year-olds, and comparing their mean scores on a test of thinking skills. "It's the best way to do it," exclaims your friend. "In fact, it's about the only way to study this question." Can you propose a different research strategy that involves a single group but answers the same question? What other information might you examine beyond the arithmetic mean?

In Revel, you can find Quiz 1.6 to test your knowledge.