Hoping to satisfy their curiosity about people and to remedy their own woes, millions turn to "psychology." They listen to talk-radio counseling, read articles on psychic powers, attend stop-smoking hypnosis seminars, and absorb self-help books on the meaning of dreams, the path to ecstatic love, the roots of personal happiness.

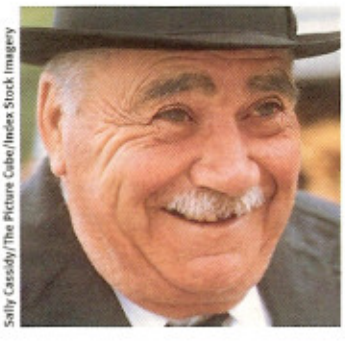
Others, intrigued by claims of psychological truth, wonder: Do mothers and infants bond in the first hours after birth? Should we trust childhood sexual abuse memories that get "recovered" in adulthood—and prosecute the alleged predators? Are first-born children more driven to achieve? Does handwriting offer clues to personality? Does psychotherapy heal?

For these questioners, as for most people whose exposure to psychology comes from popular books, magazines, and TV, psychologists analyze personality, offer counseling, and dispense child-rearing advice.

Do they? Yes, and much more. Consider some of psychology's questions that from time to time you may wonder about:

- Have you ever found yourself reacting to something just as one of your biological parents would—perhaps in a way you vowed you never would—and then wondered how much of your personality you inherited? *To what extent are personality differences predisposed by one's genes? To what extent by the home and neighborhood environments?*
- Have you ever played peekaboo with a 6-month-old infant and wondered why the baby finds the game so delightful? The baby reacts as though, when you momentarily move behind a door, you actually disappear—only to reappear later out of thin air. What do babies actually perceive and think?
- Have you ever awakened from a nightmare and, with a wave of relief, wondered why you had such a crazy dream? How often, and why, do we dream?
- Have you ever wondered what leads to school and work success? Are some people just born smarter? *Does sheer intelligence explain why some people get richer, think more creatively, or relate more sensitively?*
- Have you ever gotten depressed or anxious and wondered whether you'll ever feel "normal"? *What triggers our bad moods—and our good ones?*
- Have you ever worried about how to act among people of a different culture, race, or gender? *In what ways are we alike as members of the human family? How do we differ?*

Such questions provide grist for psychology's mill because psychology is a science that seeks to answer all sorts of questions about us all: how we think, feel, and act.



Sally Cassidy/The Picture Cube/Index Stock Imagery

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A smile is a smile the world around Throughout this book, you will see examples not only of our cultural and gender diversity but also of the similarities that define our shared human nature. People in different cultures vary in when and how often they smile, but a smile *means* the same thing anywhere in the world.

WHAT IS PSYCHOLOGY?

Psychology's Roots

Once upon a time, on a planet in your neighborhood of the universe, there came to be people. Soon thereafter, these creatures became intensely interested in themselves and in one another. They wondered, *"Who are we? From where come our*

"I have made a ceaseless effort not to ridicule, not to bewail, not to scorn human actions, but to understand them."

Benedict Spinoza, A Political Treatise, *1677*

thoughts? Our feelings? Our actions? And how are we to understand—and to master or manage—those around us?" Psychology's answers to these wonderings have developed from international roots in philosophy and biology into a science that aims to describe and explain how we think, feel, and act. Understanding the roots of today's psychology helps us appreciate psychologists' varied perspectives.

Prescientific Psychology

1. How long have people been thinking and writing about the questions that fascinate psychologists today?[1]

We can trace many of psychology's current questions back through human history. These early thinkers wondered: How do our minds work? How do our bodies relate to our minds? How much of what we know comes built in? How much is acquired through experience? In India, for example, Buddha pondered how sensations and perceptions combine to form ideas. In China, Confucius stressed the powers of ideas and of an educated mind. In ancient Israel, Hebrew scholars anticipated today's psychology by linking mind and emotion to the body; people we said to think with their hearts and feel with their bowels.

In ancient Greece, the philosopher-teacher Socrates (469–399 B.C.) and his student Plato concluded that mind is separable from body and continues after the body dies, and that knowledge is innate—built within us. As Socrates lay dying, Plato's future student, Aristotle, was entering the world in another part of Greece. Aristotle's love of data distinguished him from Socrates and Plato, who derived principles by logic. An intellectual ancestor of today's scientists, Aristotle derived principles from careful observations. His observations told him that "the soul is not separable from the body, and the same holds good of particular parts of the soul" (*De Anima*). Moreover, he said knowledge is *not* preexisting (sorry, Socrates and Plato); instead, it grows from the experiences stored in our memories.

Bettmann/Corbis

A seventeenth-century view of nerves
In his *Treatise of Man*, Descartes proposed the hydraulics of a simple reflex.

The next 2000 years brought few enduring new insights into human nature, but that changed in the 1600s, when modern science began to flourish. With it came new theories of human behavior, and new versions of the ancient debates. A frail but brilliant Frenchman named René Descartes (1595–1650) agreed with Socrates and Plato about the existence of innate ideas and the mind's being "entirely distinct from the body" and able to survive its death. Descartes' concept of mind forced him to conjecture, as people have ever since, how the immaterial mind and physical body communicate. A scientist as well as a philosopher, Descartes dissected animals and concluded that the fluid in the brain's cavities contained "animal spirits." These spirits, he surmised, flowed from the brain through what we call the nerves (which he thought were hollow) to the muscles, provoking movement. Memories formed as experiences opened pores in the brain, into which the animal spirits also flowed. Descartes was right that nerve paths are important and that they enable reflexes. Yet, genius though he was, and standing upon the accumulated knowledge from 99+ percent of our human history, he hardly had a clue of what today's average 12-year-old knows. Indeed, most of the scientific story of our self-exploration—the story told in this book's chapters—has been written in but the last historical eye blink of human time.

Meanwhile, across the English channel in Britain, science was taking a more down-to-earth form, centered on experiment, experience, and common-sense judgment. Francis Bacon (1561–1626) became one of the founders of modern science, and his influence lingers in the experiments of today's psychological science. Bacon also was fascinated by the human mind and its failings. Anticipating what we have

come to appreciate about our mind's hunger to perceive patterns even in random events, he wrote that "the human understanding, from its peculiar nature, easily supposes a greater degree of order and equality in things than it really finds" (*Novum Organuum*). He also foresaw research on our eagerness to selectively notice and remember events that confirm our beliefs: "All superstition is much the same whether it be that of astrology, dreams, omens, retributive judgments, or the like, in all of which the deluded believers observe events which are fulfilled, but neglect and pass over their failure, though it be much more common."

Some 50 years after Bacon's death, John Locke (1632–1704), a British political philosopher, sat down to write a one-page essay on "our own abilities" for an upcoming discussion with friends. After 20 years and hundreds of pages, Locke had completed one of history's latest and greatest late papers (*Essay Concerning Human Understanding*), in which he famously argued that the mind at birth is a blank slate—a "white paper"—on which experience writes. This idea, adding to Bacon's legacy, helped form modern **empiricism**, the view that knowledge originates in experience and that science should, therefore, rely on observation and experimentation.

▸ **empiricism** the view that (a) knowledge comes from experience via the senses, and (b) science flourishes through observation and experiment.

▸ **structuralism** an early school of psychology that used introspection to explore the elemental structure of the human mind.

Throughout this book, important concepts are ***bold faced.*** *As you study, you can find these terms with their definitions in a nearby margin and in the Glossary at the end of the book.*

Psychological Science Is Born

2. What event defines the birth of psychology as we know it today? What were structuralism and functionalism, and how did they differ?

Philosophers' thinking about thinking continued until the birth of psychology as we know it, on a December day in 1879, in a small room on the third floor of a shabby building at Germany's University of Leipzig. There, two young men were helping a long-faced, austere, middle-aged professor, Wilhelm Wundt, create an experimental apparatus. Their machine measured the time lag between people's hearing a ball hit a platform and their pressing a telegraph key (Hunt, 1993). Later, the researchers compared this lag to the time required for slightly more complex tasks. Curiously, people responded in about one-tenth of a second when asked to press the key as soon as the sound occurred—and in about two-tenths of a second when asked to press the key as soon as they were aware of perceiving the sound. Wundt was seeking to measure "atoms of the mind"—the fastest and simplest mental processes. Thus began what many consider psychology's first experiment, launching the first psychology laboratory, staffed by Wundt and psychology's first graduate students.

Information sources are cited in parentheses, with name and date, then provided fully in the References section at the book's end.

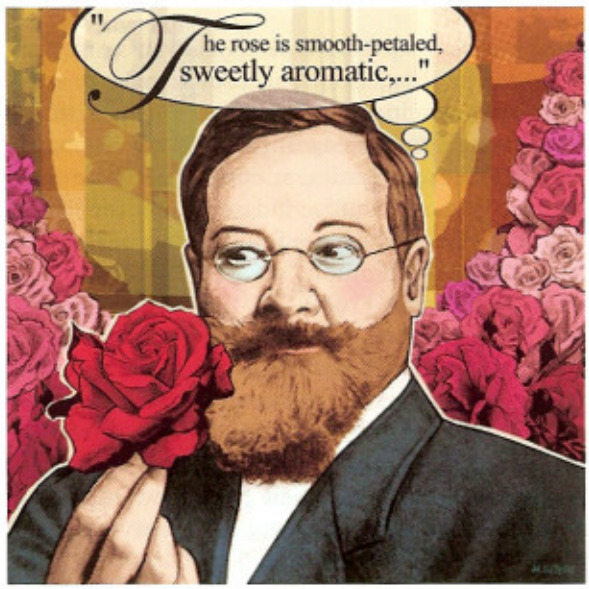
Before long, this new science of psychology became organized into different branches, or schools of thought, each promoted by pioneering thinkers. These early schools included *structuralism* and *functionalism*, described here, and Gestalt psychology, behaviorism, and psychoanalysis, described in later chapters.

THINKING ABOUT THE MIND'S STRUCTURE Soon after receiving his Ph.D. in 1892, Wundt's student Edward Bradford Titchener joined the Cornell University faculty and introduced **structuralism**. As physicists and chemists discerned the structure of matter, so Titchener aimed to discover the elements of mind. His method was to engage people in self-reflective *introspection* (looking inward), training them to report elements of their experience as they looked at a rose, listened to a metronome, smelled a scent, or tasted a substance. What were their immediate sensations, their images, their feelings? And how did these relate to one another? Titchener shared with the English essayist C. S. Lewis (1960, pp. 18–19) the view that "there is one thing, and only one in the whole universe which we know more about than we could learn from external observation." That one thing, Lewis said, is ourselves. "We have, so to speak, inside information."

Wilhelm Wundt Established the first psychology laboratory at the University of Leipzig, Germany.

Monika Sutecki

Edward Bradford Titchener
Used introspection to search for the mind's structural elements.



Alas, structuralism waned as introspection waned. Introspection required smart, verbal people. It also proved somewhat unreliable, its results varying from person to person and experience to experience. And just as the very act of measuring an atomic particle can alter what is measured, so the act of reflecting on an experience can alter the memory of it. Recent studies indicate that people's recollections frequently err, as do their self-reports about what has caused them to help or hurt another (Myers, 2002). Often we just don't know why we feel what we feel and do what we do.

"You don't know your own mind."
Jonathan Swift, Polite Conversation, *1738*

THINKING ABOUT THE MIND'S FUNCTIONS Unlike those hoping to assemble the structure of mind from simple elements—which was rather like trying to understand a car by examining its disconnected parts—philosopher-psychologist William James thought it more fruitful to consider the evolved *functions* of our thoughts and feelings. Smelling is what the nose does; thinking is what the brain does. But *why* do the nose and brain do these things? Under the influence of evolutionary theorist Charles Darwin, James assumed that thinking, like smelling, developed because it was adaptive—it contributed to our ancestors' survival. Consciousness serves a function. It enables us to consider our past, adjust to our present circumstances, and plan our future.

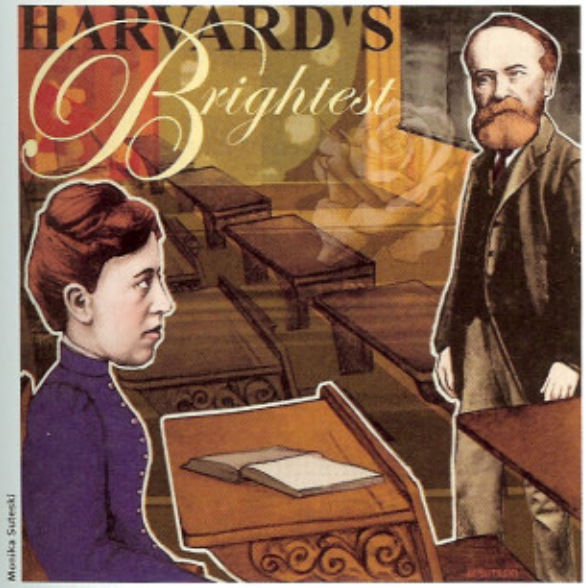
As a **functionalist**, James encouraged explorations of down-to-earth emotions, memories, will power, habits, and moment-to-moment streams of consciousness. His psychology was "full-bodied" and "warm-hearted," wrote another famed psychologist, Ernest Hilgard (1987, p. 50).

James' greatest legacy, however, came less from his laboratory than from his Harvard teaching and his writing. When not plagued by ill health and depression, James was an impish, outgoing, and joyous man, who once recalled that "the first lecture on psychology I ever heard was the first I ever gave." During one of his wisecracking lectures, a student interrupted and asked him to get serious (Hunt, 1993). He was reportedly one of the first American professors to solicit end-of-course student evaluations of his teaching.

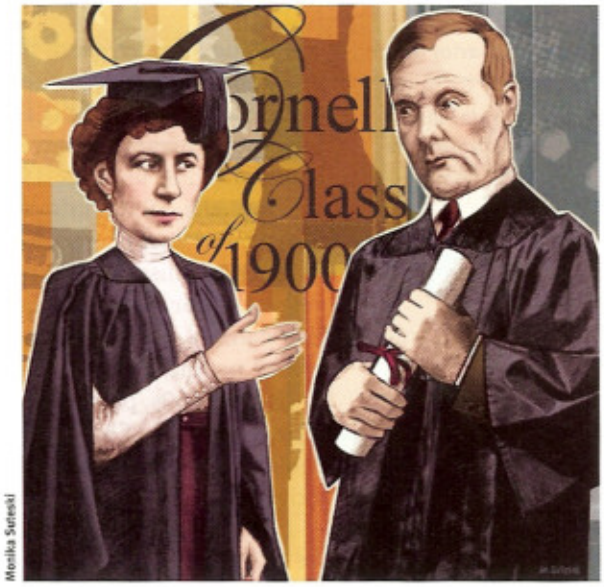
James displayed great spunk in 1890, when—over the objections of Harvard's president—he admitted Mary Calkins into his graduate seminar (Scarborough & Furumoto, 1987). When Calkins joined, all the other students dropped. (In those years women lacked even the right to vote.) So James tutored her alone. Later she finished all the requirements for a Harvard Ph.D., outscoring all the male students on the qualifying exams. Alas, Harvard denied her the degree she had earned, offering her instead a degree from Radcliffe College, its undergraduate sister school for women. Calkins resisted the unequal treatment and refused the degree.

More than a century later, psychologists and psychology students were lobbying Harvard to posthumously award the Ph.D. she earned (*Feminist Psychologist*, 2002).

► **functionalism** a school of psychology that focused on how mental and behavioral processes function—how they enable the organism to adapt, survive, and flourish.



William James and Mary Whiton Calkins James, legendary teacher-writer, mentored Calkins, who became a pioneering memory researcher and American Psychological Association president.



Margaret Floy Washburn The first woman to receive a psychology Ph.D.; synthesized animal behavior research in *The Animal Mind*.

Calkins nevertheless became a distinguished memory researcher and the American Psychological Association's (APA's) first female president in 1905. What a different world from the recent past—1996 to 2002—when women claimed two-thirds or more of new psychology Ph.D.s and were five of the seven elected presidents of the science-oriented American Psychological Society. In Canada and Europe, too, most recent psychology doctorates have been earned by women.

When Harvard denied Calkins psychology's first female psychology Ph.D., that left the honor to Margaret Floy Washburn, who later wrote an influential book, *The Animal Mind*, and became the second female APA president in 1921. Although Washburn's thesis was the first foreign study Wundt published in his journal, her gender meant she was barred from joining the organization of experimental psychologists founded by Titchener, her own graduate adviser (Johnson, 1997).

James' influence reached even further through his dozens of well-received articles, which moved the publisher Henry Holt to offer a contract for a textbook of the new science of psychology. James agreed and began work in 1878, with an apology for requesting two years to finish his writing. The work proved an unexpected chore and actually took him 12 years. (Why am I not surprised?) But more than a century later, people still read *Principles of Psychology* and marvel at the brilliance and elegance with which James introduced psychology to the educated public.

Psychological Science Develops

3. How has the science of psychology's focus changed since its birth in the late nineteenth century? What is the modern definition of psychology?

This young science of psychology developed from the more established fields of philosophy and biology. Wundt was a German philosopher and physiologist. James was an American philosopher. Ivan Pavlov, who pioneered the study of learning, was a Russian physiologist. Sigmund Freud, controversial personality theorist, was an Austrian physician. Jean Piaget, the last century's most influential observer of children, was a Swiss biologist. This list of pioneering psychologists—"Magellans of the mind," as Morton Hunt (1993) called them—illustrates psychology's origins in many disciplines and countries.

▶ **psychology** the science of behavior and mental processes.

▶ **nature-nurture issue** the longstanding controversy over the relative contributions that genes and experience make to the development of psychological traits and behaviors.

It is no wonder, then, that psychology has developed along many lines, or that its practitioners have sometimes disagreed about the very definition of *psychology*. Early psychologists Wundt and Titchener focused on *inner* sensations, images, and feelings. James, too, engaged in introspective examination of the stream of consciousness and of emotion. Thus, until the 1920s, *psychology* was defined as "the science of mental life."

From the 1920s into the 1960s, American psychologists, initially led by flamboyant and provocative John B. Watson and later by the equally provocative B. F. Skinner, dismissed introspection and redefined *psychology* as "the science of observable behavior." After all, said these "behaviorists," science is rooted in observation. You cannot observe a sensation, a feeling, or a thought, but you *can* observe and record people's *behavior* as they respond to different situations.

In the 1960s, psychology began to recapture its initial interest in mental processes through studies of how our minds process and retain information. To encompass psychology's concern with observable behavior *and* with inner thoughts and feelings, today we define **psychology** as *the science of behavior and mental processes*.

Let's unpack this definition. *Behavior* is anything an organism *does*—any action we can observe and record. Yelling, smiling, blinking, sweating, talking, and questionnaire marking are all observable behaviors. *Mental processes* are the internal subjective experiences we infer from behavior—sensations, perceptions, dreams, thoughts, beliefs, and feelings.

For many psychologists, the key word in psychology's definition is *science*. Psychology, as I will emphasize throughout this book, is less a set of findings than a way of asking and answering questions. As a science, psychology attempts to sift opinions and evaluate ideas with careful observation and rigorous analysis. In its attempt to describe and explain human nature, psychological science welcomes hunches and plausible-sounding theories. And it puts them to the test. If a theory works—if the data support its predictions—so much the better for that theory. If the predictions fail, the theory will be revised or rejected.

My aim in this text, then, is not merely to report results but also to show you how psychologists play their game. You will see how researchers evaluate conflicting opinions and ideas. And you will learn how all of us, whether scientists or simply curious people, can think smarter when describing and explaining the events of our lives.

John B. Watson and Rosalie Rayner Working with Rayner, Watson championed psychology as the science of behavior and demonstrated conditioned responses on "Little Albert."

B. F. Skinner A leading "behaviorist," who rejected introspection and studied how consequences shape behavior.

Contemporary Psychology

Like its pioneers, today's psychologists are citizens of many lands. The International Union of Psychological Science has 69 member nations, from Albania to Zimbabwe. Nearly everywhere, membership in psychological societies is mushrooming—from 4183 American Psychological Association members and affiliates in 1945 to more than 160,000 today, with similarly rapid growth in Britain (**FIGURE 1.1**). In China, five universities had psychology departments in 1985; by the century's end, there were 50 (Jing, 1999). Worldwide, some 500,000 people have been trained as psychologists, and 130,000 of them belong to European psychological organizations (Tikkanen, 2001). Moreover, thanks to international publications, joint meetings, and the Internet, collaboration and communication cross borders now more than ever: "We are moving rapidly towards a single world of psychological science," reports Robert Bjork (2000). Psychology is *growing* and it is *globalizing*.

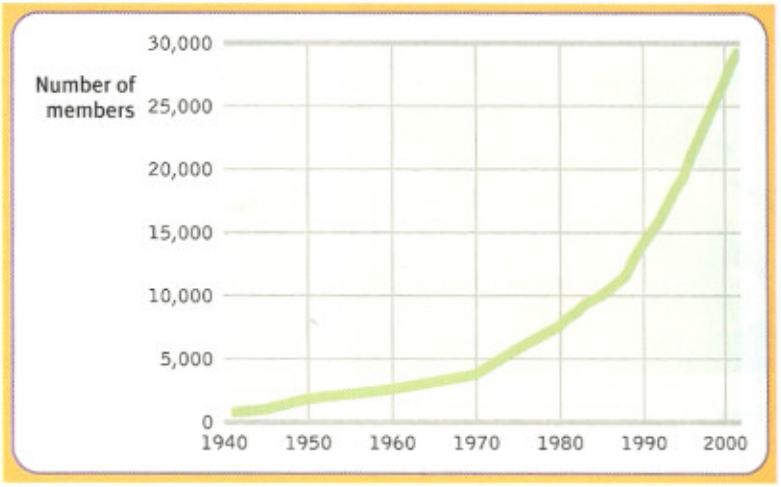


figure 1.1
British Psychological Society membership

Today's psychologists debate some enduring issues and view behavior from differing perspectives. They also teach, work, and do research in many different subfields.

Psychology's Perspectives

4. What theoretical perspectives do psychologists take?

During its short history, psychology has wrestled with some issues that will reappear throughout this book. The biggest and most persistent issue (and the focus of Chapter 3) concerns *the relative contributions of biology and experience*. Do our human traits develop through experience, or do we come equipped with them? As we have seen, the ancient Greeks debated this, and Locke and Descartes rekindled the debate in the 1600s. Today's psychologists explore this **nature-nurture** debate by asking, for example:

- How are differences in intelligence, personality, and psychological disorders influenced by heredity and by environment?
- Is children's grammar innate or formed by experience?
- Are sexual behaviors more "pushed" by inner biology or "pulled" by external incentives?
- Should we treat depression as a disorder of the brain or a disorder of thought—or both?
- How are humans alike (because of their common biology and evolutionary history) and different (because of their differing environments)?
- Are gender differences biologically predisposed or socially constructed?

The debate continues. Yet over and over again we will see that in contemporary science the nature-nurture tension dissolves: *Nurture works on what nature endows.* Our species is biologically endowed with an enormous capacity to learn and adapt. Moreover, every psychological event (every thought, every emotion) is simultaneously a biological event. Thus depression can be *both* a thought disorder and a brain disorder.

This book looks at behavior, thought, and emotion from differing perspectives. Consider, for example, how the complementary perspectives described in **TABLE 1.1,** page 8, can shed light on anger.


Dennis Degnan/Corbis


Tim Wright/Corbis

Like peas in a pod Because identical twins have the same genes, they are ideal participants in studies designed to shed light on hereditary and environmental influences on temperament, intelligence, and other traits. Studies of identical and fraternal twins provide a rich array of findings—described in later chapters—that underscore the importance of both nature and nurture.

Robert Brenner/PhotoEdit

Views of anger How would each of psychology's perspectives explain what's going on here?

table 1.1 Psychology's Current Perspectives

Perspective	Focus	Sample Questions
Neuroscience	How the body and brain enable emotions, memories, and sensory experiences	How are messages transmitted within the body? How is blood chemistry linked with moods and motives?
Evolutionary	How the natural selection of traits promotes the perpetuation of one's genes	How does evolution influence behavior tendencies?
Behavior genetics	How much our genes and our environment influence our individual differences	To what extent are psychological traits such as intelligence, personality, sexual orientation, and vulnerability to depression attributable to our genes? To our environment?
Psychodynamic	How behavior springs from unconscious drives and conflicts	How can someone's personality traits and disorders be explained in terms of sexual and aggressive drives or as the disguised effects of unfulfilled wishes and childhood traumas?
Behavioral	How we learn observable responses	How do we learn to fear particular objects or situations? What is the most effective way to alter our behavior, say, to lose weight or stop smoking?
Cognitive	How we encode, process, store, and retrieve information	How do we use information in remembering? Reasoning? Solving problems?
Social-cultural	How behavior and thinking vary across situations and cultures	How are we—as Africans, Asians, Australians, or North Americans —alike as members of one human family? As products of different environmental contexts, how do we differ?

- Someone working from a *neuroscience perspective* might study the brain circuits that produce the physical state of being "red in the face" and "hot under the collar."
- Someone working from an *evolutionary perspective* might analyze how anger facilitated the survival of our ancestors' genes.
- Someone working from a *behavior genetics perspective* might study how heredity and experience influence our individual differences in temperament.
- Someone working from a *psychodynamic perspective* might view an outburst as an outlet for unconscious hostility.
- Someone working from a *behavioral perspective* might study the facial expressions and body gestures that accompany anger, or might attempt to determine which external stimuli result in angry responses or aggressive acts.
- Someone working from a *cognitive perspective* might study how our interpretation of a situation affects our anger and how our anger affects our thinking.
- Someone working from a *social-cultural perspective* might explore which situations produce the most anger, and how expressions of anger vary across cultural contexts.

Such perspectives needn't contradict one another. Rather, they are complementary outlooks on the same biological state. It's like explaining why grizzly bears hibernate. Is it because hibernation enhanced their ancestors' survival and reproduction? Because their inner physiology drives them to do so? Because cold environments hinder food gathering during winter? Such perspectives are complementary, because "everything is related to everything else" (Brewer, 1996).

So bear in mind psychology's limits. Don't expect it to answer the ultimate questions posed by Russian novelist Leo Tolstoy (1904): "Why should I live? Why should

I do anything? Is there in life any purpose which the inevitable death that awaits me does not undo and destroy?" Instead, expect that psychology will help you understand why people think, feel, and act as they do. Then you should find the study of psychology fascinating and useful.

Psychology's Subfields

5. What are psychology's specialized subfields?

Picturing a chemist at work, you probably envision a white-coated scientist surrounded by glassware and high-tech equipment. Picture a psychologist at work and you would be right to envision

- a white-coated scientist probing a rat's brain.
- an intelligence researcher measuring how quickly an infant becomes bored with (looks away from) a familiar picture.
- an executive evaluating a new "healthy life-styles" training program for employees.
- someone at a computer keyboard analyzing data on whether adopted teens' temperaments more closely resemble those of their adoptive parents or those of their biological parents.
- a therapist listening carefully to a client's depressed thoughts.
- a traveler en route to another culture to collect data on variations in human values and behaviors.
- a teacher or writer sharing the joy of psychology with others.

The cluster of subfields that we call psychology has less unity than most other sciences. But there is a payoff: Psychology is a meeting ground for different disciplines and is thus a perfect home for those with wide-ranging interests. In their diverse activities, from biological experimentation to cultural comparisons, a common quest unites the tribe of psychology: to describe and explain behavior and the mind underlying it.

Some psychologists conduct **basic research** that builds psychology's knowledge base. In the pages that follow we will meet a wide variety of such researchers:

- *Biological psychologists* exploring the links between brain and mind
- *Developmental psychologists* studying our changing abilities from womb to tomb
- *Cognitive psychologists* experimenting with how we perceive, think, and solve problems
- *Personality psychologists* investigating our persistent traits
- *Social psychologists* exploring how we view and affect one another

These psychologists also may conduct **applied research** that tackles practical problems. So do other psychologists, such as *industrial/organizational psychologists* as they study and advise on behavior in the workplace. They use psychology's concepts and methods to help organizations and companies select and train employees more effectively, to boost morale and productivity, to design products, and to implement systems.

Although most psychology textbooks focus on psychological science, psychology is also a helping profession devoted to such practical issues as how to have a happy

► **basic research** pure science that aims to increase the scientific knowledge base.

► **applied research** scientific study that aims to solve practical problems.

"I'm a social scientist, Michael. That means I can't explain electricity or anything like that, but if you ever want to know about people I'm your man."

Jeff Greenberg/PhotoEdit

Laura Dwight/PhotoEdit

Michael Newman/PhotoEdit

Psychology: A science and a profession Psychologists experiment with, observe, test, and treat behavior. Here we see psychologists recording children's behavior, testing a child, and doing face-to-face therapy.

Laura Dwight

I see you! A biological psychologist might view this child's delighted response as evidence for brain maturation. A cognitive psychologist might see it as a demonstration of the baby's growing knowledge of his surroundings. For a cross-cultural psychologist, the role of grandparents in different societies might be the issue of interest.

"Once expanded to the dimensions of a larger idea, [the mind] never returns to its original size."

Oliver Wendell Holmes, 1809–1894

You can use these Rehearse It questions to gauge whether you are ready for the next section. The answers are in Appendix C in the back of this book.

marriage, how to overcome anxiety or depression, and how to raise thriving children. **Clinical psychologists** study, assess, and treat troubled people. After graduate school training, they administer and interpret tests, provide psychotherapy, manage mental health programs, and conduct basic and applied research. By contrast, **psychiatrists**, who also often provide psychotherapy, are medical doctors licensed to prescribe drugs and otherwise treat physical causes of psychological disorders. (Some clinical psychologists are lobbying for a similar right to prescribe mental health–related drugs, and in 2002 the state of New Mexico granted that right to specially trained and licensed psychologists.)

With perspectives ranging from the biological to the social, and with settings from the laboratory to the clinic, psychology relates to many disciplines. More and more, psychology connects with fields ranging from mathematics to biology to sociology to philosophy. And more and more, psychology's methods and findings aid other disciplines. Psychologists teach in medical schools, law schools, and theological seminaries, and they work in hospitals, factories, and corporate offices. They engage in interdisciplinary studies, such as psychohistory (the psychological analysis of historical characters), psycholinguistics (the study of language and thinking), and psychoceramics (the study of crackpots).[2]

Psychology also influences modern culture. Knowledge transforms us. Learning about the solar system and the germ theory of disease alters the way people think and act. Learning psychology's findings also changes people: They less often judge psychological disorders as a moral failing, treatable by punishment and ostracism. They less often regard and treat women as men's mental inferiors. They less often view and rear children as ignorant willful beasts in need of taming. "In each case," notes Morton Hunt (1990, p. 206), "knowledge has modified attitudes, and, through them, behavior." Once aware of psychology's well-researched ideas—about how body and mind connect, how a child's mind grows, how we construct our perceptions, how we remember (and misremember) our experiences, how people across the world differ (and are alike)—your mind may never again be quite the same.

[2]Confession time: I wrote the last part of this sentence on April Fools' Day.

rehearse it!

1. The science of psychology was born in December 1879, when a psychologist and his students measured the time lag between people's hearing a ball hit a platform and their pressing a key. The psychologist who ran this experiment and established the first psychology lab was
   a. Charles Darwin.
   b. William James.
   c. Edward Bradford Titchener.
   d. Wilhelm Wundt.
2. A popular psychology textbook was written in 1890. Its famous author was
   a. Wilhelm Wundt.
   b. Mary Whiton Calkins.
   c. Charles Darwin.
   d. William James.
3. The definition of *psychology* has changed several times since the late 1800s. In the early twentieth century, _____ redefined *psychology* as "the science of observable behavior."
   a. James Watson
   b. René Descartes
   c. William James
   d. Edward Bradford Titchener
4. Psychology is now defined as the science of behavior and mental processes. The perspective in psychology that focuses on how behavior and thought differ from situation to situation and from culture to culture is the
   a. cognitive perspective.
   b. behavioral perspective.
   c. social-cultural perspective.
   d. neuroscience perspective.
5. In the history of psychology, one of the main debates has been over the nature-nurture issue. Nature is to nurture as
   a. personality is to intelligence.
   b. biology is to experience.
   c. intelligence is to biology.
   d. psychological traits are to behaviors.
6. The behavioral perspective in psychology emphasizes observable responses and how they are acquired and modified. A behavioral psychologist would be most likely to study
   a. the effect of school uniforms on classroom behaviors.
   b. the hidden meaning in children's themes and drawings.
   c. the age at which children can learn algebra.
   d. whether certain mathematical abilities appear to be inherited.
7. A psychologist who treats emotionally troubled adolescents at the local mental health agency is most likely to be a/an
   a. research psychologist.
   b. psychiatrist.
   c. industrial/organizational psychologist.
   d. clinical psychologist.
8. A psychologist who conducts basic research to expand psychology's knowledge base would be most likely to
   a. design a computer screen with limited glare and assess the effect on computer operators' eyes after a day's work.
   b. treat older people who are overcome by depression.
   c. observe 3- and 6-year-old children solving puzzles and analyze differences in their abilities.
   d. interview children with behavioral problems and suggest treatments.

Answers can be found in Appendix C.

WHY DO PSYCHOLOGY?

Although in some ways we outsmart the smartest computers, our intuition often goes awry. To err is human. Enter psychological science. With its procedures for gathering and sifting evidence, science restrains error. As we familiarize ourselves with its strategies and incorporate its underlying principles into our daily thinking, we can think smarter. *Psychologists use the science of behavior and mental processes to better understand why people think, feel, and act as they do.*

What About Intuition and Common Sense?

6. *Why are the answers that flow from the scientific approach more reliable than those based on intuition and common sense?*

In sifting reality from illusion, won't intuition and plain common sense suffice for everyday life? Some say psychology merely documents what people already know and dresses it in jargon: "So what else is new—you get paid for using fancy methods to prove what my grandmother knew?"

Others scorn a scientific approach because of their faith in human intuition. Advocates of "intuitive management" urge us to distrust statistical predictors and tune into our hunches when hiring, firing, and investing. Like *Star Wars'* Luke Skywalker, should we trust the force within?

Bob Daemmrich/The Image Works

The limits of intuition Personnel interviewers tend to be overconfident of their gut feelings about job applicants. Their confidence stems partly from their recalling cases where their favorable impression proved right, and from their ignorance about rejected applicants who succeeded elsewhere.

Actually, notes writer Madeleine L'Engle, "The naked intellect is an extraordinarily inaccurate instrument." Intuition can lead us astray. We sometimes err in presuming we could have foreseen what we know happened.

Did We Know It All Along? The Hindsight Bias

How easy it is to seem astute when drawing the bull's eye after the arrow has struck. *After* each stock market downswing—after the bursting of the dot-com bubble, for example—investment gurus say "the market was obviously overdue for a correction." After the first World Trade Center tower was hit on 9/11, some said people in the second tower *should* have immediately evacuated (it became obvious only later that it was not an accident). But *before* the arrow strikes, the stock market drops, and the terrorists attack, these results are anything but obvious. Finding out that something has happened makes it seem inevitable. Psychologists call this 20/20 hindsight vision the **hindsight bias**, also known as the *I-knew-it-all-along phenomenon* (Slovic & Fischhoff, 1977; Wood, 1979).

"Life is lived forwards, but understood backwards."

Philosopher Søren Kierkegaard, 1813–1855

This phenomenon is easy to demonstrate: Give half the members of a group some purported psychological finding, and the other half an opposite result. Tell the first group, "Psychologists have found that separation weakens romantic attraction. As the saying goes, 'Out of sight, out of mind.'" Ask them to imagine why this might be true. Most people can, and nearly all will then regard this true finding as unsurprising.

Tell the second group just the opposite—that "psychologists have found that separation strengthens romantic attraction. As the saying goes, 'Absence makes the heart grow fonder.'" People given this result can also easily explain it, and they overwhelmingly see it as unsurprising common sense. Obviously, when both a supposed finding and its opposite seem like common sense, there is a problem.

Such errors in our recollections and explanations show why we need psychological research. Just asking people how and why they felt or acted as they did can

► **clinical psychology** a branch of psychology that studies, assesses, and treats people with psychological disorders.

► **psychiatry** a branch of medicine dealing with psychological disorders; practiced by physicians who sometimes provide medical (for example, drug) treatments as well as psychological therapy.

► **hindsight bias** the tendency to believe, after learning an outcome, that one would have foreseen it. (Also known as the *I-knew-it-all-along phenomenon*.)

Hindsight bias *After* the horror of 9/11 it seemed obvious that the American intelligence service should have taken advance warnings more seriously, that airport security should have anticipated box-cutter–wielding terrorists, that occupants of the second World Trade Center tower should have known to play it safe and leave. With 20/20 hindsight, everything seems obvious.

Tim Boyle/Getty Images

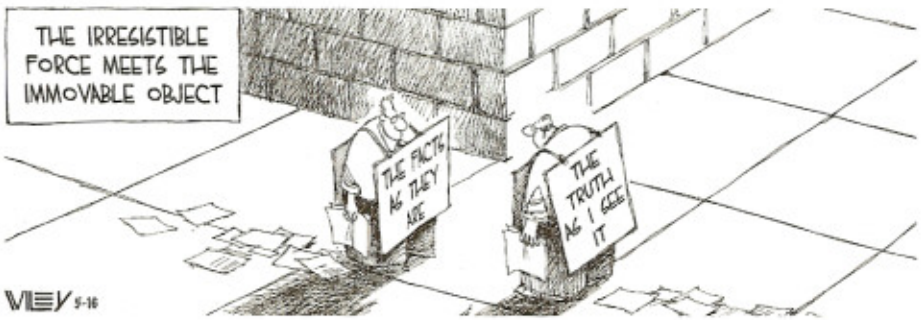
"Anything seems commonplace, once explained."

Dr. Watson to Sherlock Holmes

sometimes be misleading—*not* because common sense is usually wrong, but because it is after the fact. Common sense describes what has happened more easily than it predicts what will happen.

Nevertheless, Grandmother is often right. As Yogi Berra once said, "You can observe a lot by watching." (We have Berra to thank for other gems, such as "Nobody ever comes here—it's too crowded," and "If the people don't want to come out to the ballpark, nobody's gonna stop 'em.") Because we're all behavior watchers, it would be surprising if many of psychology's findings had *not* been foreseen. Many people believe that love breeds happiness, and they are right (we have what Chapter 10 calls a deep "need to belong").

NON SEQUITUR



But sometimes Grandmother's intuition has it wrong. Informed by countless casual observations, our intuition may tell us that familiarity breeds contempt, that dreams predict the future, and that emotional reactions coincide with menstrual phase. As we will see in later chapters, the available evidence suggests that these commonsense ideas are wrong, wrong, and wrong. Throughout this book we will see how research has both inspired and overturned popular ideas—about aging, about sleep and dreams, about personality. And we will also see how it has surprised us with discoveries about how the brain's chemical messengers control our moods and memories, about animal abilities, and about the effects of stress on our capacity to fight disease.

Overconfidence

Our everyday thinking is limited not only by our after-the-fact common sense but also by our human tendency to be overly confident. As Chapter 9 explains, we tend to think we know more than we do. Asked how sure we are of our answers to factual questions (Is Boston north or south of Paris?), we tend to be more confident than correct.[3] Or consider these three anagrams, which Richard Goranson (1978) asked people to unscramble:

WREAT → WATER

ETRYN → ENTRY

GRABE → BARGE

Fun anagram solutions from Wordsmith.org:
Elvis = lives
Dormitory = dirty room
Slot machines = cash lost in 'em

[3]Boston is south of Paris.

Reflect for a moment: About how many seconds do you think it would have taken you to unscramble each of those?

Once people know the target word, hindsight makes it seem obvious—so much so that they become overconfident. They think they would have seen the solution in only 10 seconds or so, when in reality the average problem solver spent 3 minutes, as you also might, given a similar anagram without the solution: OCHSA (see page 14 to check your answer).

Are we any better at predicting our social behavior? To find out, Robert Vallone and his associates (1990) had students predict at the beginning of the school year whether they would drop a course, vote in an upcoming election, call their parents more than twice a month, and so forth. On average, the students felt 84 percent confident in making these self-predictions. Later quizzes about their actual behavior showed their predictions were correct only 71 percent of the time. Even when they were 100 percent sure of themselves, their self-predictions erred 15 percent of the time.

The point to remember: Hindsight and overconfidence bias lead us to overestimate our intuition. But scientific inquiry, fed by skepticism and humility, helps us sift reality from illusion.

"We don't like their sound. Groups of guitars are on their way out."

Decca Records, in turning down a recording contract with the Beatles in 1962

"Computers in the future may weigh no more than 1.5 tons."

Popular Mechanics, *1949*

"The telephone may be appropriate for our American cousins, but not here, because we have an adequate supply of messenger boys."

British expert group evaluating the invention of the telephone

"They couldn't hit an elephant at this dist—."

General John Sedgwick's last words, uttered during a U.S. Civil War battle, 1864

The Scientific Attitude

7. What attitudes characterize scientific inquiry?

Underlying all science is, first, a hard-headed *curiosity*, a passion to explore and understand without misleading or being misled. Some questions (Is there life after death?) are beyond science. To answer them in any way requires a leap of faith. With many other ideas (Can some people demonstrate ESP?), the proof is in the pudding. No matter how sensible or crazy-sounding an idea, the hard-headed question is, Does it work? When put to the test, can its predictions be confirmed?

This scientific approach has a long history. As ancient a figure as Moses used such an approach. How do you evaluate a self-proclaimed prophet? His answer: Put the prophet to the test. If the predicted event "does not take place or prove true," then so much the worse for the prophet (*Deuteronomy* 18:22). Magician James Randi uses Moses' approach when testing those claiming to see auras around people's bodies:

Randi: *Do you see an aura around my head?*
Aura-seer: *Yes, indeed.*
Randi: *Can you still see the aura if I put this magazine in front of my face?*
Aura-seer: *Of course.*
Randi: *Then if I were to step behind a wall barely taller than I am, you could determine my location from the aura visible above my head, right?*

Randi tells me that no aura-seer has yet agreed to take this simple test.

When subjected to such scrutiny, crazy-sounding ideas sometimes find support. More often, science relegates crazy-sounding ideas to the mountain of forgotten claims of perpetual motion machines, miracle cancer cures, and out-of-body travels into centuries past. To sift reality from fantasy, sense from nonsense, therefore requires a scientific attitude: being skeptical but not cynical, open but not gullible.

As scientists, psychologists also approach the world of behavior with a *curious skepticism*. They persistently ask two questions: What do you mean? How do you know? In business, the motto is "Show me the money." In science, it is "Show me the evidence."

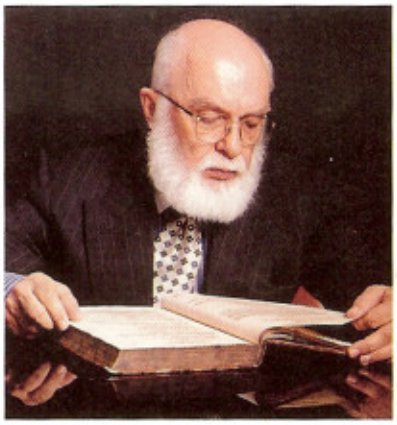
Consider some familiar claims: that parental behaviors determine their children's sexual orientation; that lie detectors tell the truth; that astrologers can analyze your character and predict your future based on the position of the planets at your birth. As you will see in the chapters that follow, putting such claims to the test has led most psychologists to doubt them. In the arena of competing ideas, skeptical testing can reveal which ones best match the facts. "To believe with certainty," says a Polish proverb, "we must begin by doubting."

"The scientist . . . must be free to ask any question, to doubt any assertion, to seek for any evidence, to correct any errors."

Physicist J. Robert Oppenheimer, Life, *October 10, 1949*

"A skeptic is one who is willing to question any truth claim, asking for clarity in definition, consistency in logic, and adequacy of evidence."

Philosopher Paul Kurtz, The Skeptical Inquirer, *1994*


Rob Kinmonth

The amazing Randi The magician James Randi exemplifies skepticism. He has tested and debunked a variety of psychic phenomena.

Putting a scientific attitude into practice requires not only skepticism but also *humility*, because we may have to reject our own ideas. In the last analysis, what matters is not my opinion or yours, but the truths nature reveals in response to our questioning. If people don't behave as our ideas predict, then so much the worse for our ideas. This is the humble attitude expressed in one of psychology's early mottos: "The rat is always right."

Historians of science tell us that these attitudes of curiosity, skepticism, and humility helped make modern science possible. Many of its founders were people whose religious convictions made them humble before nature and skeptical of mere human authority (Hooykaas, 1972; Merton, 1938). Of course, scientists, like anyone else, can have big egos and may cling to their preconceptions. We all view nature through the spectacles of our preconceived ideas. Yet the ideal that unifies psychologists with all scientists is the curious, skeptical, humble scrutiny of competing ideas. As a community, scientists check and recheck one another's findings and conclusions.

"My deeply held belief is that if a god anything like the traditional sort exists, our curiosity and intelligence are provided by such a god. We would be unappreciative of those gifts . . . if we suppressed our passion to explore the universe and ourselves."

Carl Sagan, Broca's Brain, *1979*

Critical Thinking

This scientific attitude prepares us to think smarter. Smart thinking, called **critical thinking**, examines assumptions, discerns hidden values, evaluates evidence, and assesses conclusions. Whether reading a news report or listening to a conversation, critical thinkers ask questions. Like scientists, they wonder, How do they know that? What's this person's agenda? Is the conclusion based on anecdote and gut feelings, or on evidence? Does the evidence justify a cause-effect conclusion? What alternative explanations are possible? Carried to an extreme, healthy skepticism can degenerate into a negative cynicism that scorns any unproven idea. Better to have a critical attitude that produces humility—an awareness of our own vulnerability to error and an openness to surprises and new perspectives.

Throughout this book, you will encounter Thinking Critically boxes. Each highlights careful thinking about some interesting or important issue. In addition, at the end of each chapter, you will find A Critical Thinker's Review of the key concepts. This feature uses six categories of critical thinking to help you become a smarter thinker and to provide a memorable way for you to review the chapter.

"The real purpose of the scientific method is to make sure Nature hasn't misled you into thinking you know something you don't actually know."

Robert M. Pirsig, Zen and the Art of Motorcycle Maintenance, *1974*

Has psychology's critical inquiry been open to surprising findings? The answer, as ensuing chapters illustrate, is plainly yes. Believe it or not . . .

- massive losses of brain tissue early in life may have minimal long-term effects (see page 59).
- within days, newborns can recognize their mother's odor and voice (see pages 101–102).
- brain damage can leave a person able to learn new skills, yet be unaware of such (see pages 60–61).
- diverse groups—men and women, old and young, rich and working class, those with disabilities and without—report roughly comparable levels of personal happiness (see pages 396–398).
- electroconvulsive ("shock") therapy is often a very effective treatment for severe depression (see page 533).

And has critical inquiry convincingly debunked popular presumptions? The answer, as ensuing chapters also illustrate, is again yes. The evidence indicates that . . .

- sleepwalkers are *not* acting out their dreams and sleeptalkers are *not* verbalizing their dreams (see Chapter 6).
- our past experiences are *not* all recorded verbatim in our brains; with brain stimulation or hypnosis, one *cannot* simply "play the tape" and relive long-buried or repressed memories (see Chapter 8).
- most people do *not* suffer from unrealistically low self-esteem (see page 458).
- opposites do *not* generally attract (see page 571).

Solution to anagram on page 13: CHAOS.

rehearse it!

9. Psychology tells us what we already know from common sense, say some skeptics. Hindsight bias refers to our tendency to
   a. perceive events as obvious or inevitable after the fact.
   b. assume that two events happened because we wished them to happen.
   c. overestimate our abilities to predict the future.
   d. make judgments that fly in the face of common sense.

10. As scientists, psychologists view theories with skepticism, humility, and curiosity. This means that they
    a. approach research with a negative cynicism.
    b. assume that an article published in a reputable journal must be true.
    c. realize that some issues should not be studied.
    d. persistently ask questions and are willing to reject ideas that cannot be verified by research.

11. A newspaper article describes how a "cure for cancer has been found." A critical thinker probably will
    a. immediately dismiss the article as untrue because there is no evidence to back up the facts.
    b. accept the information as a wonderful breakthrough.
    c. question the article, evaluate the evidence, and assess the conclusions.
    d. question the article but quickly accept it as true due to the author's excellent reputation.

Answers can be found in Appendix C.

HOW DO PSYCHOLOGISTS ASK AND ANSWER QUESTIONS?

Psychologists arm their scientific attitude with the *scientific method*: They make observations, form theories, and then refine their theories in the light of new observations.

The Scientific Method

8. How do psychologists use the scientific method to construct theories?

In everyday conversation, we tend to use *theory* to mean "mere hunch." In science, *theory* is linked with observation. A scientific **theory** *explains* through an integrated set of principles that *organizes* and *predicts* behaviors or events. By organizing isolated facts, a theory simplifies things. There are too many facts about behavior to remember them all. By linking facts and bridging them to deeper principles, a theory offers a useful summary. When we connect the observed dots, we may discover a coherent picture.

A good theory of depression, for example, helps us organize countless observations concerning depression into a much shorter list of principles. Say we observe over and over that people with depression describe their past, present, and future in gloomy terms. We might therefore theorize that low self-esteem contributes to depression. So far so good: Our self-esteem principle neatly summarizes a long list of facts about people with depression.

Yet no matter how reasonable a theory may sound—and low self-esteem seems a reasonable explanation of depression—we must put it to the test. A good theory doesn't just sound appealing. It must imply testable predictions, called **hypotheses**. By enabling us to test and reject or revise the theory, such predictions give direction to research. They specify what results would support the theory and what results would disconfirm it. To test our self-esteem theory of depression, we might give people a test of self-esteem on which they respond to statements such as "I have good ideas." Then we could see whether, as we hypothesized, people who report poorer self-images also score higher on a depression scale (**FIGURE 1.2,** on page 16).

In testing our theory, we should be aware that it can bias subjective observations. Having theorized that depression springs from low self-esteem, we may see what we expect. We may perceive depressed people's neutral comments as self-disparaging.

As a check on their biases, psychologists report their research precisely enough—with clear **operational definitions** of concepts—to allow others to **replicate** (repeat) their observations. If other researchers re-create a study with different

► **critical thinking** thinking that does not blindly accept arguments and conclusions. Rather, it examines assumptions, discerns hidden values, evaluates evidence, and assesses conclusions.

► **theory** an explanation using an integrated set of principles that organizes and predicts observations.

► **hypothesis** a testable prediction, often implied by a theory.

► **operational definition** a statement of the procedures (operations) used to define research variables. For example, *intelligence* may be operationally defined as what an intelligence test measures.

► **replication** repeating the essence of a research study, usually with different participants in different situations, to see whether the basic finding extends to other participants and circumstances.

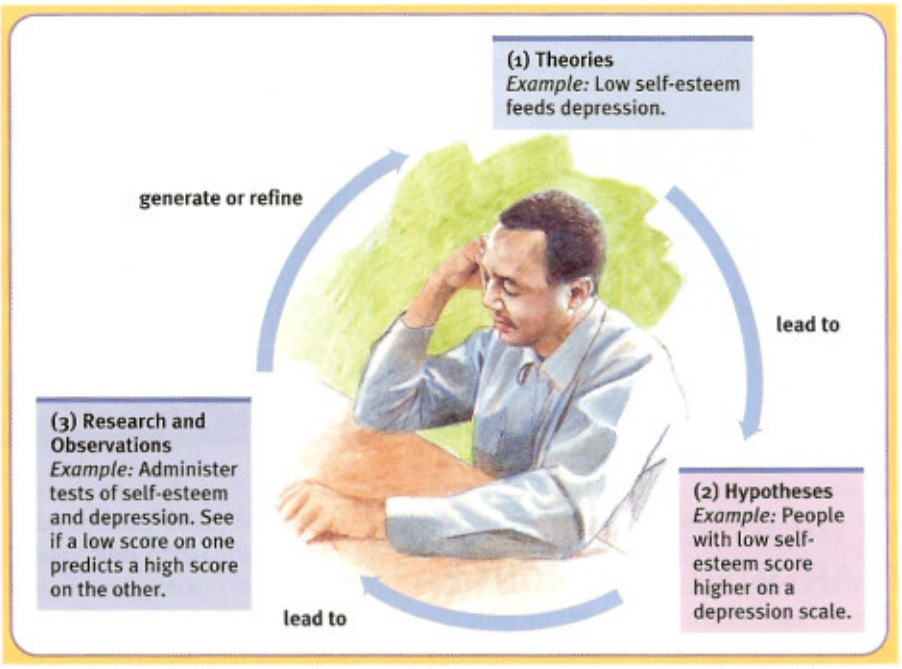


figure 1.2
The scientific method A self-correcting process for asking questions and observing nature's answer.

participants and materials and get similar results, then our confidence in the finding's reliability grows. The first study of hindsight bias aroused psychologists' curiosity. Now, after many successful replications with differing people and questions, we feel sure of the phenomenon's power.

In the end, our theory will be useful if it (1) effectively *organizes* a range of self-reports and observations and (2) implies clear *predictions* that anyone can use to check the theory or to derive practical applications. (If we boost people's self-esteem, will their depression lift?) Eventually, our research will probably lead to a revised theory (such as the one on pages 492–495) that better organizes and predicts what we know about depression.

Good theories explain by
1. *organizing and linking observed facts.*
2. *implying hypotheses that offer testable predictions and, sometimes, practical applications.*

Our research strategies include descriptive, correlational, and experimental methods. We test hypotheses and refine our theories by making *observations* that *describe* behavior, detecting *correlations* that help *predict* behavior, and doing *experiments* that help *explain* behavior. To think critically about popular psychology claims, we need to recognize these designs and to know what conclusions they allow.

Description

9. How do psychologists observe and describe behavior?

The starting point of any science is description. In everyday life, all of us observe and describe people, often drawing conclusions about why they behave as they do. Professional psychologists do much the same, only more objectively and systematically.

The Case Study

Among the oldest research methods is the **case study**, in which psychologists study one individual in great depth in the hope of revealing things true of us all. Some examples: Much of our early knowledge about the brain came from case studies of individuals who suffered a particular impairment after damage to a certain brain region. Sigmund Freud constructed his theory of personality from a handful of case studies. Developmental psychologist Jean Piaget taught us about children's thinking after carefully observing and questioning but a few children. Studies of only a few chimpanzees have revealed their capacity for understanding and language. Intensive case studies are sometimes very revealing.

"'Well my dear,' said Miss Marple, 'human nature is very much the same everywhere, and of course, one has opportunities of observing it at closer quarters in a village.'"

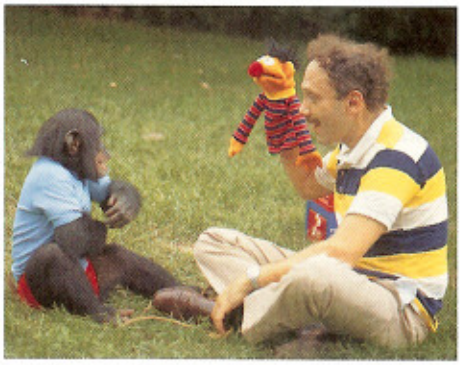
Agatha Christie, The Tuesday Club Murders, 1933

Although case studies can also suggest hypotheses for further study, they sometimes mislead us: An individual may be atypical. Unrepresentative information can lead to mistaken judgments and false conclusions. Indeed, anytime a researcher mentions a finding ("Smokers die younger: 95 percent of men over 85 are nonsmokers") someone is sure to offer a contradictory case ("Well, I have an uncle who smoked two packs a day and lived to be 89"). Anecdotal cases—dramatic stories, personal experiences, even psychological case examples—have a way of overwhelming general truths. Highly publicized school shootings can raise alarm about school violence even while school violence rates are subsiding. Numbers can be numbing (in one study of 1300 dream reports concerning a kidnapped child, only 5 percent correctly envisioned the child as dead—see page 179). Anecdotes are often more startling. ("But I know a man who dreamed his sister was in a car accident, and two days later she was badly injured.")

The point to remember: Individual cases can suggest fruitful ideas. What's true of all of us can be glimpsed in any one of us. But to discern the general truths that cover individual cases, we must answer questions with other methods.

▸ **case study** an observation technique in which one person is studied in depth in the hope of revealing universal principles.

▸ **survey** a technique for ascertaining the self-reported attitudes or behaviors of people, usually by questioning a representative, random sample of them.



Susan Kuklin/Photo Researchers

The case of the conversational chimpanzee In intensive case studies of chimpanzees, psychologists have explored the intriguing question of whether language is uniquely human. Here Nim Chimpsky signs *hug* as his trainer, psychologist Herbert Terrace, shows him the puppet Ernie. But is Nim really capable of using language? We'll explore that issue in Chapter 9.

The Survey

The **survey** method, commonly used in both descriptive and correlational studies, looks at many cases in less depth. A survey asks people to report their behavior or opinions. Questions about everything from sexual practices to political opinions get put to the public. Harris and Gallup polls have revealed that 72 percent of Americans think there is too much TV violence, 84 percent favor equal job opportunities for homosexual people, 89 percent say they face high stress, 95 percent believe in God, and 96 percent would like to change something about their appearance. But asking questions is tricky, and the answers may well depend on your wording and your choice of respondents.

WORDING EFFECTS Even subtle changes in the order or wording of questions can have major effects. Should cigarette ads or pornography be allowed on television? People are much more likely to approve "not allowing" such things than "forbidding" or "censoring" them. In one national survey, only 27 percent of Americans approved of "government censorship" of media sex and violence, though 66 percent approved of "more restrictions on what is shown on television" (Lacayo, 1995). People are similarly much more approving of "aid to the needy" than of "welfare," of "affirmative action" than of "preferential treatment," and of "revenue enhancers" than of "taxes." Because wording questions is such a delicate matter, critical thinkers will reflect on how the phrasing of a question might have affected the opinions respondents expressed.

SAMPLING You can describe human experience using common sense, dramatic anecdotes, personal experience, and arbitrary samples. But for an accurate picture of the experiences and attitudes of a whole population, there's only one game in town—the representative sample.

We can extend this point to everyday thinking, as we generalize from samples we observe. We meet a few students and attend a few classes during a visit to a college and infer from those instances how friendly the campus is and how good the teaching is. We observe the weather during a three-day visit to Copenhagen and then tell our friends about the climate there.

Overgeneralizing from such select samples is tempting, especially when they are vivid cases. Given (a) a statistical summary of a professor's student evaluations and (b) the vivid comments of two irate students, an administrator's impression of the professor may be influenced as much by the two unhappy students as by the many favorable evaluations in the statistical summary. Standing in the checkout line at the supermarket, George sees the woman in front of him pay with government-provided food stamps and then watches with dismay as she drives away in a fancy car. In both situations, the temptation to generalize from a few vivid but unrepresentative cases is nearly irresistible.

This Modern World by Tom Tomorrow © 1995.

With very large samples, estimates become quite reliable. E *is estimated to represent 12.7 percent of the letters in written English.* E, *in fact, is 12.3 percent of the 925,141 letters in Melville's* Moby Dick; *12.4 percent of the 586,747 letters in Dickens'* A Tale of Two Cities; *and 12.1 percent of the 3,901,021 letters in 12 of Mark Twain's works (*Chance News, *1997).*

The point to remember: The best basis for generalizing is from a representative sample of cases.

If you wished to survey the students at your college or university, how could you survey a representative sample of the total student **population**—the whole group you wanted to study and describe? Typically, by choosing a **random sample**, one in which every person in the entire group has an equal chance of participating.

To sample the students at your institution randomly, you would *not* send each of them a questionnaire. (The conscientious people who return it would not be a random sample.) Rather, you would aim for a representative sample by, say, using a table of random numbers to pick participants from a student listing and then making sure you involve as many as possible. Large representative samples are better than small ones, but a small representative sample of 100 is better than an unrepresentative sample of 500.

The point to remember: Before believing survey findings, think critically: Consider the sample. You cannot compensate for an unrepresentative sample by simply adding more people.

The random-sampling principle also works in national surveys. Imagine that you had a giant barrel containing 60 million white beans mixed with 40 million red beans. A scoop that randomly sampled 1500 of them would contain about 60 percent white and 40 percent red beans, give or take 2 or 3 percent. Sampling voters in a national election survey is like sampling the beans; 1500 randomly sampled people, drawn from all areas of a country, provide a remarkably accurate snapshot of the opinions of a nation.

"How would you like me to answer that question? As a member of my ethnic group, educational class, income group, or religious category?"

Because gathering a random sample can be a huge task, some don't make the effort. Shere Hite's book *Women and Love* reported survey findings based on only a 4.5 percent response rate from mailings to an unrepresentative sample of 100,000 women. The response was doubly unrepresentative because not only did she have a modest, self-selected return, but the women initially contacted were members of women's organizations. Nonetheless, "It's 4500 people. That's enough for me," reported Hite. And it was apparently enough for *Time* magazine, which made a cover story of her findings—that 70 percent of women married five or more years were having affairs, and that 95 percent of women felt emotionally harassed by the men they love (Wallis, 1987). Evidently it didn't matter that on less publicized surveys, *randomly* sampled American women expressed much higher levels of satisfaction. And only 1 in 7 reported having had an affair during their current marriage—a level of faithfulness replicated in British, French, and Danish surveys (Greeley, 1991, 1994). Without random sampling, large samples like Hite's—including call-in phone samples and TV Web site polls—often merely give misleading results.

Naturalistic Observation

A third descriptive research method involves watching and recording the behavior of organisms in their natural environment. These **naturalistic observations** range from watching chimpanzee societies in the jungle, to using unobtrusive measures of parent-child interactions in different cultures, to recording students' self-seating patterns in the lunchrooms of multiracial schools.

Like the case study and survey methods, naturalistic observation does not *explain* behavior. It *describes* it. Nevertheless, descriptions can be revealing. We once thought, for example, that only humans use tools. Then naturalistic observation revealed that chimpanzees sometimes insert a stick in a termite mound and withdraw it, eating the stick's load of termites. Such naturalistic observations, recalls chimpanzee observer Jane Goodall (1998), paved the way for later studies of animal thinking, language, and emotion. "Observations, made in the natural habitat, helped to show that the societies and behavior of animals are far more complex than previously supposed," thus expanding our understanding of our fellow animals. We

▸ **population** all the cases in a group, from which samples may be drawn for a study. (Note: Except for national studies, this does *not* refer to a country's whole population.)

▸ **random sample** a sample that fairly represents a population because each member has an equal chance of inclusion.

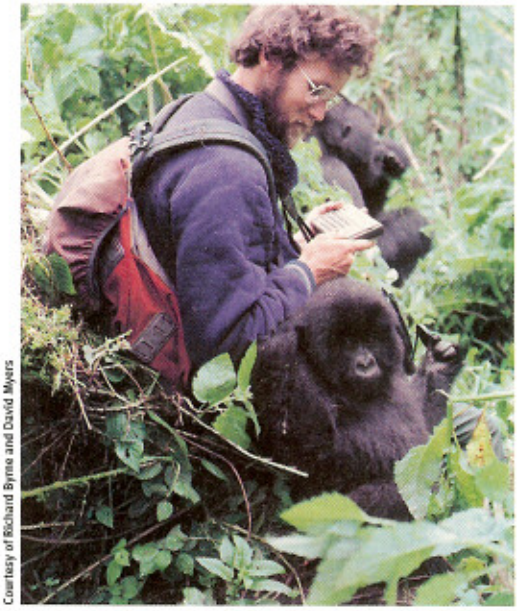
▸ **naturalistic observation** observing and recording behavior in naturally occurring situations without trying to manipulate and control the situation.

▸ **correlation coefficient** a statistical measure of the extent to which two factors vary together, and thus of how well either factor predicts the other.

later learned that chimps and baboons also use deception to achieve their aims. Psychologists Andrew Whiten and Richard Byrne (1988) repeatedly saw one young baboon pretending to have been attacked by another as a tactic to get its mother to drive the other baboon away from its food.

Naturalistic observations are also done with humans. Here's one funny finding: We humans laugh 30 times more often in social situations than in solitary situations. (Have you noticed how seldom you laugh when alone?) And when we do laugh, 17 muscles contort our mouth and squeeze our eyes, and we emit a series of 75-millisecond vowel-like sounds that are spaced about one-fifth of a second apart (Provine, 2001).

Naturalistic observation also enabled Robert Levine and Ara Norenzayan (1999) to compare the pace of life in 31 countries. By operationally defining *pace of life* as walking speed, the speed with which postal clerks completed a simple request, and the accuracy of public clocks, they concluded that life is fastest paced in Japan and Western Europe, and slower paced in economically less developed countries. People in colder climates also tend to live at a faster pace (and are more prone to die from heart disease). Naturalistic observation is often used to describe behavior. But this study, showing how pace of life is associated with culture and climate, illustrates how naturalistic observation can also be used with correlational research, our next topic.



Courtesy of Richard Byrne and David Myers

Naturalistic observation Some psychologists study human and animal behavior in natural environments. As University of St. Andrews psychologist Richard Byrne observes an adult gorilla, recording its behavior on a hand-held computer, a curious infant approaches and investigates his camera lens cap.

Correlation

Describing behavior is a first step toward predicting it. When surveys and naturalistic observations reveal that one trait or behavior accompanies another, we say the two *correlate*. The **correlation coefficient** is a statistical measure of relationship: It reveals how closely two things vary together and thus how well either one *predicts* the other. Knowing how much aptitude test scores *correlate* with school success tells us how well the scores *predict* school success.

A *positive* correlation (between 0 and +1.00) indicates a *direct* relationship, meaning that two things increase together or decrease together. Some examples:

- According to some studies, the amount of violence viewed on television correlates about +.3 with aggressive social behavior; people's TV-viewing habits therefore modestly predict their aggressiveness (or vice versa).
- Genetically identical twins correlate about +.6 on tests of extraversion, which means that the outgoingness of either twin gives a reasonable clue to that of the other (Bouchard & others, 1990).
- University of Michigan surveys of 71,000 representatively sampled high school seniors revealed that the more hours students worked on a job, the less they slept and exercised and the more they used cigarettes, alcohol, and other drugs (ISR, 1994).

A *negative* correlation—equally predictive—indicates an *inverse* relationship: As one thing increases, the other decreases. Our earlier findings on self-esteem and depression illustrate a negative correlation: People who score *low* on self-esteem tend to score *high* on depression. Negative correlations could go as low as −1.00, which means that, like people on the opposite ends of a teeter-totter, one set of scores goes down precisely as the other goes up.

Though informative, psychology's correlations usually leave most of the variation among individuals unpredicted. As we will see, there is a correlation between parents' abusiveness and their children's later abusiveness when they become parents. But this does not mean that most abused children become abusive. The correlation simply indicates a statistical relationship: Although most abused children do not grow into abusers, nonabused children are even less likely to become abusive. Correlations point us toward predictions, but usually imperfect ones.

► **illusory correlation** the perception of a relationship where none exists.

Correlation and Causation

10. Why do correlations permit prediction but not explanation?

We have seen that correlations, however imperfect, do help us predict and restrain the illusions of our flawed intuition. Watching violence correlates with (and therefore predicts) aggression. But does that mean it causes aggression? Does low self-esteem cause depression? If, based on the correlational evidence, you assume that they do, you have much company. Among the most irresistible thinking errors made both by laypeople and by professional psychologists is assuming that correlation proves causation. But no matter how strong the relationship, it does not!

R. Sidney/The Image Works

Correlation need not mean causation Length of marriage correlates with hair loss in men. Does this mean that marriage causes men to lose their hair (or that balding men make better husbands)? In this case, as in many others, a third factor obviously explains the correlation: Golden anniversaries and baldness both accompany aging.

For example, what about the negative correlation between self-esteem and depression? Perhaps low self-esteem does cause depression. But as **FIGURE 1.3** suggests, we'd get the same correlation of low self-esteem and depression if depression caused people to be down on themselves, or if something else—a third factor such as heredity or brain chemistry—caused both low self-esteem and depression. Among men, length of marriage correlates positively with hair loss—because both are associated with a third factor, age.

This point is so important—so basic to thinking smarter with psychology—that it merits one more example, from a survey of 12,118 adolescents: The more teens feel loved by their parents, the less likely they are to behave in unhealthy ways—having early sex, smoking, abusing alcohol and drugs, exhibiting violence (Resnick & others, 1997). "Adults have a powerful effect on their children's behavior right through the high school years," gushed an Associated Press story on the study. But the correlation comes with no built-in cause-effect arrow. Thus, the AP could as well have said, "Well-behaved teens feel their parents' love and approval; out-of-bounds teens more often think their parents are disapproving jerks."

A New York Times *writer reported a massive survey showing that "adolescents whose parents smoked were 50 percent more likely than children of nonsmokers to report having had sex." He concluded (would you agree?) that the survey indicated a causal effect—that "to reduce the chances that their children will become sexually active at an early age" parents might "quit smoking" (O'Neil, 2002).*

The point to remember: Correlation indicates the *possibility* of a cause-effect relationship, *but it does not prove causation*. Knowing that two events are correlated need not tell us anything about causation. Remember this principle and you will be wiser as you see reports of scientific studies in the news and in this book.

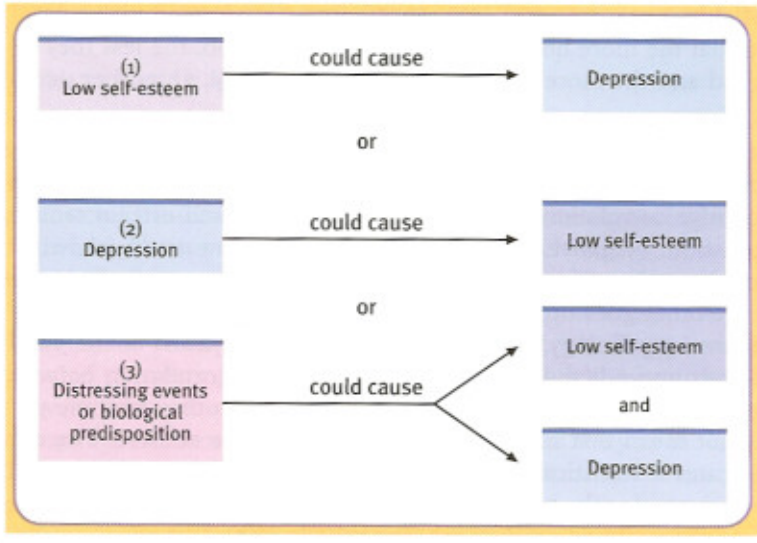


figure 1.3
Three possible cause-effect relationships People low in self-esteem are more likely to report depression than are those high in self-esteem. One possible explanation of this negative correlation is that a bad self-image causes depressed feelings. But, as the diagram indicates, other cause-effect relationships are possible.

Illusory Correlations

11. How accurately does the naked eye detect correlations?

Correlations make visible the relationships that we might otherwise miss. They also restrain our "seeing" relationships that actually do not exist. A perceived nonexistent correlation is an **illusory correlation**. When we *believe* there is a relationship between two things, we are likely to *notice* and *recall* instances that confirm our belief (Trolier & Hamilton, 1986).

Illusory correlations help explain many a superstitious belief, such as the presumption that more babies are born when the moon is full or that infertile couples who adopt become more likely to conceive (Gilovich, 1991) (**FIGURE 1.4**). Such illusory thinking helps explain why for so many years people believed (and many still do) that sugar made children hyperactive, that getting cold and wet caused one to catch a cold, and that weather changes trigger arthritis pain. We are, it seems, very willing to perceive patterns, whether they're there or not, but not so willing to test our hypotheses.

Because we are sensitive to dramatic or unusual events, we are especially likely to notice and remember the occurrence of two such events in sequence—say, a premonition of an unlikely phone call followed by the call. When the call does not follow the premonition, we are less likely to note and remember the nonevent.

The point to remember: When we notice random coincidences, we may forget that they are random and instead see them as correlated. Thus, we can easily deceive ourselves by seeing what is not there.

	Conceive	Do not conceive
Adopt	confirming evidence	disconfirming evidence
Do not adopt	disconfirming evidence	confirming evidence

Michael Newman Jr./PhotoEdit

figure 1.4
Illusory correlation in everyday life Many people believe infertile couples become more likely to conceive a child after adopting a baby. This belief arises from their attention being drawn to such cases. The many couples who adopt without conceiving or conceive without adopting grab less attention. To determine whether there actually is a correlation between adoption and conception, we need data from all four cells in this figure. (From Gilovich, 1991.)

Perceiving Order in Random Events

Illusory correlations arise from our natural eagerness to make sense of our world—what poet Wallace Stevens called our "rage for order." Given even random data, we look for order, for meaningful patterns. And we usually find such, because *random sequences often don't look random*. Consider a random coin flip: If someone flipped a coin six times, which of the following sequences of heads (H) and tails (T) would be most likely: HHHTTT or HTTHTH or HHHHHH?

Daniel Kahneman and Amos Tversky (1972) found that most people believe HTTHTH would be the most likely random sequence. Actually, all are equally likely (or, you might say, equally unlikely) to occur. A bridge or poker hand of 10 through Ace, all of hearts, would seem extraordinary; actually, it would be no more or less likely than any other specific hand of cards (**FIGURE 1.5**).

In random sequences, seeming patterns and streaks (such as repeating digits) occur more often than people expect. To demonstrate this phenomenon for myself (as you can do), I flipped a coin 51 times, with these results:

1. H	10. T	19. H	28. T	37. T	46. H
2. T	11. T	20. H	29. H	38. T	47. H
3. T	12. H	21. T	30. T	39. H	48. T
4. T	13. H	22. T	31. T	40. T	49. T
5. H	14. T	23. H	32. T	41. H	50. T
6. H	15. T	24. T	33. T	42. H	51. T
7. H	16. H	25. T	34. T	43. H	
8. T	17. T	26. T	35. T	44. H	
9. T	18. T	27. H	36. H	45. T	

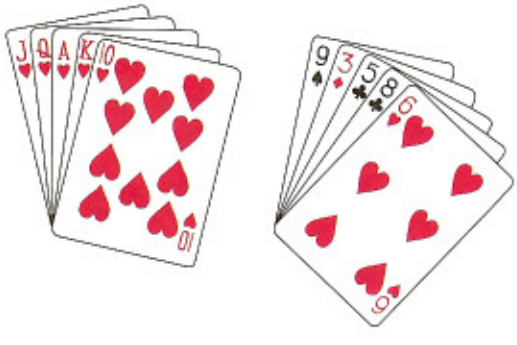
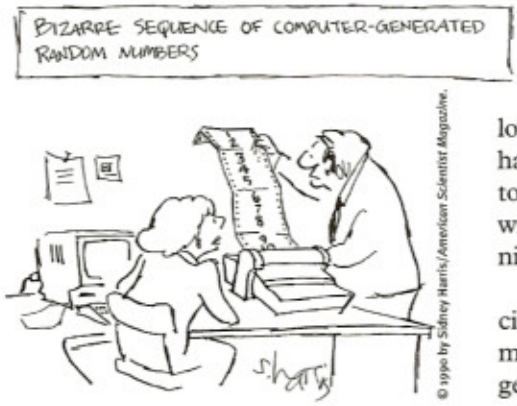


figure 1.5
Two random sequences Your chances of being dealt either of these hands are precisely the same: 1 in 2,598,960.

Bizarre-looking, perhaps. But actually no more unlikely than any other number sequence.



Looking over the sequence, patterns jump out: Tosses 10 to 22 provided an almost perfect pattern of pairs of tails followed by pairs of heads. On tosses 30 to 38 I had a "cold hand," with only one head in eight tosses. But my fortunes immediately reversed with a "hot hand"—seven heads out of the next nine tosses.

What explains these patterns? Was I exercising some sort of paranormal control over my coin? Did I snap out of my tails funk and get in a heads groove? No such explanations are needed, for these are the sorts of streaks found in any random data. Comparing each toss to the next, 24 of the 50 comparisons yielded a changed result—just the sort of near 50-50 result we expect from coin tossing. Despite the seeming patterns in these data, the outcome of one toss gives no clue to the outcome of the next toss.

However, some happenings seem so extraordinary that we struggle to conceive an ordinary, chance-related explanation (as applies to our coin-tosses). In such cases, statisticians often are less mystified. When Evelyn Marie Adams won the New Jersey lottery *twice*, newspapers reported the odds of her feat as 1 in 17 trillion. Bizarre? Actually, 1 in 17 trillion are the odds that a given person who buys a single ticket for two New Jersey lotteries will win both times. But statisticians Stephen Samuels and George McCabe (1989) report that, given the millions of people who buy U.S. state lottery tickets, it was "practically a sure thing" that someday, somewhere, someone would hit a state jackpot twice. Indeed, say fellow statisticians Persi Diaconis and Frederick Mosteller (1989), "with a large enough sample, any outrageous thing is likely to happen." "The really unusual day would be one where nothing unusual happens," adds Diaconis (2002). An event that happens to but one in 1 billion people every day occurs about six times a day, 2000 times a year. (For two provocative instances of random sequences that don't look random, see Thinking Critically About Hot and Cold Streaks in Basketball and the Stock Market on page 23.)

On the 2002 anniversary of 9/11, New York State's three-pick lottery numbers came up 9–1–1.

On March 11, 1998, Utah's Ernie and Lynn Carey gained three new grandchildren when three of their daughters gave birth—on the same day (Los Angeles Times, *1998*).


UPI/Corbis-Bettmann

Given enough random events, something weird will happen
Evelyn Marie Adams was the beneficiary of one of those extraordinary, chance events when she won the New Jersey lottery a second time.

rehearse it!

12. In psychology, a good theory implies hypotheses, or predictions that can be tested. When hypotheses are tested, the result is typically
    a. increased skepticism.
    b. rejection of the merely theoretical.
    c. confirmation or revision of the theory.
    d. personal bias on the part of the investigator.
13. Psychology's basic *research strategies* are description, correlation, and experimentation. Which of the following would you use in an attempt to predict college grades from high school grades?
    a. A case study
    b. Naturalistic observation
    c. Correlational research
    d. Experimental research
14. You wish to take an accurate poll in a certain country by questioning people who truly represent the country's adult population. Therefore, you need to make sure the people are
    a. at least 30 percent urban dwellers.
    b. registered voters.
    c. a very large sample of the population.
    d. a random sample of the population.
15. Suppose a psychologist finds that the *more* natural childbirth training classes a woman attends, the *less* pain medication she requires during childbirth. The relationship between the number of training sessions and the amount of pain medication required is a
    a. positive correlation (direct relationship).
    b. negative correlation (inverse relationship).
    c. cause-effect relationship.
    d. controlled experiment.
16. Knowing that two events are correlated does not tell us what is the cause and what is the effect. However, it does provide
    a. a basis for prediction.
    b. an explanation of events.
    c. proof that as one increases, the other also increases.
    d. an indication that an underlying third factor is at work.
17. Some people wrongly perceive that their dreams predict future events. This is an example of a/an
    a. negative correlation.
    b. positive correlation.
    c. illusory correlation.
    d. naturalistic correlation.

Answers can be found in Appendix C.

Thinking Critically About:

Hot and Cold Streaks in Basketball and the Stock Market

Misinterpreted random sequences are common in sports and investing. In both arenas, the statistical facts collide with commonsense intuition.

Basketball Players' "Hot Hands"

Every basketball player and every fan intuitively "knows" that players have hot and cold streaks. Players who have "hot hands" can't seem to miss. Those who have "cold" ones can't find the center of the hoop. When Thomas Gilovich, Robert Vallone, and Amos Tversky (1985) interviewed Philadelphia 76ers, the players estimated they were about 25 percent more likely to make a shot after they had just made one than after a miss. In one survey, 9 in 10 basketball fans agreed that a player "has a better chance of making a shot after having just *made* his last two or three shots than he does after having just *missed* his last two or three shots." Believing in shooting streaks, players will feed the ball to a teammate who has just made two or three shots in a row. Many coaches will bench the player who has just missed three in a row.

The only trouble is (believe it or not), it isn't true! When Gilovich and his collaborators studied detailed individual shooting records, they found that the 76ers—and the Boston Celtics, the New Jersey Nets, the New York Knicks, and Cornell University's men's and women's basketball players—were equally likely to score after a miss and after a basket. A typical 50 percent shooter averages 50 percent after just missing three shots, and 50 percent after just making three shots. It works with free throws, too. Celtics star Larry Bird made 88 percent of his free throws after making a free throw and 91 percent after missing. (Did this reduce Larry Bird to a mere puppet, manipulated by statistical laws? No, his skill was reflected in his 90 percent average.)

Why, then, do players and fans alike believe that players are more likely to score after scoring and to miss after missing? (The same phenomenon turns up in baseball, where the individual and team streaks and slumps that fascinate sportswriters are to be expected, given mere random variation [Myers, 2002].) It's because streaks do occur, more than people expect in random sequences. In any series of 20 shots by a 50 percent shooter (or any 20 flips of a coin), there is a 50-50 chance of 4 baskets (or heads) in a row, and it is quite possible that one person out of five will have a streak of 5 or 6. Players and fans notice these random streaks and so form the errant conclusion that "when you're hot, you're hot" (**FIGURE 1.6**).

Mutual Funds: Does Past Performance Predict Future Returns?

The same misinterpretation of random sequences occurs when investors believe that a mutual fund that has had a string of good years will likely outperform one that has had a string of bad years. Based on that assumption, investment magazines report mutual funds' performance. But, as economist Burton Malkiel (1989, 1995) documents, past performances of mutual funds do *not* predict their future performance. If on January 1 of each year since 1980 we had bought the previous year's top-performing funds, our hot funds would not have beaten the next year's market average. If we had put our money instead on the *Forbes* "Honor Roll" of funds each year for the two decades following 1975, we would have pulled in 13.5 percent (compared with the market's overall 14.9 percent annual return). Of the top 81 Canadian funds during 1994, 40 performed above average and 41 below average during 1995 (Chalmers, 1995).

When funds have streaks of several good or bad years, we may nevertheless think that past success predicts future success. "Randomness is a difficult notion for people to accept," notes Malkiel. "When events come in clusters and streaks, people look for explanations and patterns. They refuse to believe that such patterns—which frequently occur in random data—could equally well be derived from tossing a coin. So it is in the stock market as well."

The point to remember: When watching basketball, choosing stocks, or flipping coins, remember that our intuition often misleads us. Random sequences frequently don't look random. Expect streaks.

figure 1.6

Who is the chance shooter? Here are 21 consecutive shots, each scoring either a basket or a miss, by two players who each make 11. Within this sample of shots, which player's sequence looks more like what we would expect in a random sequence? (See page 24; adapted from Barry Ross, *Discover,* 1987.)

Answer to question in Figure 1.6 (page 23): For these players, chance shooting, like chance coin tossing, should produce a change in outcome about 50 percent of the time. Player B, whose outcomes may look more random, actually has fewer *streaks than would be expected by chance. Seventy percent of the time (14 times out of 20), Player B's outcome changes on successive shots. Player A's next outcome differs from the last 10 times out of 20.*

Experimentation

12. How do experiments clarify or reveal cause-effect relationships?

Happy are they "who have been able to perceive the causes of things," remarked the Roman poet Virgil. We endlessly wonder and debate *why* we act as we do. Why do some people smoke? Have babies while they are still children? Do stupid things when drunk? Become troubled teens and open fire on their classmates? Though psychology cannot answer these questions directly, it has helped us to understand what influences drug use, sexual behaviors, thinking when drinking, and aggression.

Many factors influence our everyday behavior. To isolate cause and effect—say, in looking for possible causes of depression—psychologists sometimes try to statistically control for other factors. For example, many studies have found that breast-fed infants grow up with somewhat higher intelligence scores than those of infants bottle-fed with cows milk (Angelsen & others, 2001; Gale & Martyn, 1996; Johnson & others, 1996; Lucas & others, 1992; Mortensen & others, 2002; Quinn & others, 2001). Mother's milk correlates modestly but positively with later intelligence. But does this mean that smarter mothers (who more often breast-feed) have smarter children? Or, as some researchers believe, do the nutrients of mother's milk contribute to brain development? To help answer this question, researchers have "controlled for" (statistically removed differences in) maternal age, education, and intelligence. Still, breast-fed infants exhibit slightly higher intelligence as young children.

The clearest and cleanest way to isolate cause and effect is, however, to **experiment**. Experiments enable a researcher to focus on the possible effects of one or more factors by (1) *manipulating the factors of interest* and (2) *holding constant ("controlling") other factors*. Knowing that correlations of infant nutrition and later intelligence can't possibly control for all other possible factors, a British research team led by Alan Lucas (1998) decided to experiment, using 424 hospital preterm infants. With parental permission, the researchers randomly assigned some infants to standard infant formula feedings and others to donated breast milk feedings. When given intelligence tests at age 8, the children nourished with breast milk had significantly higher intelligence scores than their formula-fed counterparts. No single experiment is conclusive, of course, but by randomly assigning infants to a feeding condition, these researchers were able to hold constant all factors except nutrition. This rigorous design helps eliminate alternative explanations and supports the conclusion that, so far as the developing intelligence of preterm infants is concerned, breast is best.

If behavior changes when we vary an experimental factor, such as infant nutrition, then we know the factor is having an effect. *The important point to remember:* Unlike correlational studies, which uncover naturally occurring relationships, an experiment manipulates a factor to determine its effect. Let's consider some more experiments.

Evaluating Therapies

Our tendency to seek new remedies when we are ill or emotionally down can produce misleading testimonies. When our health or emotions return to normal, we attribute the return to something we have done. If three days into a cold we start taking vitamin C tablets and find our cold symptoms lessening, the pills may seem more potent than they are (an illusion of control). If, after nearly failing the first exam, we listen to a "peak learning" subliminal tape and then improve on the next exam, we may credit the tape rather than conclude that our performance has returned to our average. In the 1700s, blood-letting *seemed* effective. Sometimes people improved after the treatment; when they didn't, the practitioner inferred the disease was too far advanced to be reversed. So, whether or not a remedy is truly effective, enthusiastic users will probably endorse it. To find out whether it actually is effective, we must experiment.

And that is precisely how new drug treatments and new methods of psychological therapy are evaluated (Chapter 14). In many of these studies, the participants are *blind* (uninformed) about what treatment, if any, they are receiving. One group receives the

▸ **experiment** a research method in which an investigator manipulates one or more factors (independent variables) to observe the effect on some behavior or mental process (the dependent variable). By random assignment of participants, the experiment controls other relevant factors.

▸ **placebo [pluh-SEE-bo; Latin for "I shall please"]** an inert substance or condition that may be administered instead of a presumed active agent, such as a drug, to see if it triggers the effects believed to characterize the active agent.

▸ **double-blind procedure** an experimental procedure in which both the research participants and the research staff are ignorant (blind) about whether the research participants have received the treatment or a placebo. Commonly used in drug-evaluation studies.

▸ **placebo effect** any effect on behavior caused by a placebo.

▸ **experimental condition** the condition of an experiment that exposes participants to the treatment, that is, to one version of the independent variable.

▸ **control condition** the condition of an experiment that contrasts with the experimental condition and serves as a comparison for evaluating the effect of the treatment.

▸ **random assignment** assigning participants to experimental and control conditions by chance, thus minimizing preexisting differences between those assigned to the different groups.

▸ **independent variable** the experimental factor that is manipulated; the variable whose effect is being studied.

▸ **dependent variable** the experimental factor—in psychology, the behavior or mental process—that is being measured; the variable that may change in response to manipulations of the independent variable.

treatment. Others receive a pseudotreatment—an inert **placebo** (perhaps a pill with no drug in it). Often neither the participant nor the research assistant collecting the data knows whether the participant's group is receiving the treatment. This **double-blind procedure** enables researchers to check a treatment's actual effects apart from the research participants' (and their own) enthusiasm for it and from the healing power of belief. The **placebo effect** is well documented with pain, depression, and anxiety (Kirsch & Sapirstein, 1998). Just *thinking* one is getting a treatment can boost one's spirits, relax one's body, and lead to symptom relief.

The double-blind procedure creates an **experimental condition** in which people receive the treatment, and a contrasting **control condition** without the treatment. By **randomly assigning** people to these conditions, we can be fairly certain that the two groups are otherwise identical in age, attitudes, and every other characteristic. With random assignment, as occurred with the infants in the breast milk experiment, we can also know that any later differences between people in the experimental and control conditions must be the result of the treatment.

Another example: On the advice of their physicians, millions of postmenopausal women turned to hormone replacement therapy after correlational studies found that women on replacement hormones had lower rates of heart disease, stroke, and colon cancer. But women who got the therapy were perhaps more likely to be receiving medical care, exercising, and eating well. So, did the hormones make women healthy or did healthy women take the hormones? In 2002, the National Institutes of Health announced the surprising results of a massive experiment that randomly assigned 16,608 healthy women to either replacement hormones or a placebo: Compared with women in the control condition, women receiving the hormones had *more* health problems (Love, 2002).

And an even more potent example: The drug Viagra was approved for use after 21 clinical trials, including an experiment in which researchers randomly assigned 329 men with impotence to either an experimental condition (Viagra) or a control condition (a placebo). It was a double-blind procedure—neither the men nor the person who gave them the pills knew which drug they were receiving. The result: At peak doses, 69 percent of Viagra-assisted attempts at intercourse were successful, compared with 22 percent for men receiving the placebo (Goldstein & others, 1998). Viagra worked.

This simple experiment manipulated just one drug factor. We call this experimental factor the **independent variable** because we can vary it independently of other factors, such as the men's age, weight, and personality (which random assignment controls). Experiments examine the effect of one or more independent variables on some measurable behavior, called the **dependent variable** because it can vary *depending* on what takes place during the experiment. Both variables are given precise operational definitions, which specify the procedures that manipulate the independent variable (the precise drug dosage and timing in this study) or measure the dependent variable (the questions that assessed the men's responses). These definitions answer the "What do you mean?" question with a level of precision that enables others to repeat the study.

Let's recap. A variable is anything (infant nutrition, intelligence, hair color—whatever) that can vary. Experiments aim to *manipulate* an *independent* variable, *measure* the *dependent* variable, and *control* all other variables. An experiment has at least two different conditions: a comparison or control condition and an experimental condition. Random assignment equates the conditions before any treatment effects. In this way, an experiment tests the effect of at least one independent variable (what we measure) on at least one dependent variable (what we manipulate). **TABLE 1.2,** on page 26, compares the features of psychology's research methods.

Note the distinction between random sampling *in surveys and random* assignment *in experiments. Random sampling helps us generalize to a larger population. Random assignment controls extraneous influences, which helps us infer cause and effect.*

table 1.2 Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Possible Problems
Descriptive	To observe and record behavior	Do case studies, surveys, or naturalistic observations	Nothing	Atypical sample; biased observations
Correlational	To detect naturally occurring relationships; to assess how well one variable predicts another	Compute statistical association, sometimes among survey responses	Nothing	Does not specify cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Sometimes not feasible; results may not generalize to other contexts

These concepts—experimental and control conditions, independent and dependent variables, random assignment—are important, yet easily confused. So let's put them to work with another intriguing set of experiments.

Can Subliminal Tapes Improve Your Life?

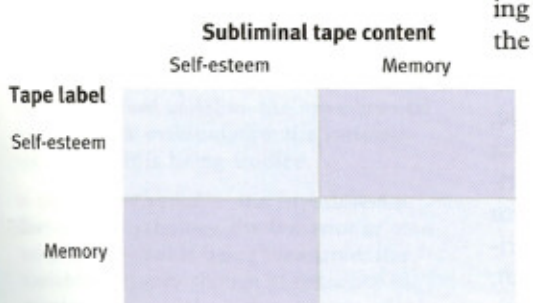
A new generation of entrepreneurs would have you believe so. We are bombarded by mail-order catalogs, cable television ads, and bookstores offering tapes whose imperceptibly faint messages supposedly "reprogram your unconscious mind for success and happiness." While struggling students listen to soothing music, subliminal messages (those below one's hearing threshold) are said to persuade the unconscious that "I am a good student. I love learning." Procrastinators can be similarly reprogrammed: "I set my priorities. I get things done ahead of time!"

Is there anything to these claims? Could positive subliminal messages help us, even a little? Chapter 5 will show that subliminal sensation is for real. We, in fact, do process much information without conscious awareness. And under certain conditions, a stimulus too weak to recognize can affect us, *briefly*.

In this experiment, what was the independent variable? The dependent variable? (See page 28.)

But does this subtle, fleeting effect extend to the powerful, enduring influence claimed by the subliminal tape merchants? Anthony Greenwald and his colleagues (1991) wanted to find out, so they randomly assigned university students to listen daily for five weeks to commercial subliminal tapes claiming to improve either self-esteem or memory. But the researchers had manipulated an experimental factor. On half the tapes they switched the labels. Some students *thought* they were receiving affirmations of self-esteem when they actually were hearing the memory enhancement tape. Others got the self-esteem tape but *thought* their memory was being recharged (**FIGURE 1.7**).

figure 1.7
Design of the subliminal tapes experiment Students' self-esteem and memory abilities were assessed before and after listening to subliminal tapes purporting to increase either self-esteem or memory. Half the students, however, received deliberately mislabeled tapes.



Were the tapes effective? Their scores on tests for both self-esteem and memory, taken before and after the five weeks, revealed zilch. No effects. None. And yet, those who *thought* they had heard a memory tape *believed* their memories had improved. A similar result occurred for those who thought they had heard a self-esteem tape. The tapes had no effects, yet the students *perceived* themselves receiving the benefits they *expected*. When reading this research, you can hear echoes of the testimonies that ooze from the mail-order tape catalogs. Many customers, having bought what is not supposed to be heard, and having indeed not heard it, actually write things like, "I really know that your tapes were invaluable in reprogramming my mind." Greenwald conducted 16 double-blind experiments evaluating subliminal self-help tapes over one 10-year period. His results were uniform: Not one had any therapeutic effect (Greenwald, 1992).

Experiments can also help us evaluate social programs. Do early childhood education programs boost impoverished children's chances for success? What are the effects of different anti-smoking campaigns? Does school sex education

reduce teen pregnancies? To answer these questions, we can experiment: If an intervention is welcomed but resources are scarce, we could use a lottery to randomly assign some people (or regions) to experience the new program and others to a control condition. If later the two groups differ, there will be less to argue about (Passell, 1993).

rehearse it!

18. A researcher wants to determine whether noise level affects the blood pressure of elderly people. In one group she varies the level of noise in the environment and records blood pressures. In this experiment, the level of noise is the
    a. control condition.
    b. dependent variable (the factor being measured).
    c. independent variable (the factor being manipulated).
    d. cause of any blood pressure variations.

19. To test the effect of a new drug on depression, we randomly assign people to control and experimental conditions. Those in the experimental condition take a pink pill containing the new medication; those in the control group take a pink pill that contains no medication. Which statement is true?
    a. The medication is the dependent variable.
    b. Depression is the independent variable.
    c. Participants in the control group take a placebo.
    d. Neither the experimental nor the control group is told the purpose of the experiment.

20. To eliminate the biasing effect of a researcher's positive expectations on the outcome of a health clinic's research experiment,
    a. patients are randomly assigned to the control and experimental groups (random assignment).
    b. members of the experimental group are carefully matched for age, sex, income, and level of education with members of the control group (controlled selection).
    c. neither the patients nor the researcher will know whether a given person has been assigned to the experimental or control condition (double-blind procedure).
    d. people in the experimental group are chosen by selecting every tenth person in an alphabetical listing of all the clinic's patients (random selection).

21. Description is to explanation as case study is to
    a. correlation.
    b. naturalistic observation.
    c. experiment.
    d. survey.

Answers can be found in Appendix C.

FREQUENTLY ASKED QUESTIONS ABOUT PSYCHOLOGY

We have seen how case studies, surveys, and naturalistic observations help us describe behavior. We have also noted that correlational studies assess the relationship between two factors, which indicates how well knowing one thing lets us predict another. We have examined the logic that underlies experiments, which use control conditions and random assignment of participants to isolate the effects of an independent variable on a dependent variable. We have reflected on how a scientific approach can restrain biases.

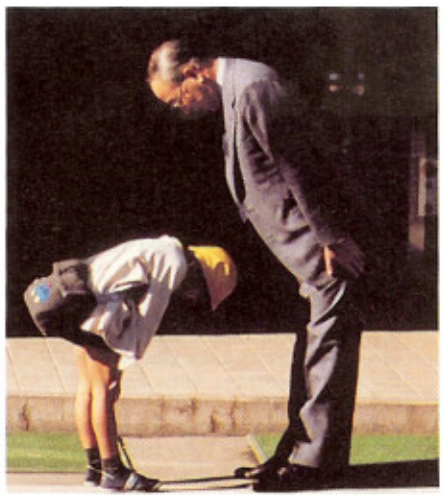
You are now prepared to understand what lies ahead and to think critically about psychological matters. Yet, even knowing this much, you may still be approaching psychology with a mixture of curiosity and apprehension. So before we plunge in, let's consider some frequently asked questions.

13. Can laboratory experiments illuminate everyday life?

When you see or hear about psychological research, do you ever wonder whether people's behavior in the lab will predict their behavior in real life? For example, does detecting the blink of a faint red light in a dark room have anything useful to say about flying a plane at night? Does our tendency to remember best the first and last items in a list of unrelated words tell us anything about why we remember the names of certain people we meet at a party? After viewing a violent, sexually explicit film, does an aroused man's increased willingness to push buttons that he thinks will electrically shock a woman really say anything about whether violent pornography makes a man more likely to abuse a woman?

Before you answer, consider: The experimenter *intends* the laboratory environment to be a simplified reality—one in which important features of everyday life can be simulated and controlled. Just as an aeronautical wind tunnel enables an engineer to re-create atmospheric forces under controlled conditions, a laboratory experiment enables a psychologist to re-create psychological forces under controlled conditions.

The experiment's purpose, notes Douglas Mook (1983), is not to re-create the exact behaviors of everyday life but to test theoretical principles. *It is the resulting principles—not the specific findings—that help explain everyday behaviors.*



Mark Wexler/Woodfin Camp & Associates

A cultured greeting Because culture shapes people's understanding of social behavior, actions that seem ordinary to us may seem quite odd to visitors from far away. Yet underlying these differences are powerful similarities. Schoolchildren everywhere greet their teachers with respect, although not necessarily with the formality of this young Japanese schoolchild.

Answer to question on page 26: In the subliminal tapes experiment, the primary independent variable was the type of subliminal message, self-esteem versus memory. (This experiment actually had a second independent variable as well: people's beliefs about which tape they received.) The primary dependent variable was improvement on the self-esteem and memory measures.

"All people are the same; only their habits differ."

Confucius, 551–479 B.C.

When psychologists apply laboratory research on aggression to actual violence, they are applying theoretical *principles* of aggressive behavior, principles they have refined through many experiments. Similarly, it is the principles of the visual system, developed from experiments in artificial settings (such as looking at red lights in the dark), that we apply to more complex behaviors, such as night flying. And many investigations show that principles derived in the laboratory *do* typically generalize to the everyday world (Anderson & others, 1999).

The point to remember: As psychologists, our concerns lie less with particular behaviors than with the general principles that help explain many behaviors.

14. Does behavior depend on one's culture and gender?

If culture shapes behavior, what can psychological studies done in one culture, often with white North Americans, really tell us about people in general? As we will see time and again, **culture**—shared ideas and behaviors that one generation passes on to the next—matters. Our culture influences our standards of promptness and frankness, our attitudes toward premarital sex and varying body shapes, our tendency to be casual or formal, and much, much more. Being aware of such differences, we can restrain our assumptions that others will think and act as we do. Given the growing mixing and clashing of cultures, our need for such awareness is urgent.

You will see throughout this book that gender matters too. Researchers report gender differences in what we dream, in how we express and detect emotions, and in our risk for alcoholism, depression, and eating disorders. Not only is studying such differences interesting, it also is potentially beneficial. For example, many researchers believe that women carry on conversations more readily to build relationships; men usually talk to give information and advice (Tannen, 1990). Knowing this difference can help us prevent conflicts and misunderstandings in everyday relationships.

Likewise, it's important to remember that psychologically as well as biologically, women and men are overwhelmingly similar. Whether female or male, we learn to walk at about the same age. We experience the same sensations of light and sound. We feel the same pangs of hunger, desire, and fear. We exhibit similar overall intelligence and well-being. We also tend to exhibit and perceive the very behaviors our culture expects of males and females.

Our shared biological heritage does, however, unite us as a universal human family. The same underlying processes guide people everywhere:

- People diagnosed with dyslexia, a reading disorder, exhibit the same brain malfunction whether they are Italian, French, or British (Paulesu & others, 2001).
- Variation in languages—spoken and gestured—may impede communication across cultures, yet all languages share deep principles of grammar, and people from opposite hemispheres can communicate with a smile or a frown.
- People in different cultures do vary in feelings of loneliness, but across cultures shyness, low self-esteem, and being unmarried magnify loneliness (Jones & others, 1985; Rokach & others, 2002).
- Most Japanese prefer their fish raw and most North Americans prefer theirs cooked, but the same principles of hunger and taste influence all of us when we sit down to a meal. We are each in certain respects like all others, like some others, and like no other. Studying people of all races and cultures helps us discern our similarities and our differences, our human kinship and our diversity.

The point to remember: Even when specific attitudes and behaviors vary across cultures, as they often do, the underlying processes are much the same. A children's song says it well: "We're all the same and different."

► **culture** the enduring behaviors, ideas, attitudes, and traditions shared by a large group of people and transmitted from one generation to the next.

15. Why do psychologists study animals?

Many psychologists study animals because they find them fascinating. They want to understand how different species learn, think, and behave. Psychologists also study animals to learn about people, by doing experiments that are permissible only with

animals. Rats, critics say, are not long-tailed people. Yet human physiology resembles that of many other animals. Animal experiments have therefore led to treatments for human diseases—insulin for diabetes, vaccines to prevent polio and rabies, transplants to replace defective organs. We humans are not like animals. We *are* animals.

Likewise, the same processes by which humans see, exhibit emotion, and become obese are present in rats and monkeys. To discover more about the basics of human learning, researchers even study sea slugs. To understand how a combustion engine works, you would do better to study the engine of a lawn mower than that of a Mercedes. Like Mercedes engines, humans are complex. But it is precisely the simplicity of the sea slug's nervous system that makes it so revealing of the neural mechanisms of learning.

"Rats are very similar to humans except that they are not stupid enough to purchase lottery tickets."

Dave Barry, July 2, 2002

16. Is it ethical to experiment on animals?

If we share important similarities with other animals, then should we not respect them? "We cannot defend our scientific work with animals on the basis of the similarities between them and ourselves and then defend it morally on the basis of differences," noted Roger Ulrich (1991). The animal protection movement protests the use of animals in psychological, biological, and medical research. Researchers remind us that the world's 30 million mammals used each year in research are but a fraction of 1 percent of the billions of animals killed annually for food (which means the average person eats 20 animals a year). While researchers each year conduct experiments on some 200,000 dogs and cats cared for under humane regulations, humane animal shelters are forced to kill 50 times that many (Goodwin & Morrison, 1999).

Only 7 percent of psychology's studies have involved animals, 95 percent of which were rats, mice, rabbits, or birds. Electric shock was used in about 10 percent of these studies (Coile & Miller, 1984; Gallup & Suarez, 1985). In British psychology departments, where animal use dropped by two-thirds in the dozen years after 1977, only 4 percent of animal studies involved electric shock, all with rats (Thomas & Blackman, 1991).

Animal protection organizations, such as Psychologists for the Ethical Treatment of Animals, advocate naturalistic observation of animals rather than laboratory manipulation. However, many researchers say this is not the morality of good versus evil but of compassion for animals versus compassion for people. How many of us would have attacked Pasteur's experiments with rabies, which caused some dogs to suffer but led to a vaccine that spared millions of people, and dogs, from agonizing death? And would we really wish to have deprived ourselves of the animal research that led to effective methods of training children with mental disorders; of understanding aging; of relieving fears and depression; of controlling obesity, alcoholism, and stress-related pain and disease?

Out of this heated debate, two issues emerge. The basic one is whether it is right to place the well-being of humans above that of animals. In experiments on stress and cancer, is it right that mice get tumors in hopes that people might not? Is our use of other animals as natural as the behavior of carnivorous hawks, cats, and whales? (No other animals assign rights to those who are lower on the food chain.)

If we give human life first priority, the second issue is the priority given the well-being of the animals in research. What safeguards should protect animals? Most researchers today feel ethically obligated to enhance the well-being of captive animals and protect them from needless suffering. In one survey of animal researchers, 98 percent or more supported government regulations protecting primates, dogs, and cats, and 74 percent supported regulations providing for the humane care of rats and mice (Plous & Herzog, 2000). Many professional associations and funding agencies now have guidelines for the humane use of animals. For example, British Psychological Society guidelines now call for housing animals under reasonably natural living conditions, with companions for social animals (Lea, 2000). Humane care also leads to more effective science, because pain and stress would distort the animals' behavior during experiments.

"I believe that to prevent, cripple, or needlessly complicate the research that can relieve animal and human suffering is profoundly inhuman, cruel, and immoral."

Psychologist Neal Miller, 1983

"The righteous know the needs of their animals."

Proverbs 12:10

D. Shapiro, © Wildlife Conservation Society

Animal research benefiting animals
Thanks partly to research on the benefits of novelty, control, and stimulation, these Bronx Zoo gorillas are enjoying improved quality of life.

Animals have themselves benefited from animal research. One Ohio team of research psychologists measured stress hormone levels in samples of millions of dogs brought each year to animal shelters, and they devised methods of handling and stroking them that reduced stress and eased their transition to adoptive homes (Tuber & others, 1999). Thanks to animal behavior studies, formerly idle Bronx Zoo animals are now staving off listless boredom by working for their supper, as would their counterparts in the wild (Stewart, 2002). Other studies have helped improve care and management in animals' natural habitats. By revealing our behavioral kinship with animals and the remarkable intelligence of some animals, experiments have also led to an increase in our empathy for them. At its best, a psychology concerned for humans and sensitive to animals serves the welfare of both.

17. Is it ethical to experiment on people?

If the image of animals or people receiving supposed electric shocks troubles you, you may find it a relief that most psychological research involves no such stress. With people, blinking lights, flashing words, and pleasant social interactions are more common.

Occasionally, though, researchers do temporarily stress or deceive people, but only when they believe it is essential to a justifiable end, such as understanding and controlling violent behavior or studying mood swings. Such experiments wouldn't work if the participants knew all there was to know about the experiment beforehand. Either the procedures would be ineffective or the participants, wanting to be helpful, might try to confirm the researchers' predictions.

Ethical principles developed by the American Psychological Association (1992) and the British Psychological Society (1993) urge investigators to (1) obtain the informed consent of potential participants, (2) protect them from harm and discomfort, (3) treat information about individual participants confidentially, and (4) fully explain the research afterward. Moreover, most universities today screen research proposals through an ethics committee that safeguards the well-being of every participant.

"The greatness of a nation can be judged by the way its animals are treated."
Mahatma Gandhi, 1869–1948

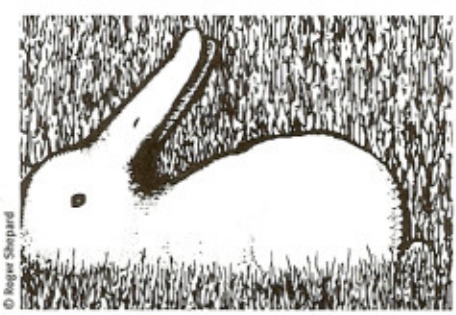
18. Is psychology free of value judgments?

Psychology is definitely not value-free. Values affect what we study, how we study it, and how we interpret results. Consider: Researchers' values influence their choice of research topics—whether to study worker productivity or worker morale, sex discrimination or gender differences, conformity or independence. Values can even color "the facts." Our preconceptions can bias our observations and interpretations; sometimes we see what we want or expect to see (**Figure 1.8**). Even the words we use to describe a phenomenon can reflect our values. Labeling the sex acts we do not practice as "perversions" or as "sexual variations" conveys a value judgment. The same holds true in everyday speech, when one person's "rigidity" is another's "consistency," or one person's "faith" is another's "fanaticism." Our labeling someone as "firm" or "stubborn," "careful" or "picky," "discreet" or "secretive" reveals our feelings. Both in and out of psychology, labels describe and labels evaluate.

Popular *applications* of psychology also contain hidden values. If you defer to "professional" guidance about how to live—how to raise children, how to achieve self-fulfillment, what to do with sexual feelings, how to get ahead at work—you are accepting value-laden advice. A science of behavior and mental processes can certainly help us reach our goals, but it cannot decide what those goals should be.

"It is doubtless impossible to approach any human problem with a mind free from bias."
Simone De Beauvoir, The Second Sex, 1953

figure 1.8
What do you see? People interpret ambiguous information to fit their preconceptions. Did you see a duck or a rabbit? Before showing some friends this image, ask them if they can see the duck lying on its back (or the bunny in the grass). (From Shepard, 1990.)



© Roger Shepard

19. Is psychology potentially dangerous?

If some people see psychology as merely common sense, others have a different concern—that it is becoming dangerously powerful. Is it an accident that astronomy is the oldest science and psychology the youngest? Exploring the external universe is one thing, but exploring our own inner universe seems even more dangerous and threatening. Might psychology be used to manipulate people?

Knowledge, like all power, can be used for good or evil. Nuclear power has been used to light up cities—and to demolish them. Persuasive power has been used to educate people—and to deceive them. The power of mind-altering drugs has been used to restore sanity—and to destroy it.

Although psychology does indeed have the power to deceive, its purpose is to enlighten. Every day, psychologists are exploring ways to enhance learning, creativity, and compassion. Psychology also speaks to many of our world's great problems—war, overpopulation, prejudice, family dysfunction, crime—all of which involve attitudes and behaviors. And psychology speaks to our deepest longings—for nourishment, for love, for happiness. True, psychology cannot address all of life's great questions, but it speaks to some mighty important ones.

rehearse it!

22. In a laboratory experiment, features of everyday life can be simulated, manipulated, and controlled. The laboratory environment is designed to help us
    a. exactly re-create the events of everyday life.
    b. re-create psychological forces under controlled conditions.
    c. create opportunities for naturalistic observation.
    d. minimize the use of animals and humans in psychological research.

23. Which of the following is true regarding gender differences and similarities?
    a. Differences between the genders outweigh any similarities.
    b. Despite some gender differences, the underlying processes of human behavior are the same.
    c. Both similarities and differences between the genders depend more on biology than on environment.
    d. Gender differences are so numerous, it is difficult to make meaningful comparisons.

24. The animal protection movement has protested the use of animals in all fields of scientific research. In defending their experimental research with animals, psychologists have noted that
    a. animals' physiology and behavior can tell us much about our own.
    b. they do not torture or needlessly exploit animals.
    c. advancing the well-being of humans justifies animal experimentation.
    d. All of the above

Answers can be found in Appendix C.

TIPS FOR STUDYING PSYCHOLOGY

20. How can psychological principles help you as a student?

The investment you are making in studying psychology should enrich your life and enlarge your vision. Although many of life's significant questions are beyond psychology, some very important ones are illuminated by even a first psychology course. Through painstaking research, psychologists have gained insights into brain and mind, depression and joy, dreams and memories. Even the unanswered questions can enrich us, by renewing our sense of mystery about "things too wonderful" for us yet to understand. What is more, your study of psychology can help teach you *how to ask and answer important questions*—how to think critically as you evaluate competing ideas and claims.

Having your life enriched and your vision enlarged (and getting a decent grade) requires effective study. As you will see in Chapter 8, to master information you must *actively process* it. Your mind is not like your stomach, something to be filled passively; it is more like a muscle that grows stronger with exercise. Countless experiments reveal that people learn and remember material best when they put it in their own words, rehearse it, and then review and rehearse it again.

The **SQ3R** study method incorporates these principles (Robinson, 1970). SQ3R is an acronym for its five steps: *S*urvey, *Q*uestion, *R*ead, *R*ehearse, *R*eview.

To study a chapter, first *survey*, taking a bird's-eye view as you note its headings. Notice how the chapter is organized.

As you prepare to read each section, use its heading or the preview question to form a *question* that you should answer. For this section, you might have asked, "How can I most effectively and efficiently master the information in this book?"

Then *read*, actively searching for the answer. At each sitting, read only as much of the chapter as you can absorb without tiring. Usually, a single main chapter section will do—the Frequently Asked Questions section you just finished, for example. Relating what you are reading to your own life will improve understanding and retention. Reading the occasional Close-Up and Thinking Critically boxes will also help.

► **SQ3R** a study method incorporating five steps: *S*urvey, *Q*uestion, *R*ead, *R*ehearse, *R*eview.

Having read a section, *rehearse* in your own words what you read. Test yourself by trying to answer your question, rehearsing what you can recall, then glancing back over what you can't recall.

Finally, *review:* Read over any notes you have taken, again with an eye on the chapter's organization, and quickly review the whole chapter.

Survey, question, read, rehearse, review. I have organized this book's chapters to facilitate your use of the SQ3R study system. Each chapter begins with a chapter outline that aids your *survey*. Headings and preview *questions* suggest issues and concepts you should consider as you *read*. The material is organized into sections of readable length, and at the end of each section there are *Rehearse* It questions that help you test yourself before moving on. The chapter *Reviewing* sections, as well as the Critical Thinker's *Review* and the key terms help you check your mastery of important concepts. Survey, question, read. . . .

Five additional study tips may further boost your learning:

1. *Distribute your study time.* One of psychology's oldest findings is that "spaced practice" promotes better retention than "massed practice." You'll remember material better if you space your time over several study periods rather than cram it into one long study blitz. Better to give your study of this text one hour a day, with one day off a week, than six hours at a time. Doing this requires a disciplined approach to managing your time. (Richard Straub explains time management in the *Student Study Guide* that accompanies this text.) For example, rather than trying to read an entire chapter in a single sitting, read just one section and then turn to something else.
2. *Learn to think critically.* Whether reading or in class, note people's *assumptions and values*. What perspective or bias underlies an argument? *Evaluate evidence*. Is it anecdotal? Correlational? Experimental? *Assess conclusions*. Are there alternative explanations?
3. *In class, listen actively.* As psychologist William James urged a century ago, "No reception without reaction, no impression without . . . expression." Listen for the main ideas and subideas of a lecture. Write them down. Ask questions during and after class. In class, as in your private study, process the information actively and you will understand and retain it better.
4. *Overlearn.* Psychology tells us that overlearning improves retention. Most of us are prone to overestimating how much we know. You may understand a chapter as you read it, but by devoting extra study time to testing yourself and reviewing what you think you know, you will retain your new knowledge long into the future.
5. *Be a smart test-taker.* If a test contains both multiple-choice questions and an essay question, turn first to the essay. Read the question carefully, noting exactly what the instructor is asking. On the back of a page, pencil in a list of points you'd like to make and then organize them. Before writing, put aside the essay and work through the multiple-choice questions. (As you do so, your mind may continue to mull over the essay question. Sometimes the objective questions will bring pertinent thoughts to mind.) Then reread the essay question, rethink your answer, and start writing. When finished, proofread to eliminate spelling and grammatical errors that make you look less competent than you are. When reading multiple-choice questions, don't confuse yourself by trying to imagine how each alternative might be right. Try instead to recall the answer *before* reading the alternatives given. Answer the question as if it were a fill-in-the-blank; first cover the answers and complete the sentence in your mind, and then find the alternative that best matches your own answer.

While exploring psychology, you will learn much more than effective study techniques. Psychology deepens our appreciation for how we humans perceive, think, feel, and act. By so doing it can indeed enrich our lives and enlarge our vision. Through this book I hope to help guide you toward that end. As educator Charles Eliot said a century ago: "Books are the quietest and most constant of friends, and the most patient of teachers."