Advanced Placement Psychology (AP Psych)
Summer Reading Assignment, 2020-2021

Directions:

For your first AP Psych assignment, your job is to become better acquainted with the first unit of year. Perspectives and Personality Theory introduce the history and perspectives of psychology and look to explain and understand how an individual's personality develops the way that it does.

I have provided you with copies of the first two chapters. Your assignment is to:

- read the material for comprehension,
- annotate the content using lined notebook paper,
- create note cards/flashcards of new vocabulary, and
- complete a visual graphic organizer for each chapter.

This assignment is due Friday, September 18 2020, and reflects 10% of your first quarter grade.

The purpose of this assignment is two-fold. One is to become familiar with the content of our first two chapters which build the foundation for rest of the course. The second is to begin focusing on the multi-skilled approach required for a college level course. Those skills include close reading, comprehension reflected in annotations, building vocabulary, and experience with visual learning.

We will focus on these skills to begin our course and then build upon them throughout the course. **Expect a baseline assessment of these two chapters during the first week of school.**

Have a great summer vacation, and if you have any questions, email me:

Mr. Eckert (eckert@csdnb.org)

Chapter 1

Introduction and History of Psychology

PEOPLE REFERRED TO HIM as Clever Hans because, to all appearances, he was exceptionally smart. But another characteristic made his case truly remarkable: Hans was a horse. His celebrity grew from public demonstrations in which he apparently solved math problems. "What is 12 plus 7?" a bystander might ask, and Hans would tap 19 times with his hoof. He wasn't *always* right, mind you, but most of the time Hans gave correct answers to problems involving simple addition, subtraction, multiplication, and division—even square roots. Nor were his presumed talents limited to math: When presented with questions written on large cards, Hans would spell out answers by tapping the ground to indicate letters on an alphabet board.

As Hans's fame spread throughout Europe and America, he became the world's most famous animal. But the scientific community, as you might expect, had its skeptics. Could a horse think and reason? Surely not. But then, how could they explain Hans's apparent talents?

One fall day in 1904, a committee of scientists, assembled by Carl Stumpf, director of the Berlin Psychological Institute, paid a visit to Hans's owner, Wilhelm von Osten, to investigate the matter. The group brought a variety of backgrounds to the task, including psychology, zoology, and veterinary medicine. For good measure, Stumpf also brought along a circus animal trainer and a prominent politician. For his part, Mr. Von Osten obligingly put Hans through his intellectual paces, while the committee observed. Their initial skepticism soon gave way to fascination at the horse's performance. More

● Clever Hans

important for the committee's mission, they found no hint that von Osten was cheating.

Nevertheless, one of the committee members, psychologist Oskar Pfungst, remained suspicious. He wondered whether the horse might be responding to cues unconsciously given by von Osten. Dr. Pfungst, therefore, proposed a more controlled test of Hans's abilities. Could the horse correctly answer questions when its owner Osten did not know the answer or was out of sight? Sure enough, when von Osten was not allowed to see the written questions, Hans failed the test. Likewise, when von Osten could see the questions but was required to stand behind a curtain or otherwise outside the horse's field of vision, Hans could not answer.

Von Osten was deeply disappointed with the results. But, to his credit, he cooperated with Pfungst to find out exactly what sorts of cues the horse had been sensing. A slight lean forward served as the signal for Hans to start tapping. The "stop" sign could be a subtle straightening of von Osten's posture, a rise of his eyebrows, or even a flaring of his nostrils. Hans, it turned out, was a clever horse, indeed—clever at reading almost imperceptible physical cues. When it came to verbal and math skills, however, his abilities were just average . . . for a horse.

KEY QUESTION

WHAT IS PSYCHOLOGY—AND WHAT IS IT *NOT*?

In a generic sense, everyone is a psychologist. We all study people, analyze their behavior, try to understand what they are thinking and feeling, and attempt to predict what they will do next. But there is a real difference between the commonsense psychology your Uncle Felix or Aunt Ethel uses in everyday life and the psychology you will learn about in the following pages. We have already glimpsed the latter in Dr. Pfungst's skeptical "show-me-the-evidence" approach. More specifically, the working definition of psychology that we will use throughout this book is a part of our Core Concept for this section of the chapter:

CORE CONCEPT

Psychology is a broad field with many specialties, but fundamentally, psychology is the scientific study of behavior and mental processes.

We can find the original meaning of **psychology** in the Greek roots of the word. *Psyché* means "mind"—which the ancient Greeks believed to be separate and distinct from the physical body—and the suffix *-ology* means "a field of study." Therefore, *psychology* literally means "the study of the mind." Psychologists today, however, use the broader definition that we included in our Core Concept: Psychology includes not only *mental processes* but also *behaviors*. That is to say, psychology's domain extends across both directly observable behaviors (talking, smiling, and crying, for example) and the internal mental processes that can be only indirectly observed (such as thinking, feeling, and desiring). Psychologists have not always agreed on these boundaries for their field—particularly on whether subjective mental processes could be explored by a discipline that claims to be a science.

The other important part of our definition, then, involves this scientific aspect of psychology. In brief, the *science* of psychology is based on objective, verifiable evidence obtained with the same care used by Pfungst in his study of Clever Hans.

■ **Psychology** The scientific study of behavior and mental processes.

Psychologists have set the standard for the methodology and scientific study of behaviors and mental processes. By making the **empirical approach** the standard for all psychological research, psychologists have been able to conduct studies that have changed the way we think. Giving you a more complete explanation of what we mean by the science of psychology will occupy much of the rest of the chapter.

For the moment, we want to focus on a point that is only implied in our definition of psychology: the notion that psychology is *not* mere speculation about human nature, nor is it a body of folk wisdom about people that "everybody knows" to be true. Throughout this book you will find many examples of such "commonsense" ideas that psychological science has shown to be false.

■ **Empirical approach** A study conducted via careful observations and scientifically based research.

DO IT YOURSELF! Is It Psychological Science or Psychobabble?

"Show me the evidence!" is the rallying cry of critical thinking. This rule has not penetrated our popular culture, where books tell us that men are from Mars and women are from Venus and that some people think with the "left brain" and others with the "right brain." In fact, much that is called psychology by the popular press and on TV is not based on science at all. Likewise, it is a good bet that you will find many volumes in the "Psychology and Self-Help" section of your local bookstore that are based on nothing more than speculation, exaggeration, or misunderstanding—what we call *pseudopsychology* and psychologist Carol Tavris (2000) more scathingly labels *psychobabble*. Whichever term you prefer, your authors hope that this book will help you spot bogus psychology for what it is.

Now, let's put a sampling of your psychological beliefs to the test. Some of the following statements are true, and some are false. Don't worry if you get a few—or all—of the items wrong: You will have lots of company. The point is that what so-called common sense teaches us about psychological processes may not withstand the scrutiny of a scientific test. Mark each of the following statements as "true" or "false." (The answers are given at the end.)

____ 1. It is a myth that most people use only about 10% of their brains.

____ 2. During your most vivid dreams, your body may be paralyzed.

____ 3. Psychological stress can cause physical illness.

____ 4. The color red exists only as a sensation in the brain. There is no "red" in the world outside the brain.

____ 5. Bipolar (manic-depressive) disorder is caused by a conflict in the unconscious mind.

____ 6. The newborn child's mind is essentially a "blank slate" on which everything he or she will know is "written" (learned) by experience.

____ 7. Everything that happens to us leaves a permanent record in memory.

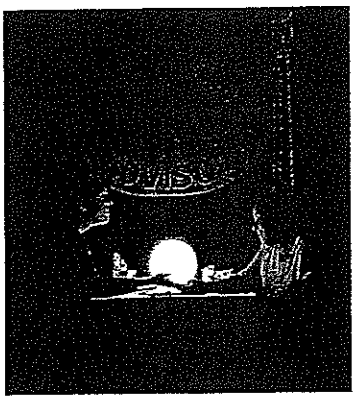
____ 8. You were born with all the brain cells that you will ever have.

____ 9. Intelligence is a nearly pure genetic trait that is fixed at the same level throughout a person's life.

____ 10. Polygraph ("lie detector") devices are remarkably accurate in detecting physical responses that, in the eye of a trained examiner, reliably indicate when a suspect is lying.

Answers: The first four items are true; the rest are false. Below you will find some brief explanations for each item; you will find more detail in the chapters indicated in parentheses.

1. *True:* This *is* a myth. We use all parts of our brains every day. (See Chapter 2, "Biopsychology and the Foundations of Neuroscience.")
2. *True:* During our most vivid dreams, which occur during rapid eye movement sleep (REM), the voluntary muscles in our body are paralyzed, with the exception of those controlling our eyes. (See Chapter 3, "States of Consciousness.")
3. *True:* The link between mind and body can make you sick when you are under chronic stress. (See Chapter 10, "Stress, Health, and Well-Being.")
4. *True:* Strange as it may seem, all sensations of color are created in the brain itself. Light waves do have different frequencies, but they have no color. The brain interprets the various frequencies of light as different colors. (See Chapter 4, "Sensation and Perception.")
5. *False:* There is no evidence at all that unconscious conflicts play a role in bipolar disorder. Instead, the evidence suggests a strong biochemical component. The disorder usually responds well to certain drugs, hinting that it involves faulty brain chemistry. Research also suggests that this faulty chemistry may have a genetic basis. (See Chapter 12, "Mental Disorders," and Chapter 13, "Therapies for Mental Disorders.")
6. *False:* Far from being a "blank slate," the newborn child has a large repertoire of built-in abilities and protective reflexes. The "blank slate" myth also ignores the child's genetic potential. (See Chapter 9, "Psychological Development.")
7. *False:* Although many details of our lives are remembered, there is no evidence that memory records all the details of our lives. In fact, we have good reason to believe that most of the information around us never reaches memory and that what does reach memory often becomes distorted. (See Chapter 7, "Cognition.")
8. *False:* Contrary to what scientists thought just a few years ago, some parts of the brain continue to create new cells throughout life. (See Chapter 2, "Biopsychology and the Foundations of Neuroscience.")
9. *False:* Intelligence is the result of both heredity and environment. Because it depends, in part, on environment, your level of intelligence (as measured by an IQ test) can change throughout your life. (See Chapter 7, " Cognition.")
10. *False:* Even the most expert polygrapher can incorrectly classify a truth-teller as a liar or fail to identify someone who is lying. Objective evidence supporting the accuracy of lie detectors is meager. (See Chapter 8, "Emotion and Motivation.")



● Fortune tellers, astrologers, and other practitioners of pseudopsychology don't bother to verify their claims with the same care that Pfungst used to test Clever Hans.

Could some of your own beliefs be among them? We challenge you to find out by taking the quiz in the box, "Do It Yourself! Is it Psychological Science or Psychobabble?"

Psychology and Critical Thinking

The Clever Hans incident occurred over one hundred years ago. Yet people today seem as eager as ever to embrace fantastic claims—especially those of mysterious powers of the mind and supernatural influences on our personalities. For evidence, we have to look no further than the horoscope in the daily newspaper. Never mind that astrology has been thoroughly debunked (Schick & Vaughn, 2001).[1] And the same goes for graphology (the bogus science of handwriting analysis), fortune telling, and the purported power of subliminal messages in the movies or on TV to persuade us to buy certain products or vote for certain politicians. All fall under the heading of **pseudopsychology:** phony, unscientific psychology masquerading as the real thing.

One of the goals your authors have for this book is to help you differentiate between psychology and pseudopsychology—that is, to *think critically* about claims made under the name of psychology. Most people, of course, think of themselves as good thinkers—just using common sense—but, as we will see over and over again in this book, what masquerades as psychological common sense has often turned out to be wrong. "Common sense," after all, has led many people to accept uncritically the polygraph (the so-called lie detector), the superiority of certain racial groups, demonic possession as a cause of mental illness, the primative brain operation sometimes called the "lobotomy," and the notion that horrific deeds (such as the recent torture of prisoners in Iraq) are perpetrated by just a few "bad apples."

Harmful Effects of Pseudopsychology So, what's the big deal if people want to believe such things? We—your authors, Phil, Bob, Ann, and Craig—suggest that there are two sets of problems.

First, those who uncritically accept the claims of pseudoscientific psychology risk depriving themselves of some *real* psychological insights that are even more interesting and useful. To give one example, few people realize that we humans are highly susceptible to **confirmation bias.** That is, we pay attention to events that confirm our beliefs and ignore evidence that contradicts them (Halpern, 2002). Knowledge of the confirmation bias helps us understand why, for example, astrology fans usually remember those days when the horoscope seems accurate and forget the days when it misses the mark.

The second set of problems with pseudopsychology involves the potential for more serious harm. For example, unfounded psychological beliefs (*pseudopsychology*) can waste time, money, and talent—even lives—as you will see when we discuss false "recovered memories" of sexual abuse (in Chapter 7) or when the presumption of female intellectual inferiority keeps women out of "men's jobs." Some people still don't know that psychological science long ago demonstrated that memory is not always accurate and that neither sex is intellectually inferior to the other (Neisser et al., 1996).

Pseudopsychology can also provide a fertile field for fraud. This happens when people are bilked by fortune tellers, handwriting analysts (grapholo-

■ **Pseudopsychology** Erroneous assertions or practices set forth as being scientific psychology.

■ **Confirmation bias** The tendency to attend to evidence that complements and confirms our beliefs or expectations, while ignoring evidence that does not.

[1]Throughout this book you will find that we use brief citations in parentheses calling your attention to a complete bibliographic reference found in the "References" section, beginning on p. R-1, near the end of this book. These brief in-text citations give the authors' last names and the publication date. With the complete reference in hand, your library can help you find the original source.

gists), or astrologists, who claim to have special knowledge of personality. Still another form of harm (of special concern to psychologists) involves diminished public support for legitimate psychological science.

Merely raising questions about accepted pseudoscientific beliefs can sometimes be dangerous. For example, in some parts of the United States only a few decades ago, those who dared to question the presumed mental and moral inferiority of African Americans were sometimes beaten, jailed, or lynched. Even today, in many regions of the world, posing critical questions about the status of women or particular racial groups still carries dire consequences.

When skeptical psychologists tested the claims for facilitated communication, they found that it wasn't the autistic children who were responsible for the messages.

Dangerous Therapies: The Facilitated Communication Fiasco Yet another potential harmful consequence of pseudoscientific psychology lurks in unvalidated therapies for psychological disorders. Let's consider an example involving *facilitated communication*, a widely acclaimed treatment for *autism* (a developmental disorder that can severely impair attention, language, and social functioning) that was popular in the 1990s. The treatment (which we will explain in a moment) is based on the erroneous belief that autism sufferers can have impressive verbal abilities that lie hidden by their disorder.

In brief, facilitated communication is a method by which a helper (or *facilitator*) attempts to communicate with an autistic person by asking questions and then assisting the person to respond by typing or pointing to letters on a letter board. (You can see how this is done in the accompanying photo.) You may have already identified the problem with this method: making sure that it is the autistic person who is really responding, rather than the facilitator.

Initially, the reports on facilitated communication were promising—even enthusiastic. But some psychologists were skeptical. They pointed out that the glowing reports were simply anecdotes, lacking in strict scientific controls. They also expressed concern that the helper might be consciously or unconsciously guiding the child's hand to produce the messages. (You have probably noticed the parallels with the case of Clever Hans.)

Sure enough, when studies of facilitated communication were done under controlled conditions, the results showed the skeptics' concerns to be well founded (Cabay, 1994; Wheeler et al., 1993). When the facilitator knew the questions being asked, the autistic child would seem to give sensible answers. But when "blinders" were applied—by hiding the questions from the facilitator—the answers were inaccurate or nonsensical. In fact, the experiments that demonstrated the flaws in facilitated communication employed essentially the same design that Dr. Pfungst used almost a century before to test Clever Hans.

Sadly, even though facilitated communication had extended hope to beleaguered parents and teachers, psychological research dashed those hopes. Moreover, the consequences of an uncritical belief in facilitated communication proved worse than false hopes. Not only did the use of facilitated communication mean that more effective treatments were delayed, but many parents blamed themselves when their children did not respond as expected to the treatment (Levine et al., 1994). Worst of all may have been the false accusations of sexual abuse derived from facilitated messages thought to have come from the autistic children (Bicklen, 1990; Heckler, 1994). The controlled studies left little doubt that the messages describing abuse originated wholly in the minds of the facilitators. In the wake of these findings, the American Psychological Association (2003b) denounced facilitated communication as a failure and relegated it to the junk pile of ineffective therapies.

The Skeptical Psychologist What lesson can you, as a student of psychology, draw from the facilitated communication fiasco and from the case of Clever

Hans? After all, you won't be able to run your own scientific test on every fantastic-sounding claim that comes along. We hope that you will develop a skeptical, critical attitude about reports of amazing new treatments, dramatic psychological "breakthroughs," and products that claim to help you develop "untapped potential." And we hope you will always pause to ask: Is there a simpler explanation? Has someone done a controlled test? Could the claims be merely the result of people's *expectations*—that is, could *confirmation bias* be at work? By doing so, you will have adopted the skeptical, show-me-the-evidence attitude of a good psychologist. This is exactly the approach that we will take on the journey through psychology that we begin in this chapter.

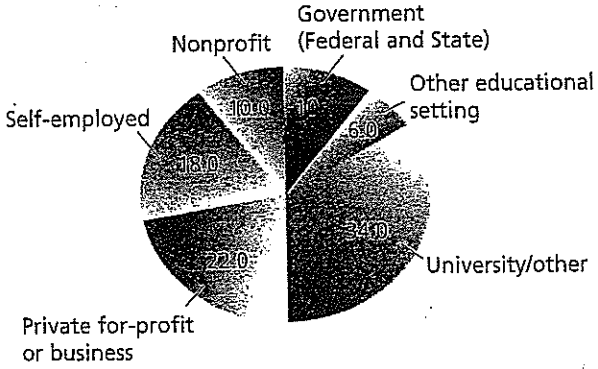
What Do Psychologists Do?

In the next few pages you will discover that psychology is a more diverse field than most people realize. Many students enroll in their first psychology course expecting that it will deal mainly with mental disorders and psychological therapies. But they soon find that psychology is also about learning, memory, perception, intelligence, personality, social interaction, thinking, emotion, and many more concepts that we will explore throughout this book. In the remainder of this section, we will first confront a stereotype about psychologists, and then we will show you three main ways to be a psychologist. After that, you will learn about some of the field's principal areas of specialization and, finally, about the difference between psychologists and psychiatrists.

Not All Psychologists Are Therapists Contrary to the popular stereotype, not all psychologists are therapists. You will find them at work almost everywhere: in education, industry, sports, prisons, government, churches, and temples, in private practice, and in the psychology departments of colleges and universities (see Figure 1.1). Psychologists also work for athletic teams, engineering firms, consulting firms, and the courts (both the judicial and the NBA variety). In these diverse settings, they perform a wide range of tasks, including teaching, research, assessment, and equipment design, as well as psychotherapy. Psychology's specialties are too numerous to cover them all here, but we can give you the flavor of the field by first dividing psychology into three broad categories.

Three Ways Of Doing Psychology Broadly speaking, we can divide psychology into three main branches or categories: *experimental psychology, teaching of psychology,* and *applied psychology.* **Experimental psychologists** are the workhorses who do the basic research in psychology. Most are faculty members at a college or university. This group, also called *research psychologists,* is the smallest of the three major branches of psychology (Frincke & Pate, 2004).

■ **Experimental psychologists** Psychologists who do research on basic psychological processes—as contrasted with applied psychologists; also called *research psychologists.*



● **FIGURE 1.1** Work Settings of Psychologists

(Updated information from *Employed Doctoral Scientists and Engineers, by Sector of Employment, Broad Field of Doctorate and Sex: 2001,* National Science Foundation.)

The second category, **teachers of psychology**, overlaps with the experimentalists, because most researchers also teach classes at the colleges or universities where they do their experimental work. Increasingly, however, large numbers of psychologists are hired by high schools, colleges, and universities primarily to teach. Community colleges alone employ some 9000 psychologists in teaching positions across the United States (Johnson & Rudmann, 2004).

Applied psychologists use the knowledge developed by experimental psychologists to tackle human problems, such as training, equipment design, and psychological treatment. Applied psychologists work in a wide variety of places such as schools, clinics, factories, social service agencies, airports, hospitals, and casinos. All told, some 64% of the doctoral-level psychologists in the United States work primarily as applied psychologists, and that percentage has been steadily increasing since the 1950s (Kohout & Wicherski, 2000; Rosenzweig, 1992; Stapp et al., 1985).

Applied Psychological Specialties What, exactly, do applied psychologists do? Here are profiles of some of the most popular applied specialties:

- *Industrial and organizational psychologists* (often called *I/O psychologists*) specialize in modifying the work environment to maximize productivity and morale. Some I/O psychologists develop interview and testing procedures to help organizations select new employees; some develop programs to train and retain employees; and others specialize in market research.
- *Sports psychologists*, as you might expect, work with athletes to help them maximize their performance. They deal with enhancing motivation, controlling emotions under pressure, and planning practice sessions. Many major sports franchises have sports psychologists on staff.
- *Engineering psychologists* work at the interface between people and equipment. Some design devices, such as control panels or airplane instrument displays, for easy and reliable human use. Some do psychological detective work to discover what went wrong in accidents attributed to "human error." Engineering psychologists are usually employed by private industry or the government and often work on a team with other scientists.
- *School psychologists* have expertise in the problems of teaching and learning. Typically, they work for a school district, where they diagnose learning and behavior problems and consult with teachers, students, and parents. School psychologists may spend a good deal of time administering, scoring, and interpreting psychological tests.
- *Rehabilitation psychologists* serve with physicians, nurses, counselors, and social workers on teams that may treat patients with both physical and mental disorders, such as stroke, spinal cord injury, alcoholism, drug abuse, or amputation. Some work in a hospital setting. Others work for social service agencies and for sheltered workshops that provide job training for people with disabilities.
- *Clinical psychologists* and *counseling psychologists* work with people who have problems with social and emotional adjustment or those who face difficult choices in relationships, careers, or education. About half of all doctoral-level psychologists list clinical or counseling psychology as their specialty (American Psychological Association, 2003c). The clinician is more likely to have a private practice involving psychological testing and long-term therapy, while the counselor is more likely to work for an agency or school and to spend fewer sessions with each client.

More information on the career possibilities in psychology can be found in *Careers in Psychology for the Twenty-First Century*, published by the American Psychological Association (2003a).

Teachers of psychology Psychologists whose primary job is teaching, typically in high schools, colleges, and universities.

Applied psychologists Psychologists who use the knowledge developed by experimental psychologists to solve human problems.

PSYCHOLOGY IN YOUR LIFE: KNOWING THE DIFFERENCE BETWEEN A PSYCHOLOGIST AND A PSYCHIATRIST

Students sometimes worry that their psychology professors are going to "psychoanalyze" them. Apparently, they believe that psychologists stand ever vigilant—just waiting for signs of mental disorder to appear. To put your mind at rest, this is only a stereotype: People commonly think that all psychologists are *clinical* psychologists—but you have already learned that isn't true. In fact, many psychologists have no training at all in the diagnosis and treatment of mental disorders.

One other point of confusion blurs the public image of psychology: the distinction between *psychology* and *psychiatry*. **Psychiatry** is a medical specialty, not a part of psychology. Psychiatrists hold MD (Doctor of Medicine) degrees and have also had specialized training in the treatment of mental and behavioral problems. Therefore, psychiatrists are licensed to prescribe medicines and to perform other medical procedures. Consequently, psychiatrists tend to view patients from a *medical* perspective. In the public mind, however, psychiatry often gets confused with clinical psychology because both professions treat people suffering from mental disorders. Psychologists like to point out that, while psychiatric training emphasizes mental illness, it gives short shrift to basic *psychological* topics, such as perception, learning, psychological testing, and developmental issues.

In contrast with psychiatry, psychology is a much broader field, encompassing many different specialties. Each specialty—such as experimental, engineering, teaching, and I/O psychology—has its own focus. As we have seen, most have nothing to do with the diagnosis and treatment of mental disorders. Moreover, while psychologists typically hold doctoral degrees, their training is not in medicine. (Only a few psychologists have taken the necessary medical coursework that qualifies them to prescribe drugs for psychological problems.) Instead, graduate training in psychology focuses on training in research methods, along with advanced study in a particular psychological specialty.

So, now you can sound smarter than most people when you talk about psychology and psychiatry. But what about the difference between a psychologist and a *psychoanalyst*? We'll look into that in the next section.

■ **Psychiatry** A medical specialty dealing with the diagnosis and treatment of mental disorders.

CHECK YOUR UNDERSTANDING

1. **RECALL:** Experiments showing facilitated communication to be ineffective were similar to the experiment that exposed Clever Hans. Specifically, what did both experimental procedures have in common?
   a. Neither the horse nor the autistic children could see the questions.
   b. Neither Von Osten nor the facilitators could see the questions.
   c. Both Hans and the autistic children were given incentives for producing correct answers.
   d. In both situations, correct answers were given about half the time.
   e. Intentional deceit was the goal of both experiments.

2. **APPLICATION:** The *confirmation bias* refers to a mental process that explains, among other things, why people
   a. engage in risky behavior.
   b. seek help from psychiatrists.
   c. believe in astrology.
   d. become autistic.
   e. study psychology.

3. **RECALL:** Which one would be considered an applied psychologist?
   a. an I/O psychologist
   b. a social worker
   c. a psychologist doing basic research
   d. a professor of psychology at the university
   e. a psychiatrist

4. **APPLICATION:** Which one of the following would be most likely to do research on learning or memory?
   a. an applied psychologist
   b. a psychiatrist
   c. an I/O psychologist
   d. a professor of psychology at the university
   e. an experimental psychologist

5. **UNDERSTANDING THE CORE CONCEPT:** Psychology is different from other disciplines, such as psychiatry, that deal with people because
   a. psychology focuses on mental disorder.
   b. psychology is a broader field, covering all aspects of behavior and mental processes.
   c. psychologists must have doctoral degrees.
   d. psychologists do research.
   e. psychology focuses only on animal research.

ANSWERS: 1. b 2. c 3. a 4. e 5. b

WHAT ARE PSYCHOLOGY'S HISTORICAL ROOTS?

KEY QUESTION

People have probably always speculated about human behavior and mental processes. Written records, dating back some 25 centuries to the Greek philosophers Socrates, Plato, and Aristotle, include ideas about consciousness and madness. They observed that emotions can distort thinking and that our perceptions are merely interpretations of the external world. Most people today would probably agree with many of these ancient ideas—and so would modern psychology.

Throughout history, people have been interested in the causes of behavior. Psychology's roots can be traced back to the work and ideas of the ancient Greek philosophers. Having a strong background in the origin of these ideas will make the study of psychology much easier to understand.

● The ancient Greeks believed that anger, such as we see in this enraged driver, comes from the spleen, but it never occurred to them to put their theories to a controlled test.

There is endless debate about the beginnings of the study of human behavior. Oftentimes the approaches of the ancient Greeks have been oversimplified and accorded only a passing mention. However, the basis for the development of Western thought has its beginnings in ancient Greece. And although there was no formal study of psychology during this time, the issues and ideas raised by the Greeks are quite similar to theories we still discuss today.

The first real glimpse of how classical philosophy became a precursor to modern psychology can be seen in the study of the philosopher Plato. Some have described Plato's quest for knowledge and understanding as the quest for perfect knowledge. Delving into areas like cognition, he was the first philosopher credited with the study of gaining knowledge (Plato, 380 B.C.)!

After Plato, the philosopher Aristotle developed theories of sensation, perception, cognition, memory, problem solving, and ethics. His approach to learning defined science until the advent of empiricism (Aristotle).

On the other hand, the Greeks also came up with some psychological notions that now seem quaint or amusing. They believed, for example, that emotions flow from the heart, the liver, and the spleen and that mental disorder could be caused by excessive bile. Following their lead, we still use the metaphor of "heartfelt" emotions, and we may "vent the spleen" when we are angry.

But we can give the Greeks only partial credit for laying the historical foundations for psychology. At roughly the same time, Asian and African societies were developing their own psychological ideas. In Asia, Yoga and Buddhism were exploring consciousness, which they attempted to control with

meditation. Meanwhile, in Africa, other explanations for personality and mental disorder were emerging from traditional spiritual beliefs (Berry et al., 1992). Based on these *folk psychologies*, shamans (healers) developed therapies rivaling in effectiveness the treatments used in Western psychology and psychiatry today (Lambo, 1978). It was, however, the Greek tradition and, later, the Roman Catholic Church that most influenced the development of Western psychology as a science.

Oddly—and significantly—it never occurred to any of the ancient thinkers to put their speculations to a test, in the same way that Pfungst tested his suspicions about Clever Hans. In the Greek mind, truth came from casual observation, logic, and the authority of experts. Then, a few hundred years later, when the medieval Church gained control of Europe, clerics sought to minimize inquiry into human nature because they had little interest in the "world of the flesh." In fact, the Church taught that the mind and soul operate completely outside the natural laws that govern worldly objects and events. For medieval Christians, the human mind—like the mind of God—presented an unsolvable mystery.

This view prevailed until the 17th century, when French philosopher René Descartes (*Day-CART*) dared to assert that human sensations and behaviors are based on activity in the nervous system. His idea fit well with exciting new discoveries about the biology of nerve circuits in animals. For example, science had just shown how the sense organs convert stimulation into the nerve impulses and muscular responses. This discovery allowed scientists, for the first time, to see that there were biological processes (rather than mysterious spiritual forces) behind sensation and simple reflexive behaviors. Yet despite these major advances, psychology itself would not become a distinct scientific discipline for another two centuries after Descartes. As we will see, it took two revolutionary ideas to make a science of psychology possible.

Before we get to that, however, let's take a moment to state our Core Concept for this section, which emphasizes five of the competing viewpoints that emerged in the early days of psychology, as the field struggled to become a science:

CORE CONCEPT

Modern psychology developed from several conflicting traditions, including structuralism, functionalism, Gestalt psychology, behaviorism, and psychoanalysis.

After you have studied this section, you should be able to explain the basic assumptions of each tradition and the issues on which they were in conflict.

Why Study the History of Psychology? The history of psychology, although it may seem like not much happened before Wundt in 1879, is rich. Knowing the philosophy that shaped the early psychologists helps us understand why they thought the way they did. In addition, it enables all of us who are students of psychology to understand how and why psychology grew into the field that it is today. Before this text, you may not have considered how Plato and Aristotle are connected to modern thought. Studying the history of psychology is important, because knowing where psychology came from gives us a better idea of where it is going.

Structuralism: Focus on Structure—and the Founding of Scientific Psychology

One of the two revolutionary ideas to shape the early development of psychology emerged in the mid-1800s. In his book *On the Origin of Species* (1859), Charles Darwin suggested a biological kinship between humans and animals.

For psychologists this would mean that discoveries about animal biology and behavior could be applied (with caution, of course) to people. So, for example, Helmholtz's pioneering research on nerve impulses in frogs helped psychologists understand human reflexes. Likewise, Darwin's insight meant that Pavlov's later work on learning in dogs could also throw light on human learning—as we shall see in Chapter 6.

The second big idea that shaped the early science of psychology arose in chemistry, where scientists had noticed patterns in properties of the chemical elements that led them to develop the *periodic table*. At one stroke, the periodic table made the processes underlying chemical reactions clear. This achievement particularly intrigued one Wilhelm Wundt, a German scientist (who, incidentally, became the first person to call himself a "psychologist"). Wundt wondered: Could a similar approach simplify our understanding of the mind? Could he discover "the elements of conscious experience"? Wundt's quest for the elements of consciousness became known as **structuralism**, because it focused on revealing the most basic "structures" or components of the mind (Fancher, 1979), rather than what consciousness (of the mind) could do.

To pursue his dream of establishing a science of consciousness, in 1879 Wundt established an institute for psychological research at the University of Leipzig. There, in a new laboratory, Wundt and his students began to conduct studies on what they supposed to be the "elements" of consciousness: sensation and perception, memory, attention, emotion, cognition, learning, and language. All our mental activity, they asserted, consisted of combinations of such basic processes. In their experiments, they presented trained volunteers with a variety of simple stimuli and asked them to respond with the press of a lever or a description of their sensations—a technique called **introspection.**

● In 1879, Wilhelm Wundt (1832–1920) founded the first formal laboratory devoted to experimental psychology. He's shown here (center) in his laboratory in Leipzig in 1912.

From the outset, structuralism was a magnet for critics, who attacked and ridiculed Wundt from all sides. In particular, many objected to his introspective method as being too subjective. After all, they said, how can we judge the accuracy of people's description of their thoughts and feelings?

But Wundt has had the last laugh—even though structuralism no longer exists as a recognized "school" of psychology. Psychologists still rely on his introspective method for obtaining dream reports and evidence of perceptual changes, such as those you will experience in the Necker cube demonstration in the upcoming "Psychology in Your Life" section. And there is one more reason why Wundt, if he were alive today, would still be laughing: The topics that he and his students first identified and explored can be found as chapter headings in every introductory psychology text, including this one.

Functionalism: Focus on Function

One of the most vocal of Wundt's critics, the American psychologist William James, argued that structuralism's approach was far too narrow. (He also said that it was boring—which didn't help his already strained relationship with Wundt [Fancher, 1979].) James argued that psychology should include the *function* of consciousness, not just its *structure*. In a famous metaphor, he pictured

■ **Structuralism** A historical school of psychology devoted to uncovering the basic structures that make up mind and thought. Structuralists sought the "elements" of conscious experience.

■ **Introspection** The process of reporting on one's own conscious mental experiences.

■ **Functionalism** A historical school of psychology that believed mental processes could best be understood in terms of their adaptive purpose and function.
■ **Gestalt psychology** A historical school of psychology that sought to understand how the brain works by studying perception and perceptual learning. Gestalt psychologists believed that percepts consist of meaningful wholes (in German, *Gestalts*).
■ **Behaviorism** A historical school (as well as a modern perspective) that has sought to make psychology an objective science focused only on behavior—to the exclusion of mental processes.

a "stream of consciousness" as a mental process that had no static structure but was continually flowing, changing, and interacting with the environment. Appropriately, James's brand of psychology became known as **functionalism.**

James found Charles Darwin's ideas much more interesting than Wundt's. In particular, he liked Darwin's emphasis on organisms *adapting* to their environments. James therefore proposed that psychology should explain how people adapt—or fail to adapt—to the everyday world outside the laboratory. Recurring bouts of depression probably added to his concern with problems of everyday living (Ross, 1991).

Where did this approach lead the functionalists? Much of their work had a practical bent: They were the first *applied* psychologists. James wrote extensively on the development of learned "habits," emotions, the psychology of religion, and teaching. Appropriately, one of his followers, John Dewey, founded the "progressive education" movement, which emphasized learning by *doing*, rather than by merely listening to lectures and memorizing facts.

Gestalt Psychology: Focus on the Whole Instead of the Parts

Another challenge to Wundt's structuralism came from a rebellious group in his native Germany. In some respects, their approach, known as **Gestalt psychology,** was exactly the opposite of the structuralists': The Gestalt psychologists were interested in how we construct "perceptual wholes" (or *Gestalts*, in German), such as our perception of a face, rather than just a conglomeration of lines, colors, and textures. (The structuralists, you will remember, focused on the parts, or elements of consciousness, not on the whole.) But for Gestalt psychology, understanding perception was merely the means to the even more important end of understanding how the brain works. Like both the structuralists and the functionalists, psychologists of the Gestalt "school" (or philosophical approach) relied on introspection.

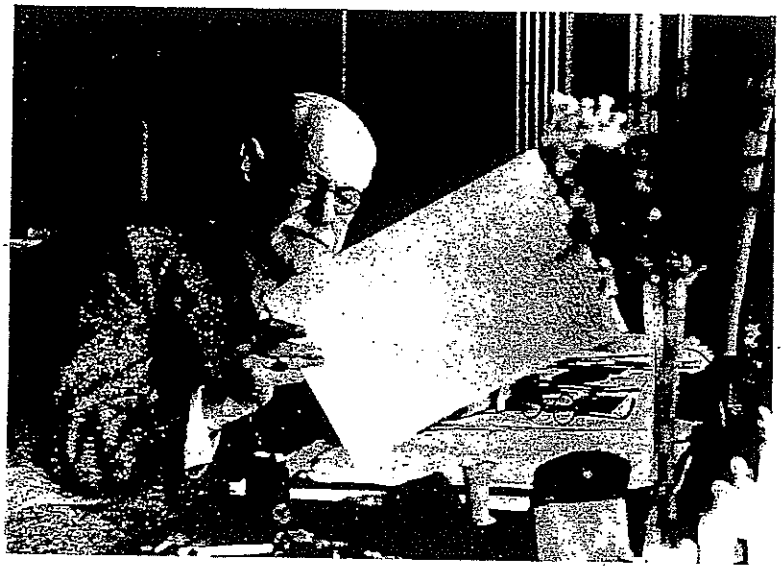
Prominent Gestalt psychologists include Max Wertheimer, who studied visual illusions and ambiguous figures, such as the Necker cube, which you will see in a moment (page 14). Another psychologist, Wolfgang Köhler, extended the reach of Gestalt psychology to *insight learning*, an overlooked form of learning marked by sudden "Aha!" experiences. We will see much more of the Gestaltists in our study of perception (Chapter 4).

Behaviorism: Eliminate the Mind and Focus on Behavior

CONNECTION: CHAPTER 6
John Watson and his colleague Rosalie Rayner performed a notorious study in which they taught a young boy, Albert, to fear furry objects.

A particularly feisty group, known as the *behaviorists*, disagreed with nearly everyone. Most notably, they proposed the novel idea that consciousness should not be a part of psychology at all! John B. Watson, the leader of the behavioral movement, argued that a true and objective science of psychology should deal solely with observable events: *stimuli* from the environment and the organism's *responses*. **Behaviorism,** said Watson, should be the science of *behavior*—not of the mind.

In general, behaviorism rejected any psychology of subjective mental processes. But, in particular, behaviorists objected to *introspection*, the practice of asking people to report on their mental experiences—a technique that the structuralists, functionalists, and Gestalt psychologists all used. Watson and his behaviorist followers cared nothing about what people were *thinking*. Instead, they wanted to know how people would *act* (for example, whether a child would respond with fear to a rabbit that, on an earlier presentation, had been accompanied by a sudden loud noise).



● Sigmund Freud (1856–1939), shown here in the office of his Vienna home, developed the psychodynamic approach to behavior.

We will encounter behaviorism again in the next section of the chapter because it is one of the ancestral lines of psychology that continues to live on in the present day.

Psychoanalysis: Focus on the Unconscious Mind

Yet another objection to Wundt's approach to psychology came from medicine—specifically from the Viennese physician Sigmund Freud and his disciples, who were pioneering the *psychoanalytic method* of treating mental disorders. Their conceptual approach, called **psychoanalysis**, asserted that mental disorders arise from conflicts in the *un*conscious mind. Accordingly, they maintained that the definition of psychology should be expanded to include the unconscious.

Because psychoanalytic theory remains a force in modern psychology, we will talk more about Freud and his ideas later in the chapter. But for now, you should know that psychoanalysis and behaviorism outlasted structuralism, functionalism, and Gestalt psychology. Today, few would call themselves structuralists, functionalists, or Gestaltists. Yet—and this is the important point—the legacies of these early approaches, along with those of behaviorism and psychoanalytic theory, can be found woven through the fabric of modern psychology. We will return for a big-picture overview of modern psychology, a field still marked by multiple viewpoints, right after we show you how a famous image makes two profound points.

■ **Psychoanalysis** An approach to psychology based on Sigmund Freud's assertions, which emphasize unconscious processes. The term is used to refer broadly both to Freud's psychoanalytic theory and to his psychoanalytic treatment method.

PSYCHOLOGY IN YOUR LIFE: AN INTROSPECTIVE LOOK AT THE NECKER CUBE

The cube in Figure 1.2A will trick your eye—or, more accurately, it will trick your brain. If you look at it for a few moments, it will suddenly seem to change perspectives. For a time you may see it as if from the upper right (Figure 1.2B), and then it will abruptly shift and appear as though you were seeing it from the lower left (Figure 1.2C).

It may take a few moments to see the shift. But once you see it change, you won't be able to prevent it from alternating back and forth, seemingly at random. Try showing the cube to a few friends and asking them what they see.

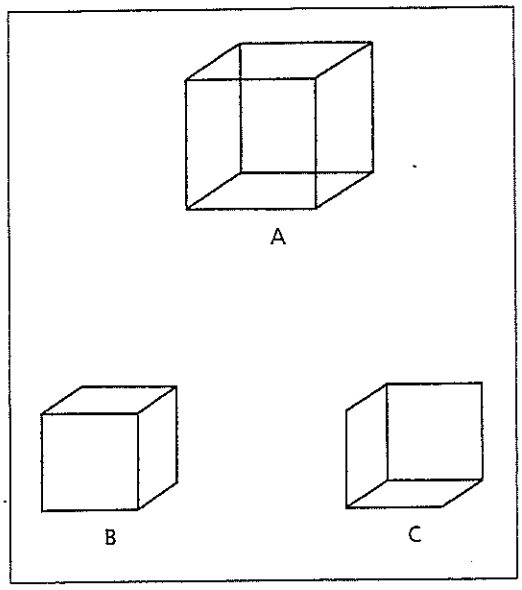


FIGURE 1.2 The Necker Cube Perspective

We feel compelled to confess that the alternating-cube phenomenon was not discovered by a psychologist. Rather, it was first noticed by Swiss geologist Louis Necker in 1832, while he was looking at cube-shaped crystals under a microscope. Since that time, it has been known in his honor as the Necker cube. For our purposes, Necker's amazing cube illustrates two important points.

First, it illustrates the much-maligned process of *introspection*, pioneered by Wundt and his students. Please note that the only way we can demonstrate that the Necker cube changes perspectives in our minds is by having people look at it and report what they see. And why is this important to psychology? Only the hardest of the hard-core behaviorists would deny that something happens mentally within a person looking at the cube. Moreover, whatever it is involves more than simply seeing lines on a page. In fact, the Necker cube demonstrates that we add *meaning* to our sensations—a process called *perception*, which will be a main focus of a later chapter. *The take-away message is that we don't simply* sense *the world as it "really" is, but we* perceive *it by adding our own interpretations.*

CONNECTION: CHAPTER 4
Gestalt psychologists intensely studied how individuals perceive ambiguous objects.

The second important point is this: The Necker cube can serve as a metaphor for the multiple perspectives in psychology. Just as there is no single right way to see the cube, there is no single perspective in psychology that gives us one right understanding of behavior and mental processes. Put another way, to understand psychology fully, we must alternately shift our viewpoints among multiple perspectives. And what are those perspectives? We will explore seven of the most important ones in the next section.

CHECK YOUR UNDERSTANDING

1. **RECALL:** The ancient Greeks' approach to psychology was not scientific because they
   a. failed to check their opinions against controlled observations.
   b. were more interested in art and music than in truth.
   c. believed that all truth was revealed in sacred texts given by their gods.
   d. lived in an age before precise measuring instruments had been developed.
   e. did not publish their results.

2. **RECALL:** René Descartes made a science of psychology possible when he suggested that
   a. science should be based entirely on common sense rather than on religion.
   b. replicability of results was essential.
   c. the elements of conscious experience could be arranged into a periodic table.
   d. psychology should be a branch of philosophy.
   e. sensations and perceptions are the result of activity in the nervous system.

3. **RECALL:** One of the roots of cognitive psychology sought to identify the "elements of conscious experience." Adherents to this viewpoint were called
   a. structuralists.
   b. functionalists.
   c. Gestalt psychologists.
   d. behaviorists.
   e. psychoanalysts.

4. **APPLICATION:** Which of the following is a method you would use to tell whether a friend had experienced a perceptual shift while viewing the Necker cube?
   a. behaviorism
   b. introspection
   c. structuralism
   d. sensation
   e. perception

5. **UNDERSTANDING THE CORE CONCEPT:** Modern psychology has strong roots in all of the following traditions except
   a. Greek philosophy.
   b. biology.
   c. astrology.
   d. functionalism.
   e. structuralism.

ANSWERS: 1. a 2. e 3. a 4. b 5. c

WHAT ARE THE PERSPECTIVES PSYCHOLOGISTS USE TODAY?

During the past century, the picture of psychology was both enriched and complicated by ideas borrowed from many sources. The result is a field that resembles a slightly dysfunctional family, with a few common interests and lots of family squabbles. In our Core Concept we simplify this family portrait by focusing on nine especially important viewpoints:

Nine main perspectives characterize modern psychology: the biological, developmental, cognitive, psychodynamic, humanistic, behavioral, sociocultural, evolutionary/sociobiological, and trait views.

The champions of each view see behavior and mental processes in a slightly different way—much like nine artists portraying the same scene from different vantage points. You are likely to find experimental psychologists and teachers of psychology holding any of these viewpoints. Among applied psychologists who do counseling, therapy, and personnel selection work, however, the trait and clinical views predominate. As you read the following pages, you should focus on the important ideas that distinguish each view from the others.

The Biological View

The **biological view** emphasizes how our physical makeup and the operation of our brains influence our personality, preferences, behavior patterns, and abilities. More specifically, psychologists taking the biological approach search for the causes of behavior in heredity, in the nervous system and the endocrine (hormone) system, and in the effects of environmental insults such as disease (*not* insults of the other kind). As you might imagine, the biological view has strong roots in medicine and biological science. Often, the enterprise of biological psychology, along with biology, neurology, and other disciplines interested in brain processes, is referred to as **neuroscience.**

Neuroscience is a "hot" area at the moment. Thanks to spectacular advances in computers and brain-imaging techniques, neuroscientists have made amazing strides in understanding the brain during the past decade. Among their achievements, they have begun to unravel the mystery of how our eyes and brain convert light waves into vision. They have also learned how damage to certain parts of the brain can destroy specific abilities, such as speech, social skills, or memory. And they have discovered brain wave patterns associated with the hidden world of sleep and dreams.

The biological view led to the discovery that certain patterns of brain waves are associated with the hidden world of dreams.

One important variation on the biological view again draws on the ideas originally proposed by the famous British scholar and naturalist Charles Darwin. **Evolutionary psychology** suggests that many human traits arise from hereditary characteristics established in our remote ancestral past. In this view, our genetic makeup—including our most deeply ingrained behaviors—were shaped by the conditions our ancestors faced thousands of years ago.

All through the history of the species, environmental forces have pruned the human family tree, favoring the survival and reproduction of those individuals with the most adaptive mental and physical characteristics. Charles Darwin called this *natural selection.* Through this process, the physical characteristics of a species evolve (change) in the direction of characteristics that give the fittest organisms a competitive advantage.

■ **Biological view** The psychological perspective that searches for the causes of behavior in the functioning of genes, the brain and nervous system, and the endocrine (hormone) system.

■ **Neuroscience** The field devoted to understanding how the brain creates thoughts, feelings, motives, consciousness, memories, and other mental processes.

■ **Evolutionary psychology** A relatively new specialty in psychology that sees behavior and mental processes in terms of their genetic adaptations for survival and reproduction.

Proponents of evolutionary psychology say that virtually all human behavior—even the most destructive behavior, such as warfare, homicide, and racial discrimination—has grown out of genetic tendencies that once may have helped humans adapt and survive. This approach has also suggested some highly controversial explanations for certain gender differences—why, for instance, men typically have more sexual partners than do women.

The Developmental View

Change may be the only constant in our lives. In the **developmental view**, psychological change results from an interaction between the *heredity* programmed in our genes and the experiences presented by our *environment*. A big question, however, involves the relative contributions made by our genes and by our surroundings in shaping who we become: Which counts more heavily, heredity or environment, *nature* or *nurture*?

Developmental psychologists also study how we change as we grow older and how we change by developing social skills, learning language, and assimilating the expectations of our culture. Much of their research has focused on *child* development. Increasingly, however, developmental psychologists have begun to look at how development unfolds in teens and adults. In the developmental chapter of this book, we will explore the sweeping patterns of psychological change seen across the lifespan, from before birth to old age.

The Cognitive View

The next of psychology's multiple modern perspectives suggests that our thoughts and actions arise from the way we *interpret* our experiences. From this viewpoint, understanding ourselves requires that we look in our minds, as well as at our biology.

In the **cognitive view**, our actions are profoundly influenced by the way we process information streaming in from our environment. Cognitive psychologists study all sorts of mental processes, or **cognitions**—thoughts, expectations, perceptions, and memories, as well as states of consciousness. You might think of them as the heirs to the best of the structuralist, functionalist, and Gestalt traditions.

Modern cognitive psychologists have also borrowed from linguistics the idea that our most basic language abilities are wired into our brains at birth (Pinker, 2002). From computer science they have borrowed the metaphor of the brain as a biological computer—designed as a processor of information (Gardner, 1985; Gazzaniga, 1998a; Sperry, 1988). And from medicine they have borrowed the technology that now allows visualizing the activity of the brain and connecting it to mental processes. Cognitive psychologists who are especially interested in the connections among mind, brain, and behavior have pioneered a hybrid field called **cognitive neuroscience.**

A special interest in mental health and mental disorder characterizes the **clinical view.** Most commonly, you will find its adherents practicing counseling or psychotherapy. But the two main groups that this perspective includes—*psychodynamic psychology* and *humanistic psychology*—have taken that interest in different directions.

The Psychodynamic View

The term *psychodynamic* comes from the belief that the mind (psyche) is a reservoir of energy (dynamics). Accordingly, **psychodynamic psychology** says that we are motivated primarily by the energy of irrational desires generated in our unconscious minds (Murray et al., 2000). This approach has been especially

■ **Developmental view** The psychological perspective emphasizing changes that occur across the lifespan.

■ **Cognitive view** The psychological perspective emphasizing mental processes, such as learning, memory, perception, and thinking, as forms of information processing.

■ **Cognitions** Mental processes, such as thinking, memory, sensation, and perception.

■ **Cognitive neuroscience** An interdisciplinary field emphasizing brain activity as information processing; involves cognitive psychology, neurology, biology, computer science, linguistics, and specialists from other fields who are interested in the connection between mental processes and the brain.

■ **Clinical view** The psychological perspective emphasizing mental health and mental illness. Psychodynamic and humanistic psychology are variations on the clinical view.

■ **Psychodynamic psychology** A clinical viewpoint emphasizing the understanding of mental disorders in terms of unconscious needs, desires, memories, and conflicts.

attractive to practitioners who specialize in psychotherapy. As a result, the psychodynamic perspective has emphasized the treatment of mental disorders over scientific research.

The best-known representative of the psychodynamic approach was Sigmund Freud, who founded *psychoanalysis* (and whom we met earlier in our tour of psychology's historical "schools"). Originally a medical technique devised to treat mental disorders, psychoanalysis portrays the mind as a sort of mental boiler that holds the rising pressure of unconscious sexual and destructive desires, along with memories of traumatic events. Even today, most psychoanalysts are medical doctors with a specialty in psychiatry and advanced training in Freudian methods. (And now you know the difference between a *psychologist* and a *psychoanalyst*.)

CONNECTION: CHAPTER 10
Freud's *theory of personality* emphasized the unconscious causes of everyday behavior, as well as mental disorder.

The Humanistic View

The other main variation on the clinical view is called **humanistic psychology**. According to this perspective, our actions are hugely influenced by our self-concept and by our need for personal growth and fulfillment. Far more than the psychoanalysts, humanistic therapists emphasize the positive side of our nature: human ability, growth, and potential.

Led by the likes of Abraham Maslow (1968, 1970, 1971) and Carl Rogers (1951, 1961, 1977), humanistic psychologists have also rejected what they saw as the cold, mechanical approach of scientific psychology. In its place, they have offered a model of human nature emphasizing the free will people have to make choices affecting their lives. They have also pressed psychology to take a greater interest in feelings and the self-concept (Cushman, 1990). As you might have suspected, humanistic psychologists have not produced a great deal of scientific research, although their voluminous writings have had a major impact on the practice of counseling and psychotherapy.


● Humanistic psychologists are interested in discovering how self-actualizing individuals, such as Martin Luther King, Jr., are able to unleash their potential for leadership and creativity.

The Behavioral View

A wholly different approach harks back to John Watson and the early days of psychology. *Behaviorism* says we should look for the causes of behavior in our environment rather than in our biology or our minds (Murray et al., 2000). This **behavioral view**, then, calls attention to the ways rewards and punishments shape how we act.

As we saw a few pages ago, in our discussion of psychology's historical roots, behaviorism first emerged as a revolution against the subjective methods used by Wundt, James, and others in the structuralist and functionalist traditions. In brief, the behaviorists totally reject a science of inner experience. Instead, they choose to study the person entirely from the outside, focusing only on what they can observe directly: the effects of people, objects, and events on behavior. And this is still the approach taken by hard-core behaviorists (although we will see in Chapter 6 that some renegades, calling themselves *cognitive behaviorists*, have opened behaviorism's door to mental processes). The behaviorists have made their greatest contribution by giving us a detailed understanding of how the environment affects learning—especially through rewards and punishments.

B. F. Skinner, the most influential American behaviorist, argued that the concept of "mind" has led psychology in circles, chasing something so subjective that it cannot even be proved to exist (Skinner, 1987, 1989, 1990). (Think about it: Can you prove that you have a mind?) As Skinner noted wryly, "The crucial age-old mistake is the belief that . . . what we feel as we behave is the cause of our behaving" (Skinner, 1989, p. 17).

■ **Humanistic psychology** A clinical viewpoint emphasizing human ability, growth, potential, and free will.

■ **Behavioral view** A psychological perspective that finds the source of our actions in environmental stimuli, rather than in inner mental processes.

■ **Sociocultural view** A psychological perspective emphasizing the importance of social interaction, social learning, and a cultural perspective.

■ **Culture** A complex blend of language, beliefs, customs, values, and traditions developed by a group of people and shared with others in the same environment.

The Sociocultural View

Who could deny that people exert powerful influences on each other? The **sociocultural view** makes this idea of *social influence* the focus of psychology. Social psychologists have used this perspective to probe the mysteries of liking, loving, prejudice, aggression, obedience, and conformity.

And speaking of culture (as we were a moment ago), even social psychologists overlooked the effects of the larger social context called **culture** until recently. As a complex blend of human language, beliefs, customs, values, and traditions, culture exerts profound influences on all of us—as we can readily see by comparing people in, say, the California-Mexican culture of San Diego with the Scandinavian-based culture of Minnesota. Psychology's blindness to culture was due, in part, to the beginnings of scientific psychology in Europe and North America, where most psychologists lived and worked under similar cultural conditions (Lonner & Malpass, 1994; Segall et al., 1998).

Now the perspective has begun to broaden. Although nearly half of the world's half-million psychologists still live and work in the United States, it is encouraging to note that interest in psychology is also growing in countries outside of Europe and North America (Pawlik & d'Ydewalle, 1996; Rosenzweig, 1992, 1999). Even so, most of our psychological knowledge still has a North American/European flavor (Cushman, 1990). Recognizing this bias, cross-cultural psychologists have begun the long task of reexamining the "laws" of psychology across cultural and ethnic boundaries (Fowers & Richardson, 1996; Gergen et al., 1996; Segall et al., 1998; Triandis, 1994, 1995).

The Evolutionary/Sociobiological View

Do you think your ancestors 150 years ago behaved similarly to the way you and your family behave today? Did they face the same survival challenges we face in the modern world? The evolutionary/sociobiological approach to psychology examines individual behavior through the lens of natural selection. This method looks at behavior as both adaptive and hereditary. At its most basic level, this approach applies the evolutionary theories of Charles Darwin to individual behavior. In this way psychologists can trace the development of behaviors unique to specific animals, or even species-specific behavior patterns, and show how they have adaptively evolved over time. Studying the species-specific behavior patterns of animals helps us understand human behavior patterns. One key component of the evolutionary approach is that these theorists look at genetics not as the key to what makes people different, but as the means by which we have evolved, and continue to evolve, into the thinking beings we are today. Indeed, it is possible to think of evolutionary psychology as an approach, rather than a specific field of study, such as behavioral genetics.

● Cross-cultural psychologists, such as this researcher in Kenya, furnish important data for checking the validity of psychological knowledge.

The Trait View

The Greeks, who seem to have had their hands in almost everything, proclaimed that our personalities are ruled by four body *humors* (fluids): blood, phlegm, melancholer, and yellow bile. Depending on which fluid is most abundant, the individual's personality might be sanguine (dominated by blood), slow and deliberate (phlegm), melancholy (melancholer), or angry and aggressive (yellow bile).

We no longer buy into the ancient Greeks' typology, of course, but their idea of personality traits lives on in modern psychology, especially among psychologists interested in personality and personality testing. *Traits*, to a psychologist, are long-lasting personality characteristics, such as introversion or extraversion—as contrasted with temporary mood states. This **trait view** is common among psychologists who do mental testing, including clinical, counseling, and I/O psychologists.

CONNECTION: CHAPTER 10
People's personalities differ on five major trait dimensions, cleverly called the *Big Five*.

The trait view is widely embraced by experimentalists and teachers of psychology, especially among those who are interested in the field of personality. We will see later in the book that proponents of this trait perspective have identified five major personality dimensions, cleverly named the *Big Five*. Significantly, these dimensions have proved to be valid for classifying people living in virtually any culture around the world.

■ **Trait view** A psychological perspective that views behavior and personality as the products of enduring psychological characteristics.

To summarize the perspectives we have just covered, please have a look at Table 1.1. There you will find an overview of the main viewpoints that make

TABLE 1.1 Nine Major Perspectives in Modern Psychology

Perspective	Overview	What Determines Behavior?	Problems and Questions for Study
Biological	We are essentially complex biological systems that respond to both hereditary and environmental influences. This view includes *evolutionary psychology*.	Behavior is determined by brain structure and chemicals, and by inborn responses to external cues for survival and reproduction.	How do heredity, the nervous system, and the endocrine system produce behavior and mental processes? Evolutionary psychologists seek to learn how behaviors may be linked to evolutionary changes that conferred a survival or reproductive advantage on our ancestors.
Developmental	People undergo predictable patterns of change throughout their lives.	Behavior is determined by the interaction of nature and nurture (heredity and environment).	What are the patterns that characterize developmental change? What are the genetic and environmental influences underlying these patterns?
Cognitive	People are information-processing systems.	Behavior is the result of our mental interpretations of our experience.	How do mental processes, including sensation, perception, learning, memory, and language, influence behavior?
Psychodynamic	*Psychodynamic psychology* emphasizes dark forces in the unconscious.	Psychodynamic theory sees behavior as arising from unconscious needs, conflicts, repressed memories, and childhood experiences.	How does the energy generated in the unconscious mind motivate our actions and account for mental disorders?
Humanistic	*Humanistic psychology* emphasizes human growth and potential.	Humanistic theory focuses on the influence of self-concept, perceptions, and interpersonal relationships, and on need for personal growth.	How can humanistic theory be applied to enhance mental health through counseling and therapy?
Behavioral	Our behavior is primarily shaped by learning.	In accordance with the laws of behavioral learning, we respond to stimulus cues and to our history of rewards and punishments.	What are the "laws" that associate our responses with stimulus conditions? How can they be applied to improve the human condition?
Sociocultural	People are social animals, so human behavior must be interpreted in its social context.	Behavior is heavily influenced by culture, by social norms and expectations, and by social learning.	Under what conditions is the social and cultural situation predictive of behavior? How are social influences different across cultures?
Evolutionary/ Sociobiological	Behavior has developed and adapted over time.	Behavior is determined by natural selection.	How do behavior and individual differences develop and change?
Trait	Individual differences result from differences in our underlying patterns of stable characteristics (traits).	Behavior results from each person's unique combination of traits.	How many fundamental traits are there? How can we use trait patterns to predict behavior?

up the spectrum of modern psychology. A few moments taken to fix these perspectives in your mind will pay big dividends in your understanding of the chapters that follow, where we will refer to them often.

The Changing Face of Psychology

Modern psychology is a field in flux. Over the last several decades, the biological, cognitive, and developmental perspectives have become dominant. And among psychologists espousing a sociocultural perspective, those who put the emphasis on culture are gaining ascendancy. Meanwhile, the behavioral camp seems to be losing ground, as are the Freudian folk, among those holding the clinical perspective. We also call your attention to an especially noteworthy trend among psychologists who are women and members of minority groups.

Ethnic minorities—especially Asians, African Americans, and Latinos—are becoming psychologists in increasing numbers (Kohout, 2001). Even more striking is the new majority status of women in psychology. In 1906, only 12% of American psychologists were women, according to a listing in *American Men of Science* (named with no irony intended). By 1921 the proportion had risen above 20%. And now, women receive approximately two-thirds of the new doctorates awarded in psychology each year (Kohout, 2001).

Although psychology has always included a higher proportion of women than any of the other sciences, women have too often found gender-related biases in their psychological career paths (Furumoto & Scarborough, 1986). For example, G. Stanley Hall, one of the pioneers of American psychology, maintained that academic work would ruin a woman's health and cause deterioration of her reproductive organs. Nevertheless, as early as 1905 the American Psychological Association elected its first female president, Mary Whiton Calkins (Furumoto, 1991). Calkins had earlier been denied a doctorate by Harvard University because of her gender, even though she had completed all the requirements. In these early days of psychology, as in all fields of science, women were pressured to choose between marriage and career. Amazingly, even those who managed a career were usually limited to teaching at women's colleges, positions with less prestige. Still, they made important contributions to their developing field, as you can see in a sampling presented in Table 1.2.

TABLE 1.2 Early Contributions Made by Women in Psychology

	Research Area	Institutional Affiliation
Christine Ladd Franklin	logic and color vision	Johns Hopkins University
Kate Gordon	memory and attention	Mt. Holyoke, Carnegie Tech.
Julia Gulliver	dreams and the subconscious self	Rockford University
Alice Hinman	attention and distraction	University of Nebraska
Lillien Martin	psychophysics	Wellesley College
Anna McKeag	pain	Bardwell School
Naomi Norsworthy	abilities of the child	Columbia Teachers College
Millicent Shinn	child development	unaffiliated
Helen Thompson	mental traits	Mt. Holyoke College
Margaret Washburn	perception	Vassar College
Mabel Williams	visual illusions	unaffiliated

Source: The 1906 edition of *American Men of Science*.

PSYCHOLOGY IN YOUR LIFE: PSYCHOLOGY AS A MAJOR

Becoming a full-fledged psychologist requires substantial training beyond the bachelor's degree. The psychology graduate student takes advanced classes in one or more specialized areas and develops skills as a scholar, researcher, or even practitioner. Upon completion of the program, the student receives a master's or doctor's degree, typically a PhD (Doctor of Philosophy), an EdD (Doctor of Education), or a PsyD (Doctor of Psychology).

Satisfying careers are available, however, at various levels of education in psychology. In most states, a license to practice psychology requires a graduate degree (usually a doctorate) and a supervised internship. Most college and university teaching or research jobs in psychology also require a doctorate.

A master's degree, typically requiring two years of study beyond the bachelor's level, may qualify you for employment as a psychology instructor at the high school level or as an applied psychologist in certain specialties, such as counseling. Master's-level psychologists are common in human service agencies, as well as in private practice (although many states do not allow them to advertise themselves as "psychologists"). In addition, many practitioners with master's degrees in the related field of social work offer therapy for emotional problems.

Holders of associate degrees and bachelor's degrees in psychology or related human services fields may find jobs as psychological aides and technicians in agencies, hospitals, nursing homes, and rehabilitation centers. If this is your goal, however, you should know that salaries at this level are relatively low (Kohout, 2000). A bachelor's degree in psychology, coupled with training in business or education, can also lead to interesting careers in personnel management or education.

Aside from studying to be a psychologist, some students aspire to be psychiatrists. To become a psychiatrist, a student must graduate from college, go to medical school for an MD (Doctor of Medicine), and then complete an extensive residency and training program. It takes about the same amount of time to become a psychiatrist as to become a psychologist, but psychiatrists and psychologists serve different purposes. Only psychiatrists can engage in "true" psychoanalysis or prescribe medication.

If you would like further information about job prospects and salary levels for psychologists, the U.S. Department of Labor's *Occupational Outlook Handbook* is a good place to start. Your high school's career or counseling center probably has a copy.

CHECK YOUR UNDERSTANDING

1. **APPLICATION:** Which of the following approaches to psychology would say that the differences between the behavior of males and females are the result of different survival and reproduction issues faced by the two sexes?
   a. psychoanalytic theory
   b. evolutionary/sociobiological psychology
   c. the trait view
   d. the sociocultural perspective
   e. the biological view

2. **RECALL:** Mental processes such as perception, thinking, and remembering are sometimes called
   a. social cues.
   b. affective events.
   c. neural nets.
   d. dependent variables.
   e. cognition.

(*continues*)

3. **APPLICATION:** If you were a teacher trying to understand how students learn, which of the following viewpoints would be most helpful?
   a. the cognitive view
   b. psychoanalytic theory
   c. evolutionary psychology
   d. the trait view
   e. the developmental view

4. **UNDERSTANDING THE CORE CONCEPT:** In which one of the following sets are *all* factors associated with the perspective indicated?
   a. memory, personality, environment: the behavioral perspective
   b. changes through the lifespan, changes as the result of mental disorders, changes a result of social pressure: the developmental perspective
   c. mental health, mental disorder, mental imagery: the trait perspective
   d. neuroscience, evolutionary psychology, genetics: the biological perspective
   e. sensation, perception, memory: the psychoanalytic perspective

ANSWERS: 1. b 2. e 3. a 4. d

USING PSYCHOLOGY TO LEARN PSYCHOLOGY

Studying with Key Questions and Core Concepts

In this book, your authors have attempted to help you find meaningful patterns that will aid you in making a mental map (sometimes called a *cognitive map*) of every chapter. To do so, we have built in many learning devices. Among the most important are the Key Questions and the Core Concepts. Let us show you how using these features can make your study of psychology easier.

The Key Questions, which take the place of the familiar section headings in each chapter, give you a "heads up" by signaling what to watch for as you read. For example, one of the Key Questions from this chapter asked, "What are the perspectives psychologists use today?" It alerted you to the idea that psychologists have some special ways of looking at mind and behavior that are different from those used in the past. You are much more likely to remember these new concepts if you approach them with an appropriate question in mind (Bransford et al., 1986; Brown & Campione, 1986; Glaser, 1984). You can also use the Key Question as a review-check of your understanding of each section before the next test. If you have a study partner, try asking each other to give detailed answers to the key questions.

You can think of Core Concepts as brief responses to the Key Questions. They also highlight the central idea in each chapter section—as previews of coming attractions. It is important to realize that a Core Concept is not a complete answer but a capsule summary of ideas to be fleshed out. As you come to understand the meaning of a Core Concept, you will see that the details of the section—the terms, names, and important research—will fall easily into place. And to reinforce your understanding, it is a good idea to revisit the Core Concept after you have finished reading the section. In fact, this is precisely what the brief end-of-section quizzes (Check Your Understanding) are designed to do.

Another good way to use the Core Concepts is to see if you can explain how the terms in boldface link to the Core Concepts. Let's take the second Core Concept in this chapter, which says;

> Modern psychology developed from several conflicting traditions, including structuralism, functionalism, Gestalt psychology, behaviorism, and psychoanalysis.

Can you explain, for example, how the term *introspection* is related to this Core Concept? (Sample answer: Only the behaviorists, among the historical schools in psychology, refused to use introspection because it was subjective.)

Together, then, the Key Questions and Core Concepts are designed to pose important questions that lead you to the big ideas in the chapter. They will help you step back from the details to see meaningful patterns.

Chapter

2

Research Methods

YUMI AND MARIA WERE TWO teenage girls from similar suburban backgrounds who grew up together and attended the same schools. Intrigued by their psychology class discussions, Yumi, of Japanese descent, and Maria, of European/American descent, began contemplating whether the differences in their heritage affected their views on personal issues.

The teens were determined to find out if Japanese and American teenagers viewed body image and health issues differently. Specifically, they wanted to know if either group perceived themselves as heavier or thinner; whether or not there were differences in the perceptions of body image between the two groups; and whether there were any differences between body image and health among the groups.

Admittedly a complicated quest, the teens first looked around for existing information to answer these questions. Finding none, the girls decided to conduct their own research. So, how did two teenagers from Washington, D.C. go about finding answers to their questions? They used a scientific approach. Beginning with their initial discussions, the identification of their questions, the review of available research, and on through the creation of a survey, analysis of the results, and a review of their methodology, Yumi and Maria employed the basic methods of science—the same principles and processes psychologists use everyday to answer their own questions, test their own theories, and gain knowledge. The scientific method, whether conducted by teenagers to answer personal questions about their peers, or conducted by psychologists, is our focus in this chapter.

HOW DO PSYCHOLOGISTS DEVELOP NEW KNOWLEDGE?

As early as 1880, psychologists were challenging the claims of spiritualists and psychics (Coon, 1992). But even today, psychology continues to dispute the unfounded claims of *pseudoscience*, which seem to blossom faster than they can be nipped in the bud. Modern sources of questionable psychology include practitioners of astrology, palmistry, graphology, biorhythm analysis, and any number of psychics, seers, and prophets who claim to have special insights into people's personalities and to be able to predict their futures.

But what makes psychology different from the pseudoscientific approaches to understanding people? Answer: None of the pseudosciences has survived trial by the *scientific method*, which is a way of rigorously testing ideas against objective observations. Instead, pseudoscience is based on mere speculation and anecdote—and on human gullibility.

You might think this a snobbish view for psychologists to take. Why can't we make room for many different approaches to the understanding of people? In fact, we do. Psychologists have no problem with sociology, anthropology, and psychiatry, for example, as partners in the enterprise of understanding people. Psychologists reject only those approaches that claim to have "evidence" but offer only anecdotes and testimonials.

What, then, makes psychology a real science? Again, it's the *method*. As our Core Concept for this section says:

CORE CONCEPT

Psychologists, like researchers in all other sciences, use the scientific method to test their ideas empirically.

What is this marvelous method? Simply put, the **scientific method** is a process for putting ideas to an objective pass–fail test. At the heart of this testing procedure is **empirical investigation**, the collecting of objective information firsthand by making careful measurements based on direct experience. Literally, *empirical* means "experience based"—as contrasted with speculation based solely on faith, hope, authority, or common sense. To investigate a question empirically is to collect evidence yourself, rather than relying solely on a logical argument or appealing to the opinion of "experts." Ultimately, a main goal of psychological science is to develop explanations for behavior and mental processes—explanations based on solid empirical studies. We call these explanations *theories*.

CONNECTION: CHAPTER 6

Social learning is acquiring a new behavior by watching others and seeing how they are rewarded and punished for their behavior.

In brief, a **theory** is a testable explanation for a set of facts or observations (Kerlinger, 1985; Kukla, 1989). Please note that this definition may be quite different from the way you customarily use the term. In everyday language, "theory" can mean "wild speculation" or a mere "hunch"—an idea that has no evidence to support it. "It's only a theory," people may say. But *theory* means something quite different to a scientist. The essence of a scientific theory is its power to explain the facts and its ability to be tested objectively. Some theories have a great deal of evidence to support them, while others are highly speculative. Examples of well-supported theories include Einstein's theory of relativity, the germ theory of disease, Darwin's theory of natural selection, and, in psychology, social learning theory (which we will discuss in Chapter 6).

■ **Scientific method** A five-step process for empirical investigation of a hypothesis under conditions designed to control biases and subjective judgments.
■ **Empirical investigation** An approach to research that relies on sensory experience and observation as research data.
■ **Theory** A testable explanation for a set of facts or observations. In science, a theory is *not* just speculation or a guess.

To illustrate the scientific method in action, we would remind you how Dr. Pfungst put Clever Hans to the test. But to take a more recent example, let's look at a simple and elegant psychological experiment published in the *Journal of the American Medical Association* by . . . a fourth grader (Rosa et al., 1998)! Meet Emily Rosa of Loveland, Colorado. Emily's school science project, it

turned out, challenged a widely held belief in the power of *therapeutic touch* (TT).

In the early 1990s, TT was touted as a medical therapy, and Emily's mother, a nurse, had explained to her how TT practitioners attempted to promote healing by moving their hands over the patient's body without directly touching it. In doing so, they believed that they were detecting and manipulating an energy field radiating from the body. These practitioners claimed they could use TT to treat a wide range of medical and psychological problems—from colic to cancer and arthritis to depression (Gorman, 1999). So effective was it believed to be that the technique was being taught in more than 100 colleges and universities in 75 countries and used by nurses in at least 80 U.S. hospitals.

Emily Rosa's experiment

But did it really work, or was it just another example of flawed common sense? Emily Rosa suspected that TT practitioners were really detecting their own beliefs and expectations, rather than a "human energy field." So she put their claims to a simple experimental test, the details of which we will use to illustrate the scientific method.

The Five Steps of the Scientific Method

Testing any scientific assertion requires five steps. (See Figure 2.1.) These steps are essentially the same whether the study involves psychology, biology, chemistry, astronomy, or any other scientific discipline. Thus it is the *method* that makes these fields scientific, not their subject matter. Ideally, a researcher (such as Emily Rosa) who follows the scientific method will proceed as follows.

Developing a Hypothesis The first step calls for coming up with a testable idea, or prediction. Scientists call this prediction a **hypothesis.** The term literally means "little theory" because it often represents only one piece of a larger

Hypothesis A statement predicting the outcome of a scientific study; a statement describing the relationship among variables in a study.

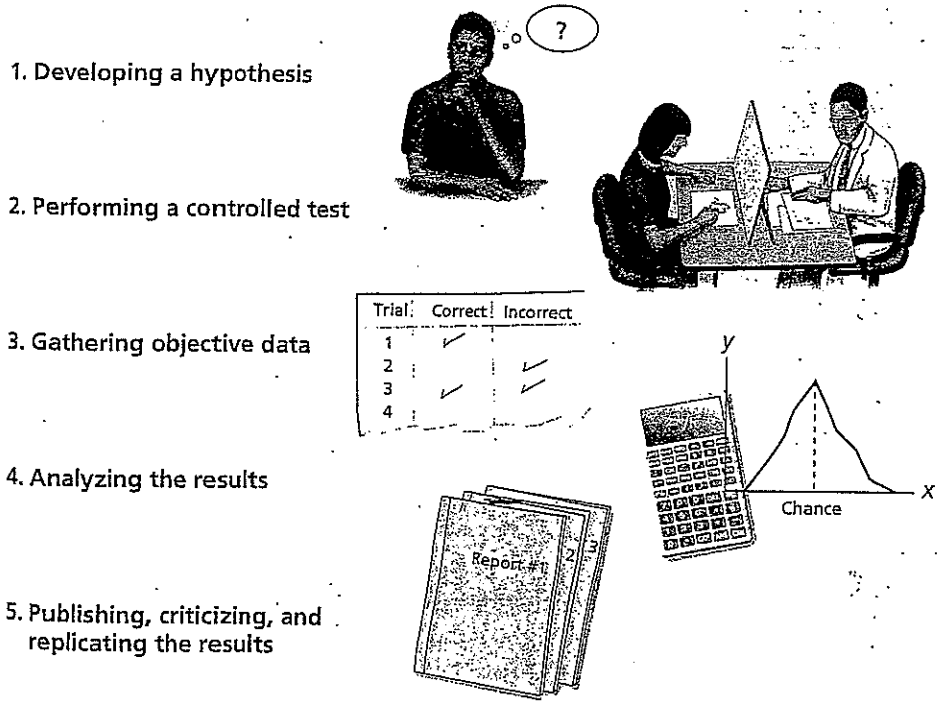


FIGURE 2.1 Five Steps of the Scientific Method

theoretical puzzle. For example, a hypothesis stating that introverted people are attracted to extraverted people might be part of a larger, more complex theory tying together all the factors that affect romantic attraction. Sometimes, however, a hypothesis can be just an interesting idea that piques the scientist's curiosity—as was the case in Emily Rosa's experiment. Her hypothesis came simply from questioning the value of a treatment (therapeutic touch) that everyone "knew" to be effective.

Like any good scientist, Emily stated her hypothesis in such a way that it could be tested and *falsified* (shown to be either correct or incorrect). To make her suspicion testable, Rosa had to follow an ironclad requirement of all scientific research: She had to give **operational definitions** for all the terms in her hypothesis. That is, she had to specify the exact procedures (operations) she would use in setting up the experimental conditions and measuring the results.

Emily wondered: Could TT practitioners accurately sense the presence of her hand when it was placed above one of their hands but out of sight? She hypothesized that they could not. In our earlier example, the study of Clever Hans, Dr. Pfungst also operationalized his hypothesis by stating that the horse could not give the right number of taps with its hoof when it couldn't see its owner or when the owner couldn't see the written questions. Here again, the hypothesis was stated *operationally*—in terms of the procedures that would be used to test it.

So far, so good. But, of course, a scientific study must not stop with a hypothesis. The great failing of pseudosciences like astrology is that they never take the other steps necessary to verify or reject their assertions. Among scientists, however, a hypothesis will be taken seriously only after it has been subjected to rigorous testing.

Performing a Controlled Test A hypothesis must undergo an "ordeal of proof"—a test that it will either pass or fail. Here's how Emily Rosa conducted her test: She invited each of 21 TT practitioners (varying in experience from 1 to 27 years) to determine which of their two hands (thrust, palms up, through holes in a screen) was closest to one of her own hands (held palm down, a few inches from either of the practitioner's hands).

In order to control the conditions of her experiment, Rosa varied only one part of the situation on each trial: whether her hand was above the subject's left or right hand. We call this variable condition the **independent variable (IV)**. Think of the independent variable as a condition that the experimenter changes *independently* of all the other carefully controlled experimental conditions. The independent variable always involves a systematic variation on the conditions that the experimenter is evaluating in a study. In Pfungst's study of Clever Hans, the independent variable involved systematically changing the conditions so that (a) Hans could not see his owner or (b) the owner could not see the questions being asked.

In Rosa's experiment on therapeutic touch, control over the experimental conditions would have been laughable if she had simply held her hand alternately above the volunteers' left and right hands or followed some other predictable pattern. That is, had the volunteers been able to guess which response was correct, the results of the experiment would have meant nothing. The solution was **random presentation** of the stimulus, which meant that chance alone determined the order in which the stimulus was presented. Random presentation is one tool in the experimenter's bag of tricks for controlling expectations that can skew the results of a study. In Rosa's experiment, randomization was achieved by a coin flip, which determined whether she presented her hand above the practitioner's left or right hand. And in Pfungst's study, randomization meant that there was no predictable pattern (such as 2, 4, 6, 8 . . .) in the correct answers to the problems presented to Hans and his trainer.

■ **Operational definitions** Specific descriptions of concepts involving the conditions of a scientific study. Operational definitions are stated in terms of how the concepts are to be measured or what operations are being employed to produce them.

■ **Independent variable (IV)** A stimulus condition so named because the experimenter changes it independently of all the other carefully controlled experimental conditions.

■ **Random presentation** A process by which chance alone determines the order in which the stimulus is presented.

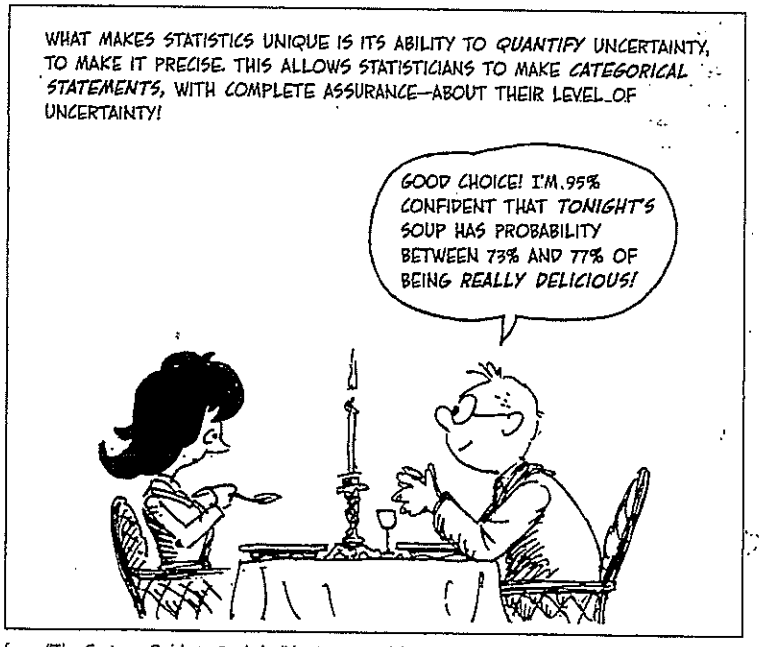
Gathering Objective Data In the third step of the scientific method, the scientist collects objective data: information gathered by direct observation. Such data depend only on the manipulations of the experimental conditions (the independent variable). The data must *not* depend on the experimenter's hopes, expectations, or personal impressions. In Emily Rosa's experiment, the data consisted of the number of correct and incorrect responses during the test—whether the practitioners responded correctly to the placement of her hand. Such responses are referred to as the **dependent variable (DV).** The term comes from the assumption that the responses of participants in an experiment *depend* directly on the conditions to which they have been exposed. As a result, the data will depend on how the independent variable has been manipulated. (You might think of the independent variable as the *stimuli* you are studying and of the dependent variable as the *responses* made by the participants in your experiment.)

In designing an experiment, the dependent variable must also be given an operational definition. That is, the researcher must specify the procedures (operations) that were used in measuring the responses being observed. This is exactly what Emily Rosa did when she described how she required her participants to respond with guesses of "left" or "right." The dependent variable in Pfungst's study consisted of the horse's hoof-tapping response to each question presented.

Analyzing the Results and Accepting or Rejecting the Hypothesis In the fourth step of the scientific method, the researcher examines the results (the data) to see whether the hypothesis survived the test. Based on that analysis, the hypothesis is accepted or rejected. Making this determination usually necessitates some special mathematical tools, particularly if the data require a close call. Statistical analysis can tell the researcher whether the observed results rise to the level of *significance*—that is, whether the results are likely due to the independent variable or merely due to chance.

A detailed explanation of statistics is beyond the scope of this book. In fact, it's a subject for a whole course in itself. But to give you a glimpse of this world, the second part of this chapter offers a brief introduction to statistics.

■ **Data** Pieces of information, especially information gathered by a researcher to be used in testing a hypothesis. (Singular: *datum.*)
■ **Dependent variable (DV)** The measured outcome of a study; the responses of the subjects in a study.



from "The Cartoon Guide to Statistics" by Larry Gonick & Wollcott Smith

There you will find a summary of key points and examples of how psychological concepts are *quantified* (measured and expressed as numbers) and how those quantities can provide meaning and understanding.

In Rosa's experiment, the statistical analysis was remarkably simple. The chances of getting a correct answer merely by guessing were 50%. That is, half the time the TT practitioners could be expected to give the right answer, even if they had no ability to sense the "human energy field." Accordingly, Rosa set this standard: Her subjects would have to perform significantly above the chance level to support the claim that they can detect a "human energy field." They did not, so she concluded that practitioners of therapeutic touch were not sensing human energy fields.

Much the same analysis applied to Pfungst's study, where the chance level of correct responses would be near zero, and *any* consistent level of correct responses would have supported the hypothesis that Clever Hans could read and calculate. That hypothesis, however, was rejected, because Hans's responses were incorrect when cues from his owner were controlled.

Publishing, Criticizing, and Replicating the Results In the fifth step of the scientific method, researchers must find out whether their work can withstand the scrutiny and criticism of the scientific community. To do so, they might communicate their results to colleagues by publishing them in a professional journal, presenting a paper at a professional meeting, or writing a book. (You may recall that Emily Rosa published her results in the *Journal of the American Medical Association.*) Then they wait for the critics to respond.

If colleagues find the study interesting and important—and especially if it challenges a widely held theory—they may look for flaws in the research design: Did the experimenter choose the participants properly? Were the statistical analyses done correctly? Could other factors account for the results?

Some critics complained that Rosa's experiment was not an accurate representation of the conditions under which therapeutic touch is done: They claimed that TT depends on the transfer of emotional energy during a medical crisis, and because Emily was not sick she didn't have disturbances in her energy field that could be detected by TT practitioners.

Critics could have checked Rosa's work by *replicating* it. To **replicate** her experiment they would redo it, perhaps under slightly different control conditions, to see whether they would get the same results. But as far as we know, Rosa's experiment was never replicated. (Nor was Pfungst's.) At this point, then, we can say that Rosa's experimental results have withstood the scientific test. We should also note that Emily's research earned her a check for $1000 from the Skeptics Society. She also received a plaque from the *Guinness Book of Records* for being the youngest researcher to have a paper published in a major medical journal.

Criticism and replication of research are a part of a thorough, and sometimes intimidating, screening process that goes on behind the scientific scenes to filter out poorly conceived and executed research. As a result, fewer than 2% of the papers submitted to psychological journals get into print without major revisions. In fact, the majority never see print at all (Eichorn & VandenBos, 1985). Journal editors and book publishers (including the publishers of this book) routinely seek the opinion of several expert reviewers for each submission before agreeing to publish it. Different reviewers often focus their criticism on different facets of the study (Fiske & Fogg, 1990). As a result, the author usually receives helpful, if sometimes painful, suggestions for revision. Only when a hypothesis has survived all these tests will editors put it in print and scholars tentatively accept it as scientific "truth." We should emphasize, however, that scientific findings are always tentative—forever in

■ **Replicate** In research, this refers to doing a study over to see whether the same results are obtained. As a control for bias, replication is often done by someone other than the researcher who performed the original study.

jeopardy from a new study that might require a new interpretation and relegate previous work to the scientific scrap heap. Granted, it is an imperfect system, but it is the best method ever developed for testing ideas about the natural world.

Types of Psychological Research

Everything we have ever learned is because of an experiment. Whether we conducted it ourselves or learned it from someone else, it came from an experiment. Some experiments are intentional, such as Newton's experiment to determine the force of gravity or Franklin's discovery of electricity, and some are accidental, such as the discovery of penicillin or how we learned that the stove was hot.

Clearly, research is an essential component of our everyday lives. To be fair, however, not all research is created equal. We look at two methodologies: the experiment, and a variety of quasi-experimental methods. The experiment is probably what first comes to mind when we think of research methodology.

Experimental Method There are many ways to approach the experimental method. Perhaps the best way is to examine the steps in designing an experiment. Table 2.1 lists the components of the research process for an experiment.

The first step in the research process begins with basic inquiry—that is, getting a research idea. What makes you curious? Is there a particular phenomenon that you wonder about, such as learning or remembering? Developing a research question involves generating an hypothesis that is testable, verifiable, and refutable. To determine these things you have to read the literature on your research idea. Some of it can be hard to find, and sometimes it is necessary to narrow down your topic.

After you have developed your hypothesis, you will need to establish your variables. In an experiment we look at three types of variables: independent, dependent, and extraneous (confounding). The independent variable (IV) is the one that the experimenter controls. For example, if you were to conduct an experiment on the effect of light on plant growth, the amount of light provided would be the IV. The dependent variable (DV) is what we measure. In that plant experiment, the amount of growth of the plant is the DV. **Confounding** or **extraneous variables** are other things that can affect the outcome of the experiment. In our example, you would have to ensure that no extra light reached your plants (other than what you specified in your design).

■ **Experiment** A kind of research in which the researcher controls all the conditions and directly manipulates the conditions, including the independent variable.

■ **Confounding** or **extraneous variables** Variables that have an unwanted influence on the outcome of an experiment.

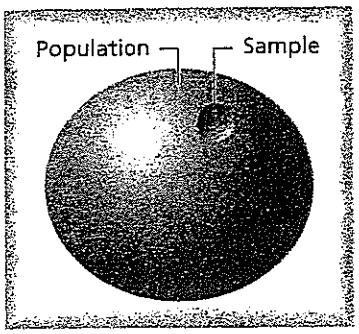
■ **Controls** Constraints that the experimenter places on the experiment to ensure that each subject has the exact same conditions.

The next task is to ensure that you have **controls**—that is, to ensure that all groups in the experiment are treated exactly the same, except for the IV. In the plant experiment, you would have to ensure that all the plants received the same amount of water, were the same species and age, were exposed to the same temperature, and so on. All of these precautions are necessary so that we can be certain that the data we get at the end of the experiment can be replicated and that our conclusions are valid.

Following the development of your procedures, variables, and controls, you will need to select your subjects. Subjects are drawn from a population, which consists of everyone who fits the description of your test group. For example, if we wanted to test how high school students learn, our population would be all high school students. It would be impossible to test every single high school student, so to compensate for that, we would take a representative sample of the population. (See Figure 2.2.)

TABLE 2.1 Components of the Research Process

Developing a research question
Surveying the literature
Hypothesis
Independent variable (IV)
Dependent variable (DV)
Extraneous variables
Controls
Sampling/Subjects (random assignment to groups)
Procedure
Results/Statistics
Discussion



● **FIGURE 2.2** A representative sample consists of randomly selected individuals who accurately represent the targeted population.

To do that we would randomly select individuals who accurately represent the population of high school students. This is a time-consuming and costly process, but it ensures that that our data will reflect the results we would get if we tested everyone. The ability to choose anyone from the population is referred to as random selection.

Another key thing to keep in mind is that every subject of an experiment must have an equal chance of being in the experimental group (which receives the IV) or the control group (which receives either a placebo or nothing). This is called **random assignment.** Each member of the sample has an equal likelihood of being chosen for the experimental group.

Once the subjects have been selected and assigned, the experiment can begin. Carefully following the procedures laid out in the research design, experimenters conduct their experiment. In their design, they must account for, and try to control, as many aspects of the experiment as possible. The reason for this is to try to remove the influence of outside influences on the experiment. As we have seen, these influences are called *extraneous variables*. The use of controls limits the influence of these so that the results of the experiment accurately reflect what is being tested.

At the conclusion of the experiment, data is collected and subjected to statistical analysis.

Non-Experimental Methods Given that experiments—painstakingly applied—can yield true cause-and-effect statements about a situation, why wouldn't we always do experiments? There are times when we cannot do so for ethical or practical reasons. Take, for example, research on cancer. To conduct a true experiment on a possible cure for lung cancer, we would have to give people lung cancer and then try to cure it. This, of course, would be morally indefensible. Instead, we would choose subjects based on the preexisting condition of having lung cancer, and try to cure them. This design is a *non-experimental* design.

Non-experimental methods can yield useful data. But, they are just not true experiments because they are missing a component of the experiment, usually in the area of controls. Of the seven non-experimental methods listed in Table 2.2, none should be disregarded; rather, all of them need to be applied carefully and with a great deal of planning.

Take the cancer experiment mentioned above. This design, in which we choose subjects on the basis of a preexisting condition, is called **ex post facto** research. We chose this method mainly in response to ethical considerations. Because our treatment for lung cancer is not guaranteed (it is being tested), the treatment might not work. In addition, ethical considerations arise in *not* giving someone the best possible treatment!

■ **Random assignment** Each subject of the sample has an equal likelihood of being chosen for the experimental group of an experiment.
■ **Ex post facto** Research in which we choose subjects based on a pre-existing condition.
■ **Correlational study** A type of research that is mainly statistical in nature. Correlational studies determine the relationship (or correlation) between two variables.

TABLE 2.2 Seven Non-Experimental Methodoligies

Ex-post facto design
Correlation study
Survey
Naturalistic observation
Longitudinal study
Cross-sectional study-
Cohort-sequential study

Correlational Studies An alternative "quasi" design is called a **correlational study.** What we are doing here is seeing the relationship (or correlation) between two variables. For example, when the surgeon general first began telling people that smoking and lung cancer were related, that statement was based on the correlation between people who smoke and the incidence of lung cancer among those people. Not everyone who smokes gets lung cancer, and not everyone who gets lung cancer smokes, but there is a very high correlation between smoking and lung cancer. As scientists often put it, *correlation does not necessarily mean causation.*

Scientists usually express the degree of correlation as a number. This requires calculating a statistic known as the *correlation coefficient*, often symbolized in formulas as the letter r. The correlation coefficient sum-

marizes the relationship between the two variables. It can range from a negative number as low as −1.0 to a positive number as high as +1.0.

We won't go into the details of calculating the correlation coefficient here. The important idea is to develop a feeling for what *positive correlation, negative correlation,* and *zero correlation* mean. If the variables have no relationship at all, their correlation is 0. You would expect a zero correlation between shoe size and GPA, for example. If, however, the two variables show a relationship in which they vary in the same direction (as the values of one variable increase, so do those of the other), then we say they have a positive correlation. An example of a positive correlation is the moderate relationship (approximately +0.4) between SAT scores and college grades.

It is important to understand that *a correlation can show a strong relationship even when it is negative.* Let us suppose that a measure of anxiety (such as a checklist of anxiety-related symptoms) shows a correlation of −0.7 between anxiety and time spent studying. In other words, more study is associated with less anxiety. Even though this is a negative correlation, it shows a *stronger* relationship than, for example, the positive correlation between SAT scores and grades (+0.4).

Another research method is the **survey.** Again, a survey is not a true experiment, but if conducted correctly, it can yield useful data. When designing a survey, the researcher must take great care to make sure the questions are not skewed or biased toward a particular answer. Also, when comparing survey results, one needs to go back and look at both surveys to make sure that the questions and answer scales are parallel. You need to be certain that questions were being asked the same way in order to be able to compare the results and draw conclusions. We will give a detailed example of the survey method later in the chapter.

In **naturalistic observation,** subjects are observed in their natural environment. This method is a good choice for studying, say, child-rearing practices, people's shopping habits, or public courting behaviors. In order to remove demand characteristics, which are cues the experimenter inadvertently gives that tell the subject what "good" results are, the subjects in a naturalistic observation should not know they are being observed. This ensures that the behavior being observed is the actual behavior in its natural state. This approach is also used extensively to study animal behavior in the wild. (Jane Goodall used it in her classic studies of chimpanzee culture.) Because a researcher merely observes, rather than controlling the conditions or manipulating the independent variable, naturalistic observations are made under far less controlled conditions than experiments.

What if you wanted to investigate the long-range effects of something? The type of research you might be most interested in is called a **longitudinal study.** In this type of study, one group of subjects is followed and observed (or examined, surveyed, etc.) for an extended period of time, such as 20 years. The benefit of this research is that you have the same subject group throughout. The drawbacks are time and expense.

The next two methodologies were developed to avoid the time and expense of the longitudinal study. The **cross-sectional study** examines a representative cross section of the population and tests/surveys these subjects at one specific time. This will yield data similar to longitudinal data but not so accurate. The **cohort-sequential study** yields better data. Here the investigators take a cross section of the population and then follow each *cohort* or group for a short

■ **Survey** A quasi-experimental method in which questions are asked to subjects. When designing a survey, the researcher has to be careful that the questions are not skewed or biased toward a particular answer.

■ **Naturalistic observation** A research method in which subjects are observed in their natural environment.

■ **Longitudinal study** A type of study in which one group of subjects is followed and observed (or examined, surveyed, etc.) for an extended period of time (years).

■ **Cross-sectional study** A study in which a representative cross section of the population is tested or surveyed at one specific time.

■ **Cohort-sequential study** A research method in which a cross section of the population is chosen and then each cohort is followed for a short period of time.

● Jane Goodall used the method of naturalistic observation to study chimpanzee behavior.

period of time. This study can take less time than the longitudinal design, is much less susceptible to bias, and therefore yields more accurate data than a cross-sectional study.

Sources of Bias in Research (or Anywhere Else)

Think of an issue on which you have strong feelings and opinions—perhaps abortion, euthanasia, or capital punishment. On such topics, our emotions make it difficult to reason objectively. Likewise, emotionally loaded topics can bring out biases that affect the ways an experimenter designs a study, collects the data, or interprets the results. Fortunately, the scientific method, with its public procedures and openness to replication, provides a powerful means to check on an experimenter's bias. Still, scientists would rather save themselves embarrassment by identifying and controlling their biases before they hit print. Here are some forms of bias to which they must be alert.

Personal bias involves an individual's beliefs, preferences, assumptions, or prejudices. Often these are not obvious to the individual holding such biases. For example, in his book *Even the Rat Was White,* psychologist Robert Guthrie (1998) points out the personal bias in the long tradition of using mainly white subjects in psychological research. Whatever form it takes, personal bias can cause scientists to notice only the evidence confirming their hypotheses and to ignore contrary data.

Expectancy bias also affects observations when observers expect—and look for—certain outcomes. We can see expectancy bias at work in a classic study in which psychology students timed groups of rats running through a maze (Rosenthal & Jacobson, 1968a). The experimenters told some students that their rats were especially bright; other students heard that their rats were slow learners. (In fact, the experimenters had randomly selected both groups of rats from the same litters.) Amazingly, the students' data showed that rats believed to be bright outperformed their supposedly duller littermates.

These sources of bias not only can lead to erroneous conclusions but also can be expensive. Imagine that you are a psychologist working for a pharmaceutical company that wants you to design a test for a new drug. With millions of dollars riding on the outcome, you will want to do it right. But what about the doctors who are going to be prescribing the drug to patients in your study? Surely those doctors will have high hopes for the drug, as will their patients. And so the stage is set for bias to creep into your study along with people's expectations.

We have seen that a common strategy for controlling expectancy bias in a drug study is to keep participants in the research experimentally "blind," or uninformed, about whether they are getting the real drug or a placebo. An even better strategy is to keep *both* the participants and the experimenter clueless about which group receives what treatment. In a drug study, this would mean that neither the researchers nor the participants would know (until the end of the study) which individuals were getting the new drug and which were getting the placebo. Such a research strategy is called a **double-blind study.** This strategy ensures that the experimenters will not inadvertently treat the experimental group differently from the control group, so that neither group will have any idea about the expected response to the pills they are taking.

Aside from these forms of observer bias, researchers must also try to identify other possible influences on the behavior being studied—influences other than the independent variable. Such *confounding variables* are factors that could be confused with the independent variable and thus distort the results. Consider, for example, a study of a stimulant drug (such as Ritalin) used to control hyperactive behavior among schoolchildren. What might be some confound-

■ **Personal bias** The researcher allowing personal beliefs to affect the outcome of a study.

■ **Expectancy bias** The researcher allowing his or her expectations to affect the outcome of a study.

■ **Double-blind study** An experimental procedure in which both researchers and participants are uninformed about the nature of the independent variable being administered.

ing variables? The drug's effect might differ because of different body weights, eating schedules, or time, method, or setting of administration. Unless arrangements are made to control all such possible confounding variables—that is, to expose all the subjects to identical conditions—the researcher has no way of knowing which factors really produced the results.

CONNECTION: CHAPTERS 5 AND 15

Paradoxically, stimulants seem to calm hyperactive behavior in children with ADHD.

Ethics in Research

Ethical considerations are an overarching component of all research. These issues range from the basic question "Should the research be conducted?" (as is being argued today regarding the use of stem cells) to questions such as "Should research be approved even if there is no direct application for it?" (in essence, the issue of basic versus applied research). Dess and Foltin (2005) pose seven questions involving what they call the "Ethics Cascade" (see Table 2.3).

The questions posed here are not simple, nor are their answers. Ethical guidelines such as the APA's "Ethical Principles of Psychologists and Code of Conduct" (2002) must be followed in the conduct of *all* research. Each research institution must have an **Institutional Review Board (IRB)** that reviews and approves all research. In addition, animal research must also be approved by an **Institutional Animal Care and Use Committee (IACUC).** Gruber (2005) also points out that all animal research must comply with the *ABCs of laboratory animal research* (Appropriate, Beneficial, and Caring).

IACUCs and IRBs are put in place to ensure not only that researchers and institutions comply with federal, state, and local laws and regulations, but also that all research is conducted ethically and humanely. No researcher takes his or her work lightly, and the ethics involving all research—be it human or animal—is serious indeed.

Deception The use of *deception* poses an especially knotty problem. The APA's "Ethical Principles" states that under most circumstances, participation in research should be voluntary and informed. That is, we should advise volunteers of what challenges they will face and give them a real opportunity to drop out of the study if they want to. But what if you are interested in the "good Samaritan" problem—the conditions under which people will help a stranger in distress? If you tell people that you have contrived a phony emergency situation and ask them whether they are willing to help, you will spoil the very effect you are trying to study. Consequently, the guidelines do allow for deception under some conditions, provided that no substantial risks are likely to accrue to the participants.

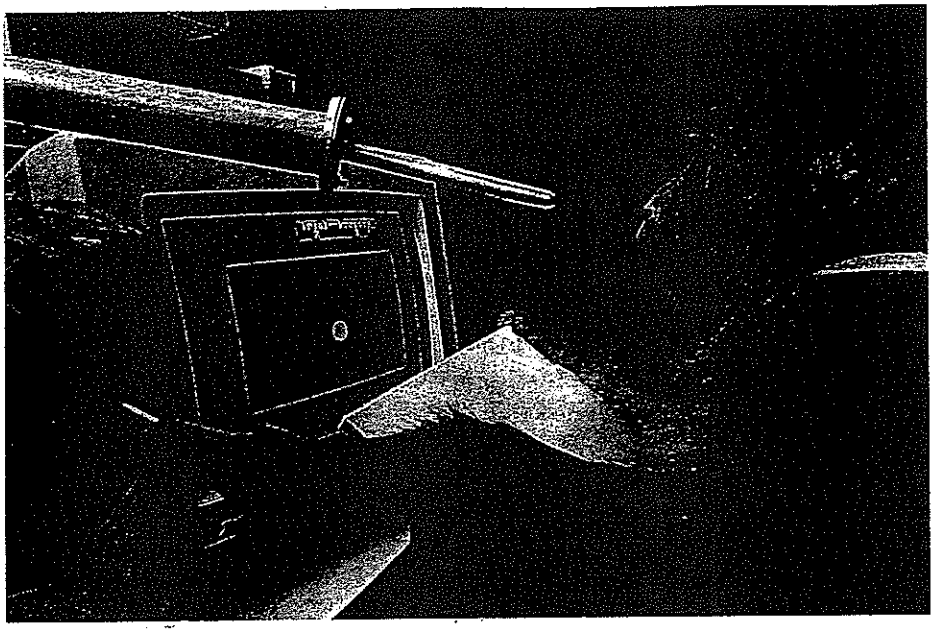
■ **Institutional Review Board (IRB)** A committee at each institution where research is conducted to review every experiment for ethics and methodology.

■ **Institutional Animal Care and Use Committee (IACUC)** A committee at each institution where research is conducted to review every experiment *involving animals* for ethics and methodology.

TABLE 2.3 Summary of Steps in the Ethics Cascade

I. Who should decide what is morally justifiable in the conduct of research?
II. Are controlled research studies ever necessary or appropriate?
III. Should all research have a foreseeable practical benefit?
IV. At whom should research be directed?
V. What specific topics are worthy of research?
VI. What particular research methodologies are scientifically valid, as well as ethically appropriate?
VII. Of the valid methods, which should be used?

Source: From LABORATORY ANIMALS IN RESEARCH AND TEACHING, Ethics, Care, and Methods edited by Chana K. Akins, Sangeeta Panicker, Christopher L. Cunningham. Chapter 2, The Ethics Cascade, Nancy K. Dess and Richard W. Foltin. APA Press, Washington, DC, 2004, reprinted with permission.



● People are sharply divided on the use of laboratory animals in research.

When deception is used, the APA guidelines require that participants be informed of the deception as soon as is possible without compromising the study's research goals. Individuals used in deceptive research must also be *debriefed* after the study to make sure that they suffer no lasting ill effects. Despite these precautions, some psychologists remain opposed to the use of deception in any form of psychological research (Baumrind, 1985; Bower, 1998d).

Animal Studies Another long-standing ethical issue surrounds the use of laboratory animals, such as rats, pigeons, and monkeys. As far back as the mid-1800s, scientists used animals in their research for a variety of reasons. These included the relative simplicity of animals' nervous systems and the relative ease with which a large number of individuals could be maintained under controlled conditions. Animals have also served as alternatives to human subjects when a procedure was deemed risky or outright harmful. Concerned about the issue as long ago as 1925, the American Psychological Association established a Committee on Precautions in Animal Experimentation, which adopted guidelines for animal research (Dewsbury, 1990). The American Psychological Association's "Ethical Principles of Psychologists" (2002) directs researchers to provide decent living conditions for animal subjects and to weigh any discomfort caused them against the value of the information sought in the research. A 1985 federal law also imposes legal restrictions on animal research (Novak & Suomi, 1988).

Recent years have seen a renewal of concern, both inside and outside of psychology, about the use of animals as subjects, particularly when the research involves painful or damaging procedures, such as brain surgery, electrode implants, and pain studies. Some people feel that the limitations should be more stringent on studies using humanlike animals, such as chimpanzees. Others believe that limitations or outright bans should apply to all animal research, including studies of simple animals such as sea slugs (which are often used in neurological studies). Many psychologists, however, support animal research under the APA guidelines (Blum, 1994). Heated debate about this issue continues.

TABLE 2.4 What Questions Can the Scientific Method *Not* Answer?

The scientific method is not appropriate for answering questions that cannot be put to an objective, empirical test. Here are some examples of such issues:

Topic	Question
Ethics	What are the ethical issues involved in animal research?
Values	Which culture has the best attitude toward work and leisure?
Morality	When is it morally acceptable to go to war?
Preferences	Is rap music better than blues?
Aesthetics	Was Picasso more creative than Van Gogh?
Existential issues	What is the meaning of life?
Religion	How do people of faith explain natural disasters?
Law	What should be the speed limit on interstate highways?

Although science can help us understand such issues, the answers ultimately must be settled by logic, faith, legislation, consensus, or other means that lie beyond the scope of the scientific method.

Questions Science Cannot Answer

It is important to understand that science is not the best approach for finding answers to every important question in our lives. Even scientists don't take a scientific approach to everything. The scientific method is merely the best way to find answers to testable questions about the natural world—the world of atoms and animals, of stones and stars, and of behavior and mental processes. On the other hand, science is *not* appropriate for answering questions that cannot be empirically tested—such as questions of ethics, morality, religious beliefs, or preferences. To see what we mean, please look at Table 2.4, which shows some of the questions that science can never answer.

PSYCHOLOGY IN YOUR LIFE: GETTING IN DEEPER

Whatever your intended major field of study, you will want to learn more about the professional role your chosen field will expect you to play. You can do this in several ways: by attending events sponsored by your major department, by getting to know your professors personally, and by taking out student memberships in professional organizations. You should also develop a habit of scanning the field's main magazines, journals, and newsletters. For those readers who are considering a major in psychology, we suggest that you investigate the following resources.

Professional Organizations in Psychology The largest and oldest professional association for psychologists, the American Psychological Association (APA), has well over 150,000 members and affiliates (American Psychological Association, 2004). The American Psychological Society (APS) was formed just a few years ago to give a stronger voice to academic and research psychologists. Although the APS is a much smaller organization, it has won wide respect; many psychologists belong both to the APA and to the APS.

These groups have student memberships that include nearly all privileges at a fraction of full membership costs. If you are thinking of majoring in psychology, ask your instructor for information about student membership in a

● Dr. Phil Zimbardo, one of your authors, served as president of the American Psychological Association in 2002.

professional psychology association. Also consider attending a state, regional, or national convention to get a better sense of what psychologists are really like. These conventions also offer an opportunity for students to present their own research. You could do so, too.

Consider, also, joining a student psychology group, if your school has one. If none is available, you may be able to organize a psychology club or a chapter of a national honorary society, such as Psi Beta (at a two-year college) or Psi Chi (at a four-year college or university).

Psychology-Related Journals and Magazines Professional groups sponsor newsletters or journals that help keep their members abreast of new developments in the field. Psychology majors should begin looking over a few of the main ones every month. Some publish general-interest articles; others contain highly technical reports tailored for those with specialized advanced training. We suggest taking your first plunge into the psychological literature with one or more of these:

- *Monitor on Psychology*—the monthly news magazine of the APA
- *Current Directions in Psychological Science*—a semimonthly APS journal that provides short reviews on trends and controversies in all areas of psychology
- *American Psychologist*—the flagship journal of the APA
- *Psychological Science*—the premiere journal of the APS
- *Whitman Journal of Psychology*—a biannual journal of high school research

In addition, there are several popular magazines in which you may find psychological articles of interest:

- *Discover*—a science magazine written for the general public
- *Scientific American*—another general-interest science magazine
- *Science News*—a weekly magazine consisting of brief blurbs on breaking news in all areas of science, including psychology
- *The Skeptical Inquirer*—a take-no-prisoners, pseudoscience-bashing magazine published by CSICOP, the Committee for the Scientific Investigation of Claims of the Paranormal

Don't feel that you must keep up on the entire psychological literature. Nobody can. Read what interests you in these publications.

Electronic Resources in Psychology The printed psychological literature is vast and growing quickly. As a result, anyone wanting to find out what is known on a special topic must know how to access the information on the Internet and in an electronic database. There are several general databases available, such as Expanded Academic Index and Ebsco Academic Search Elite. The best electronic resource specifically for psychology is PsychInfo, an online computer database offered by the American Psychological Association. Most such resources require a paid subscription, although they may be available through your campus library.

In addition, a huge amount of free information about psychology is available on the Internet. A good place to start looking would be the American Psychological Association's home page on the World Wide Web at http://www.apa.org or the American Psychological Society's home page at http://www.psychologicalscience.org. Remember that Web addresses often change. Remember, also, that anyone can put anything on the Internet, so be skeptical!

CHECK YOUR UNDERSTANDING

1. **RECALL:** A theory is
   a. an unsupported opinion.
   b. a testable explanation for what has been observed.
   c. the opposite of a fact.
   d. a statement that has not yet been supported with facts.
   e. an experimental supposition.

2. **RECALL:** A scientific study should begin with
   a. a controlled test.
   b. a hypothesis.
   c. data collection.
   d. risk/gain assessment.
   e. background reading.

3. **APPLICATION:** Which of the following could be an operational definition of "fear"?
   a. an intense feeling of terror and dread when thinking about some threatening situation
   b. panic
   c. a desire to avoid something
   d. moving away from a stimulus
   e. moving toward a stimulus

4. **ANALYSIS:** The conditions involving the independent variable could also be thought of as
   a. cognitions.
   b. experimenter biases.
   c. responses.
   d. results.
   e. stimuli.

5. **RECALL:** Which is the only form of research that can determine cause and effect?
   a. a case study
   b. a correlational study
   c. an experimental study
   d. a naturalistic observation
   e. a survey

6. **ANALYSIS:** Random assignment of subjects to different experimental conditions is a method for controlling differences between
   a. the dependent variable and the independent variable.
   b. the experimental group and the control group.
   c. empirical data and subjective data.
   d. heredity and environment.
   e. controls and extraneous variables.

7. **RECALL:** In which kind of research does the scientist have the most control over variables that might affect the outcome of the study?
   a. a case study
   b. cohort-sequential study
   c. a correlational study
   d. an experimental study
   e. a naturalistic observation

8. **ANALYSIS:** Which one of the following correlations shows the strongest relationship between two variables?
   a. +0.4
   b. +0.38
   c. −0.7
   d. 0.05
   e. −0.9

9. **ANALYSIS:** Which one of the following is a good method for controlling expectancy bias?
   a. performing a case study
   b. joining a professional organization
   c. consulting the APA's "Ethical Principles of Psychologists and Code of Conduct"
   d. doing a double-blind study
   e. clearly describing the intended results to the subjects

ANSWERS: 1.b 2.b 3.d 4.e 5.c 6.b 7.d 8.e 9.d

HOW DO WE MAKE SENSE OF THE DATA?

KEY QUESTION

A longitudinal study was conducted at Bennington College examining political views of students and how they are influenced by campus culture. This longitudinal study was begun in the 1930's, and continued through 1984. The authors of the study, Alwin, Newcomb, and Cohen, found that students' political views can be profoundly influenced by their campus culture—which should make it interesting for you to think about the climate of political opinion of your current school, and of your future college. Do the students and faculty at your school lean toward the liberal or the conservative end of the spectrum? And are the students at your school typical of their counterparts elsewhere in the country? In the following pages we will use these questions as a starting point for an exploration of the statistical methods psychologists use to make sense of the data they gather in their research.

Every fall, the *Chronicle of Higher Education* publishes its "Almanac Issue," which reports the results of a survey of first-year students at colleges and universities across the country. Table 2.5 shows how a national sample stood on a number of political issues (*Chronicle of Higher Education*, 2004). We will use this survey as the basis for assessing the political attitudes of your classmates and comparing them with those of other students across the United States.

We will begin by converting the items in the national survey into a scale that measures liberal and conservative attitudes. The second step will be to determine how you might use that scale to assess your psychology class or some other sample of students at your college or university. Next, we will show you how the resulting data might be organized and analyzed so that you could compare your own survey results with the national student survey data. In addition, we will discuss how your data could be linked, or *correlated*, with other measures, such as income, gender, or grade-point average. Then, in the final part of this section, we will point out some of the statistical pitfalls into which the unwary researcher may fall.

CORE CONCEPT

Researchers use statistics for two major purposes: (1) descriptively to characterize measurements made on groups or individuals and (2) inferentially to judge whether those measurements are the result of chance.

Statistics can be used in a myriad of ways. Perhaps the most obvious one is through the use of surveys.

Developing Your Own Survey

A look at Table 2.5 reveals that the items on the national survey are written in two different ways. Some questions are worded so that agreement is a "conservative" response. (Item 1 is an example of conservative wording: "There is

TABLE 2.5 National Student Survey Data

Agree strongly or somewhat that:	Conservative/ liberal wording	Agree	Majority response	Liberal response[a]
1. There is too much concern in the courts for the rights of criminals.	Conservative	61.1%	Conservative	38.9%
2. Abortion should be legal.	Liberal	54.5%	Liberal	54.5%
3. The death penalty should be abolished.	Liberal	32.6%	Conservative	32.6%
4. Marijuana should be legalized.	Liberal	38.8%	Conservative	38.8%
5. It is important to have laws prohibiting homosexual relationships.	Conservative	26.1%	Liberal	73.9%
6. The federal government should do more to control the sale of handguns.	Liberal	76.5%	Liberal	76.5%
7. Racial discrimination is no longer a problem in America.	Conservative	22.4%	Liberal	77.6%
8. Wealthy people should pay a larger share of taxes than they do now.	Liberal	53.1%	Liberal	53.1%
9. Same-sex couples should have the right to legal marital status.	Liberal	59.4%	Liberal	59.4%
10. Affirmative action in college admissions should be abolished.	Conservative	52.8%	Conservative	52.8%
11. The activities of married women are best confined to the home and family.	Conservative	21.7 %	Liberal	78.3%
12. Federal military spending should be increased.	Conservative	38.4%	Liberal	61.6%

[a]The score in this column has been converted to the same terms as the Liberal–Conservative Scale (LCS) scoring system. So when the question has been worded conservatively, the LCS score is calculated by subtracting the percentage who agree from 100.

too much concern in the courts for the rights of criminals.") Other items are worded so that agreement is a "liberal" response. (Item 3, for example, is worded in the liberal direction: "The death penalty should be abolished.") Good surveys are constructed in this way to be neutral and to control for the tendency some people have of simply agreeing or disagreeing with each statement.

In Table 2.5 we have indicated on each item whether agreement with the statement indicates a liberal or a conservative attitude. While you may disagree with our judgment about the liberalness or conservativeness of a particular item, it is important to note that you can clearly see what we mean by "liberal" and "conservative" by the way we have designated each item. By doing so, we have given *operational definitions* of the terms *liberal* and *conservative.* Together these items comprise what we will call our Liberal–Conservative Scale (LCS). By administering the LCS to your class, you can not only obtain political attitude scores for students in your class but also compare the class's responses with the national survey data.

To score the responses obtained on the LCS, we will give one point for each of the following "liberal" items with which a respondent *agrees:* 2, 3, 4, 6, 8, and 9. Further, we will give another point for each of the following "conservative" items with which a respondent *disagrees:* 1, 5, 7, 10, 11, and 12. Accordingly, high scores will indicate a liberal tendency, and low scores will indicate a conservative tendency. (There is no value judgment here: Neither a high nor a low score is judged as being better.)

To illustrate how we might use the LCS in a study of students' political attitudes, let's suppose that we have administered the LCS to a class of 50 students. The resulting data (which we have contrived) appear in Table 2.6. By merely counting the questions on which the majority gave a liberal response, we find that our class was more conservative (with conservative majorities on six items) than the national sample (which had liberal majorities on eight items).

Although this is an interesting result, there is much more that can be learned by organizing the data obtained from our survey. Let's first take a look, in the next section, at the *raw data.*

Organizing the Data

In addition to the data showing how students responded on each question, we obtained the following set of LCS scores for the class:

4	4	8	3
3	3	7	9
6	7	8	9
6	6	1	4
3	6	11	8
7	1	8	5
8	7	5	7
1	1	6	5
4	6	10	7
9	8	5	8
2	4	8	4
5	6	2	3
10	2		

TABLE 2.6 Distribution of LCS Responses from a Class of 50 College Students

Agree strongly or somewhat that:	Number of respondents who agree	Agree	Majority response	Liberal response
1. There is too much concern in the courts for the rights of criminals.	36	72%	Conservative	28%
2. Abortion should be legal.	28	56%	Liberal	56%
3. The death penalty should be abolished.	19	38%	Conservative	38%
4. Marijuana should be legalized.	24	48%	Conservative	48%
5. It is important to have laws prohibiting homosexual relationships.	16	32%	Liberal	68%
6. The federal government should do more to control the sale of handguns.	24	48%	Conservative	48%
7. Racial discrimination is no longer a problem in America.	14	28%	Liberal	72%
8. Wealthy people should pay a larger share of taxes than they do now.	24	48%	Conservative	48%
9. Same-sex couples should have the right to legal marital status.	32	64%	Liberal	64%
10. Affirmative action in college admissions should be abolished.	31	62%	Conservative	38%
11. The activities of married women are best confined to the home and family.	13	26%	Liberal	74%
12. Federal military spending should be increased.	19	38%	Liberal	62%

As you can see immediately, a set of raw data in this form is nearly impossible to interpret. Accordingly, our first task is to arrange the LCS scores into a **frequency distribution**, as shown in Table 2.7. In the "Frequency" column of the table, you will see, for example, that four students received a score of 1, three scored 2, and so on. Grouping of the data in this way makes much more sense than did the array of raw data above. Going one step further, we can convert the data into a bar graph called a **histogram**, which we have drawn in Figure 2.3. In this diagram, you can more readily see that the students' scores are not evenly distributed across the scale. The histogram also makes it obvious that the scores are more clustered near the middle of the distribution than they are at the ends.

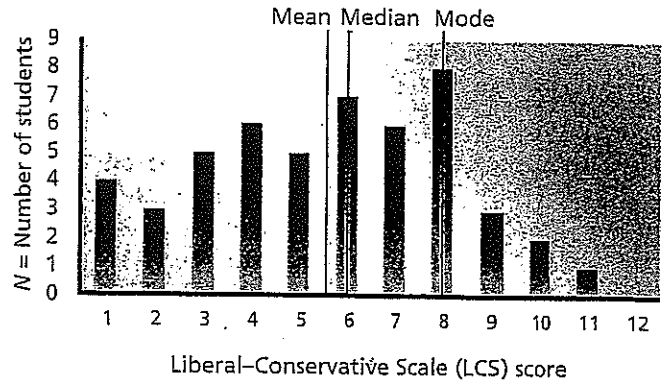
■ **Frequency distribution** A summary chart, showing how frequently each of the various scores in a set of data occurs.
■ **Histogram** A bar graph depicting a frequency distribution. The height of the bars indicates the frequency of a group of scores.
■ **Descriptive statistics** Statistical procedures used to describe characteristics and responses of groups of subjects.

Describing the Data with Descriptive Statistics

We can bring our data into even sharper focus by calculating some simple **descriptive statistics**, which are numbers that describe the main characteristics of the data. In particular, psychologists often find it useful to find a number that represents the middle of a distribution—the central point around which the scores seem to cluster. This is called a *measure of central tendency*. Additionally, researchers usually want a statistic that indicates the spread of the dis-

TABLE 2.7 Frequency Distribution of LCS Scores for a Class

LCS score	Frequency	LCS score × frequency
1	4	4
2	3	6
3	5	15
4	6	24
5	5	25
6	7	42
7	6	42
8	8	64
9	3	27
10	2	20
11	1	11
12	0	0
	$\Sigma = 50$	$\Sigma = 280$



● **FIGURE 2.3** Distribution of Liberal–Conservative Scale (LCS) Scores for a Hypothetical Class

The height of each bar indicates how many respondents obtained exactly that score on the LCS. Note that the three averages, the *mean*, the *median*, and the *mode*, are in different locations with the distribution not perfectly symmetrical. The mean is heavily influenced by extreme outlying scores, such as the four students who scored 1 on the LCS.

tribution—how closely the scores bunch up around the central point. This is called a *measure of variability*.

Measures of Central Tendency: Finding the Center of the Distribution You are undoubtedly more familiar with the everyday name for measures of central tendency: *averages*. As their more formal name suggests, measures of central tendency help us locate the center of a set of measurements, such as we have from the responses we obtained on the Liberal–Conservative Scale. Three forms of central tendency are most commonly used: the *mean*, the *median*, and the *mode*. Let's look briefly at each in turn.

The Mean Most people think only of the **mean** when they hear the word *average*. The mean is, no doubt, familiar to you as the statistic used to calculate your grade-point average. And it is the statistic that psychologists most often use to describe sets of data. To find the mean, you simply add up all the scores in a distribution and divide by the total number of scores. The calculation is summarized by the following formula:

$$M = \Sigma X \div N$$

Here M is the mean, Σ (the Greek capital letter *sigma*) is the summation of what immediately follows it, X represents each individual score, and N represents the total number of scores. In our example, to calculate the mean we would first add up all the Liberal–Conservative Scale scores (ΣX). The resulting sum is 280. Then we would divide that sum by the total number of scores ($N = 50$). Thus our mean (M) of the LCS scores for the class would be

$$M = 280 \div 50 = 5.6$$

Usually the mean is a good indicator of the center of the distribution, as you will note in Figure 2.3. Unfortunately, it has one potential flaw: Under some circumstances the mean can be unduly influenced by extreme scores. When the distribution is relatively symmetrical, this is not a problem. But when the scores bunch up toward one end of a distribution (in a *skewed* distribution),

■ **Mean** The measure of central tendency most often used to describe a set of data—calculated by adding all the scores and dividing by the number of scores.

a few extreme scores at the other end can have a disproportionate effect that pulls the mean toward the extreme score. Because of this effect, researchers sometimes choose one of the other measures of central tendency to find an average for a highly skewed distribution.

The Median One of the alternative measures of central tendency is the **median,** the middle score—the score that separates the upper half of the distribution from the lower half. In our example, the median is 6. That is, half of the scores are 6 or higher, and the other half are 6 or lower. (See Figure 2.3.) The big advantage of the median is that it is not distorted by extreme scores.

The Mode The third and simplest of the averages, or measures of central tendency, is called the **mode.** It is merely the score that occurs more often than any other. In our data, more students received a score of 8 than any other number, as shown in Figure 2.3. The modal response for this class on our conservative–liberal scale, therefore, is 8. Although the mode is the easiest index of central tendency to determine, it is often the least useful, especially when the sample is relatively small.

Take a look again at the distribution of scores in Table 2.7 and Figure 2.3. Which of the averages seems to fit the distribution best? Is it the mean of 5.6, the median of 6, or the mode of 8?

Using Averages How can we use averages to compare the class we tested with student responses on the national survey? As shown in the last two columns of Table 2.4, it is easy to convert the national survey percentages to indicate liberal responses—much as we did for the LCS scores. The mean of these national percentages is 58.2. That figure is higher than the mean of our own data set, which is 53.7. These two scores jibe with our earlier comparison of the two groups and further confirm that our class gave, on the average, more conservative responses than the national sample.

Measures of Variability: Finding the Spread of the Distribution In addition to knowing which score best represents the distribution's center, it is often useful to know how well the average represents the distribution as a whole. That is, we may want to know whether most of the scores cluster closely near the average or whether they are spread widely. We use statistics called *measures of variability* to describe the "spread-outness," of scores around some measure of central tendency.

To illustrate why variability is important, suppose that you are a third-grade teacher, and it is the beginning of the school year. Knowing that the average child in your class can read a third-grade-level book will help you to plan your lessons. You could plan more effectively, however, if you knew how similar or how divergent the reading abilities of the 30 children are. Do they all read at about the same level—that is, do they have *low variability?* If so, then you can develop a fairly standard third-grade lesson. But what if the group has *high variability,* with several who can read fourth-grade material and others who can barely read at all? In the latter case, the average reading level is not so representative of the entire class, and you will have to plan a variety of lessons to meet the children's varied needs.

The simplest measure of variability is the **range,** the difference between the highest and the lowest values in a frequency distribution. Returning to the scores produced by our hypothetical class on the Liberal–Conservative Scale, you can see in Figure 2.4 that the scores range from 1 to 11. Thus, to compute the range, you need know only two scores, the highest and the lowest.

While the range is simple to determine, psychologists usually prefer measures of variability that take into account all the scores in a distribution, not just the extremes. The most widely used alternative is the **standard deviation (SD),**

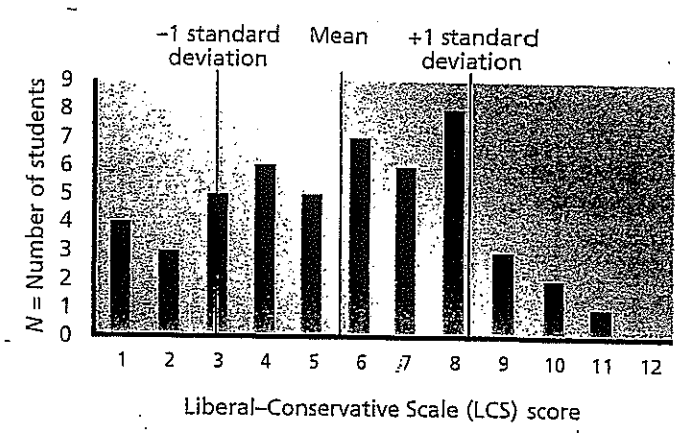
■ **Median** A measure of central tendency for a distribution, represented by the score that separates the upper half of the scores in a distribution from the lower half.

■ **Mode** A measure of central tendency for a distribution, represented by the score that occurs more often than any other.

■ **Range** The simplest measure of variability, represented by the difference between the highest and the lowest values in a frequency distribution.

■ **Standard deviation (SD)** A measure of variability that indicates the average difference between the scores and their mean.

a measure of variability that shows an average difference between each score and the mean. To calculate the standard deviation of a distribution, you need to know the mean of the distribution, along with the individual scores. Although the arithmetic involved in calculating the standard deviation is easy, the formula is a bit more complicated than the one used to calculate the mean and will not be presented here. The general procedure, however, involves subtracting the value of each individual score from the mean and then determining an average of those mean deviations. (Many calculators have a button for computing the standard deviation of a set of scores.)



● **FIGURE 2.4** The Range and Standard Deviation: Distribution of Liberal–Conservative Scale (LCS) Scores for a Hypothetical Class

The range and standard deviation are both measures of the variability or spread of a distribution. Note that most of the scores lie within one standard deviation of the mean.

Happily, the standard deviation is easy to interpret. The larger the standard deviation, the more spread out the scores are; the smaller the standard deviation, the more the scores bunch together around the mean. In our example, the standard deviation of the LCS scores is approximately 2.6. This indicates that approximately two-thirds of the group's scores can be found within 2.6 points of the mean (which is 5.6). To say the same thing in different words, about two-thirds of the scores in our distribution lie between 3 and 8.2.

Together, the mean and the standard deviation tell us much about a distribution of scores. In particular, they indicate where the center of the distribution is and how closely the scores cluster around the center. It's a fact worth remembering that a span of one standard deviation on either side of the mean covers approximately 68% of the scores in a **normal distribution.**

Earlier we determined that the hypothetical data we obtained with our Liberal–Conservative Scale revealed that students in the class we surveyed were, on the average, more conservative than students who took the national survey. The standard deviation shows, however, that there is considerable variation in opinion. In fact, several students (eight, to be exact) in our sample were *more* liberal than the national average. The resulting study is a correlational study.

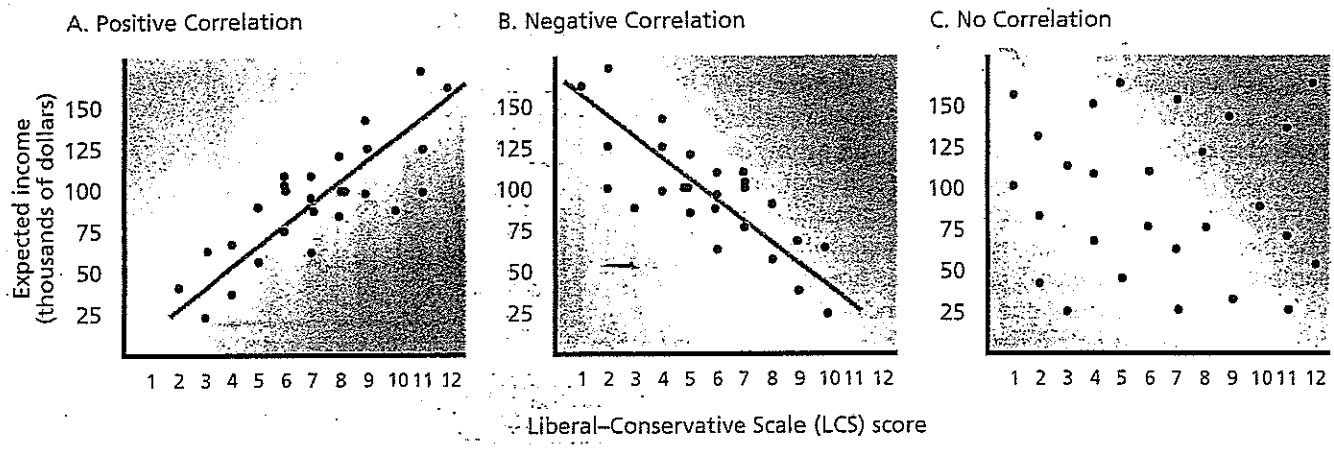
Correlation: A Relationship Between Two Variables

Now let's take our research a step further by asking whether a person's tendency toward liberalism or conservatism is related to other personal characteristics. Do conservatives come from more affluent families? Are liberals more introverted? Do conservatives get better grades? Are liberals more likely to major in the social sciences and humanities, while conservatives major in business or the natural sciences? Such questions deal with **correlation,** which is a relationship between *variables*. The resulting study is a correlational study.

To illustrate, suppose we have a hypothesis stating that the conservative students at your school are more money-oriented than the liberal students. (This hypothesis may be true—or it may *not* be true. Only a scientific test can tell.) We can put our hypothesis to a test by first defining "money-orientation" as "expected earnings five years after graduation." Next, we would obtain a sample of students from your school and request two items of information from each of them: (a) how much money they expect to be making five years after graduation and (b) their score on our Liberal–Conservative Scale. Our hypothesis, then, would predict that scores on the LCS would be associated—or *correlated*—with expected income. Specifically, we would predict that lower income estimates would be associated with higher LCS scores, while higher expected incomes would come from respondents with lower LCS scores. An analysis of the data should reveal whether or not the hypothesis is true.

■ **Normal distribution** A bell-shaped curve, describing the spread of a characteristic throughout a population.

■ **Correlation** A relationship between variables, in which changes in one variable are reflected in changes in the other variable—as in the correlation between a child's age and height.



● **FIGURE 2.5** Three Types of Correlation
A. Positive Correlation; B. Negative Correlation; C. No Correlation

For certain, we will get one of three possible outcomes: a *positive correlation*, a *negative correlation*, or *no correlation* between expected income and LCS scores. Each of these possibilities is shown graphically for a class of 26 students in Figure 2.5. Note that if we find a positive correlation, then increasing LCS scores will be associated with increasing expected incomes. In this case, the points on the graph would cluster near an upward-sloping line, as in Figure 2.5A. If, however, the two variables turn out to have a negative correlation, then increasing LCS scores will be associated with decreasing income expectations—and the points on the graph will cluster near a downward-sloping line, as in Figure 2.5B. (A negative-correlation pattern was predicted by our hypothesis.) If there is no correlation (or a near-zero correlation), the dots will fall randomly all over the graph, as in Figure 2.5C.

We can tell most precisely which one of these relationships we have by looking at the **correlation coefficient**, a number that falls between –1.0 and +1.0. (You will also learn how to calculate this number in your introductory statistics class.) If people with high scores on one variable tend to have high scores on the other variable, the correlation is positive, and the correlation coefficient will also be positive (greater than 0). If, however, people with high scores on one variable tend to have low scores on the other variable, the correlation is negative, and the coefficient will also be negative (less than 0). If there is no consistent relationship between the scores, the correlation will be close to 0.

Making Inferences with Inferential Statistics

Now that we have seen how to use descriptive statistics to describe a set of data, let's turn to **inferential statistics**, which are used to determine (infer) whether the scores from two or more groups are essentially the same or different. For example, if you hypothesized that time spent studying is associated with the grades students receive, you could use inferential statistics to compare the average amount of study time in a sample of students with high grades to that of a sample with low grades. The details of the statistical tests we could use in this example are beyond the scope of this brief introduction to statistics. Suffice it to say that most inferential statistics take into account the differences between mean scores of each group, along with their standard deviations.

■ **Correlation coefficient** A number between –1 and +1 expressing the degree of relationship between two variables.

■ **Inferential statistics** Statistical techniques (based on probability theory) used to assess whether the results of a study are reliable or whether they might be simply the result of chance. Inferential statistics are often used to determine whether two or more groups are essentially the same or different.

To be sure that any differences you find are real, you must also factor in the size of the sample you used. As you might expect, with a small sample, a relatively large difference in grades between the two sample groups is required before you can conclude that the samples represent truly different populations. In addition, you must consider the distribution of scores in both groups. Do the sample scores approximate a normal distribution? If not, you may have to use alternative statistical tests—which you will learn about in a course on statistics.

Sampling To have confidence in your results you must, of course, make sure that your sample was selected in an unbiased manner. The safest way is to select participants at random, by a method such as drawing names from a hat. Sometimes obtaining a **random sample** is not practicable: Just imagine trying to get a random sample of all college students in the country! A good alternative is to take a **representative sample.** (This is what the Gallup Poll and other major polling services do.) A representative sample reflects the important variables in the larger population in which you are interested—variables such as age, income level, ethnicity, and geographic distribution. Remarkably, a carefully selected representative sample of only a few hundred persons is often sufficient for public-opinion pollsters to obtain a highly accurate reflection of the political opinions of the entire population of a country.

Statistical Significance A researcher who finds a difference between the mean scores for two sample groups must ask whether it occurred simply because of chance or whether it represents a real difference between the two populations from which the samples were drawn. To illustrate, suppose that we compare the mean scores on the Liberal–Conservative Scale for the men and women we surveyed. If gender has no influence on liberal–conservative attitudes, then we would expect the two means to be fairly similar, and any slight difference between the samples would be due to chance. This would most likely be the case, say, if we sampled 25 men and 25 women and their mean LCS scores differed by only .1 point.

But what if the difference between the scores for the two groups is somewhat larger—say, 3 points? As you learned earlier, less than a third of the scores in a normal distribution should be greater than one standard deviation above or below the mean. So, if there is no real difference between the men's group and the women's group, the chances of getting a male sample with a mean score that is more than, say, two standard deviations above or below the mean for the female sample would be very small. Thus, a researcher who does get a difference that great would feel fairly confident that the difference is a real one and is somehow related to gender. The actual computation required to demonstrate this takes the sample size, the size of the difference, and the spread of the scores into consideration. Again, the details of this computation are beyond the scope of this book, but they are not difficult.

By common agreement, psychologists accept a difference between the groups as "real" or "significant" when the probability that it might be due to chance is less than 5 in 100 (indicated by the notation $p < .05$). A **significant difference,** then, is one that meets this criterion. However, in some cases, even stricter probability levels are used, such as $p < .01$ (less than 1 in 100) and $p < .001$ (less than 1 in 1000).

As you can see, any conclusion drawn from inferential statistics is only a statement of the probability that the results reflect a real difference in the world, rather than a chance difference in the samples selected. Science is never about absolute certainty. Truth in science is always open to revision by later data from better studies, developed from better hypotheses and better samples.

■ **Random sample** A sample group of subjects selected by chance (without biased selection techniques).

■ **Representative sample** A sample obtained in such a way that it reflects the distribution of important variables in the larger population in which the researchers are interested–variables such as age, income level, ethnicity, and geographic distribution.

■ **Significant difference** Psychologists accept a difference between the groups as "real," or significant, when the probability that it might be due to an atypical sample drawn by chance is less than 5 in 100 (indicated by the notation $p < .05$)

PSYCHOLOGY IN YOUR LIFE: STATISTICS IN POLITICS

It is statistics that tell us what numbers mean. Each consumer product survey or opinion poll ends with a statement on how significant the data are and what they mean. In politics, surveys and statistics dictate how campaigns spend their money, where candidates spend their time, and (to some extent) what candidates say. By conducting surveys, candidates can find out the best way to phrase a message and learn to whom they should say it. By surveying a representative sample of her or his (potential) constituents, a candidate can test ideas and advertisements, and then modify them based on the results, before "going public" with platforms or ads.

The numbers that candidates get from the surveys are the key components here. Survey questions that demonstrate little or no significance (statistically) let the candidate know that the issue a question addresses is not important to constituents, and in a campaign this information is very important. A candidate talking about issues that are not relevant or important to their constituents is not a candidate who is going to win election! Candidates (and campaigns) often employ psychologists to write surveys and analyze their results to help tailor the message so that the candidates can spend their time and money talking about the issues that they—as well as the people they would like to represent—care about.

CHECK YOUR UNDERSTANDING

1. **ANALYSIS:** Which of the following correlation coefficients would a statistician know, at first glance, is a mistake?
   a. 0.0
   b. +1.1
   c. +1.0
   d. −0.7
   e. −0.2

2. **RECALL:** Which of the following is a measure of central tendency?
   a. mean
   b. correlation
   c. random sample
   d. frequency distribution
   e. histogram

3. **RECALL:** The simplest measure of variability is
   a. mean.
   b. median.
   c. mode.
   d. standard deviation.
   e. range.

4. **ANALYSIS:** Most psychologists accept a difference between groups as "real," or significant, under which of the following conditions?
   a. $p < .5$
   b. $p < .3$
   c. $p < .1$
   d. $p < .05$
   e. $p = 0$

ANSWERS: 1.b 2.a 3.e 4.d

USING PSYCHOLOGY TO LEARN PSYCHOLOGY

Research in Practice

Yumi and Maria learned all about the different research methods we have considered in this chapter. As we look at their study, we can see all of the essential aspects of research. They began with an abstract that summarizes the research and its findings. Following is their actual introduction. They conducted a lengthy discussion of the available research on the topic, culling their information from a variety of authors and current and relevant sources.

In the course of their literature review, Yumi and Maria discovered the best method to use (the survey) and developed their instrument, which was translated