Pearson New International Edition

How to Think Straight About Psychology

Keith E. Stanovich

Ninth Edition

ALWAYS LEARNING

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Psychology Is Alive and Well (and Doing Fine Among the Sciences)

The Freud Problem

Stop 100 people on the street and ask them to name a psychologist, either living or dead. Record the responses. Of course, Dr. Phil, Wayne Dyer, and other "media psychologists" would certainly be named. If we leave out the media and pop psychologists, however, and consider only those who have made a recognized contribution to psychological knowledge, there would be no question about the outcome of this informal survey. Sigmund Freud would be the winner hands down. B. F. Skinner would probably finish a distant second. No other psychologist would get enough recognition even to bother about. Thus, Freud, along with the pop psychology presented in the media, largely defines psychology in the public mind.

The notoriety of Freud has greatly affected the general public's conceptions about the field of psychology and has contributed to many misunderstandings. For example, many introductory psychology students are surprised to learn that, if all the members of the American Psychological Association (APA) who were concerned with Freudian psychoanalysis were collected, they would make up less than 10 percent of the membership. In another major psychological association, the Association for Psychological Science, they would make up considerably less than 5 percent. One popular introductory psychology textbook (Wade & Tavris, 2008) is over 700 pages long, yet contains only 15 pages on which either Freud or psychoanalysis is mentioned—and these 15 pages often contain criticism ("most Freudian concepts were, and still are, rejected by most empirically oriented psychologists," p. 19).

In short, modern psychology is not obsessed with the ideas of Sigmund Freud (as are the media and some humanities disciplines), nor is it largely defined by them. Freud's work is an extremely small part of the varied set of issues, data, and theories that are the concern of modern psychologists. This larger body of research and theory encompasses the work of five recent Nobel Prize winners (David Hubel, Daniel Kahneman, Herbert Simon, Roger Sperry, and Torsten Wiesel) and a former director of the National Science Foundation (Richard Atkinson), all of whom are virtually unknown to the public.

It is bad enough that Freud's importance to modern psychology is vastly exaggerated. What makes the situation worse is that Freud's methods of investigation are completely unrepresentative of how modern psychologists conduct their research (recall that Freud began his work over a hundred years ago). In fact, the study of Freud's methods gives an utterly misleading impression of psychological research. For example, Freud did not use controlled experimentation, which is the most potent weapon in the modern psychologist's arsenal of methods. Freud thought that case studies could establish the truth or falsity of theories; we know now that this idea is mistaken. Finally, a critical problem with Freud's work concerns the connection between theory and behavioral data. For a theory to be considered scientific, the link between the theory and behavioral data must meet some minimal requirements. Freud's theories do not meet these criteria (Dufresne, 2007; Hines, 2003; Macmillan, 1997; McCullough, 2001). To make a long story short, Freud built an elaborate theory on a database (case studies and introspection) that was not substantial enough to support it. Freud concentrated on building complicated theoretical structures, but he did not, as modern psychologists do, ensure that they would rest on a database of reliable, replicable behavioral relationships. In summary, familiarity with Freud's style of work can be a significant impediment to the understanding of modern psychology.

In this chapter, we shall deal with the Freud problem in two ways. First, when we illustrate the diversity of modern psychology, the rather minor position occupied by Freud will become clear (see Haggbloom et al., 2002; Robins, Gosling, & Craik, 1999, 2000). Second, we shall discuss what features are common to psychological investigations across a wide variety of domains. A passing knowledge of Freud's work has obscured from the general public what is the only unifying characteristic of modern psychology: the quest to understand behavior by using the methods of science.

The Diversity of Modern Psychology

There is, in fact, a great diversity of content and perspectives in modern psychology. This diversity drastically reduces the coherence of psychology as a discipline. Henry Gleitman (1981), winner of the American Psychological

Foundation's Distinguished Teaching Award, characterized psychology as "a loosely federated intellectual empire that stretches from the domains of the biological sciences on one border to those of the social sciences on the other" (p. 774). Commentators outside of psychology have criticized this diversity. For example, anthropologist Clifford Geertz (2000) has complained that "from the outside, at least, it does not look like a single field, divided into schools and specialties in the usual way. It looks like an assortment of disparate and disconnected inquiries classed together because they all make reference in some way or other to something or other called mental functioning" (p. 187).

Understanding that psychology is composed of an incredibly wide and diverse set of investigations is critical to an appreciation of the nature of the discipline. Simply presenting some of the concrete indications of this diversity will illustrate the point. The APA has 54 different divisions, each representing either a particular area of research and study or a particular area of practice (see Table 1). From the table, you can see the range of subjects studied by psychologists, the range of settings involved, and the different aspects of behavior studied. The other large organization of psychologists—the Association for Psychological Science—is just as diverse. Actually, Table 1 understates the diversity within the field of psychology because it gives the impression that each division is a specific specialty area. In fact, each of the 54 divisions listed in the table is a broad area of study that contains a wide variety of subdivisions! In short, it is difficult to exaggerate the diversity of the topics that fall within the field of psychology.

Implications of Diversity

Many people come to the study of psychology hoping to learn the one grand psychological theory that unifies and explains all aspects of human behavior. Such hopes are often disappointed, because psychology contains not one grand theory, but many different theories, each covering a limited aspect of behavior (Benjamin, 2001; Griggs, Proctor, & Bujak-Johnson, 2002). The diversity of psychology guarantees that the task of theoretical unification will be immensely difficult. Indeed, many psychologists would argue that such a unification is impossible. Others, however, are searching for greater unification within the field (Cacioppo, 2007a, b; Gray, 2008; Henriques, 2004, 2005; Kenrick, 2001; Sternberg, 2005). For example, the coherence of psychology as a discipline has increased over the last decade due to the theoretical efforts of evolutionary psychologists. These researchers have tried to bring unification to our conceptualization of human psychological processes by viewing them as mechanisms serving critical evolutionary functions such as kinship recognition, mate selection, cooperation, social exchange, and child rearing (Barrett, Dunbar, & Lycett, 2002; Buss, 2005, 2007; Cartwright, 2008; Ellis & Bjorklund, 2005; Geary, 2005, 2008; Pinker, 2002). Likewise, Cacioppo (2007b) points to subfields such as social cognitive neuroscience as tying together numerous

TABLE 1 ***Divisions of the American Psychological Association***

1. General Psychology
2. Teaching of Psychology
3. Experimental Psychology
5. Evaluation, Measurement, and Statistics
6. Behavioral Neuroscience and Comparative Psychology
7. Developmental Psychology
8. Personality and Social Psychology
9. Psychological Study of Social Issues
10. Psychology of Aesthetics, Creativity, and the Arts
12. Clinical Psychology
13. Consulting Psychology
14. Industrial and Organizational Psychology
15. Educational Psychology
16. School Psychology
17. Counseling Psychology
18. Psychologists in Public Service
19. Military Psychology
20. Adult Development and Aging
21. Applied Experimental and Engineering Psychology
22. Rehabilitation Psychology
23. Consumer Psychology
24. Theoretical and Philosophical Psychology
25. Behavior Analysis
26. History of Psychology
27. Community Psychology
28. Psychopharmacology and Substance Abuse
29. Psychotherapy
30. Psychological Hypnosis
31. State Psychological Association Affairs
32. Humanistic Psychology
33. Intellectual and Developmental Disabilities
34. Population and Environmental Psychology
35. Psychology of Women
36. Psychology of Religion
37. Child and Family Policy and Practice
38. Health Psychology
39. Psychoanalysis
40. Clinical Neuropsychology
41. Psychology and Law
42. Psychologists in Independent Practice
43. Family Psychology
44. Psychological Study of Lesbian, Gay, and Bisexual Issues
45. Psychological Study of Ethnic Minority Issues
46. Media Psychology
47. Exercise and Sport Psychology
48. Peace Psychology

TABLE 1 ***Divisions of the American Psychological Association (continued)***

49. Group Psychology and Group Psychotherapy
50. Addictions
51. Psychological Study of Men and Masculinity
52. International Psychology
53. Clinical Child and Adolescent Psychology
54. Pediatric Psychology
55. Pharmacotherapy
56. Trauma Psychology

Note: There is no Division 4 or 11.

specialty areas within psychology—in this case, cognitive psychology, social psychology, and neuropsychology.

Some researchers see the diversity of psychology as reflecting an underlying strength of the discipline (Cacioppo, 2007a; Gray, 2008). For example, Cacioppo (2007a) views psychology as a so-called hub discipline—a science whose findings have unusually wide implications for other fields. He cites evidence indicating that, compared with other sciences, psychological findings have quite broad implications for other sciences.

No matter what their position on the issue of the coherence of the subject matter of psychology, all psychologists agree that theoretical unification will be an extremely difficult task. The lack of theoretical integration leads some critics of psychology to denigrate the scientific progress that psychology has made. Such criticism often arises from the mistaken notion that all true sciences must have a grand, unifying theory. It is a mistaken notion because many other sciences also lack a unifying conceptualization. Harvard psychologist William Estes (1979) has emphasized this point:

> The situation in which the experimental psychologists find themselves is not novel, to be sure, nor peculiar to psychology. Physics during the early twentieth century subdivided even at the level of undergraduate teaching into separate disciplines. Thus I was introduced to that science through separate university courses in mechanics, heat, optics, acoustics, and electricity. Similarly, chemistry has branched out, evidently irreversibly, into inorganic, organic, physical, and biochemical specialties, among which there may be no more communication than among some of the current subdisciplines of psychology. In both cases, unity has reemerged only at the level of abstract mathematical theory. Medicine has similarly fragmented into specialties, but is like psychology in that there has been no appearance of a new unity. (pp. 661–662)

Once we acknowledge the implications of the social and historical factors that determine the structure of disciplines, we can recognize that it is illogical to demand that all fields be unified. Indeed, it has been suggested that the term *psychological studies,* rather than *psychology,* would more accurately reflect the diversity of the discipline. The use of this new term would

also make it less surprising to the student that the different areas within the discipline have been characterized by vastly different rates of scientific progress. Some have made impressive progress in the explanation and prediction of behavior, while others have progressed much more slowly. The term *psychology* does not convey this state of affairs. Instead, it implies a coherence of subject matter that is not characteristic of the discipline.

One way to find more unity in the field of psychology is to look at the *methods* that psychologists use to advance knowledge. Here is where we can hope to find more unity of purpose among investigators. But here, in the domain of the methods that psychologists use to advance knowledge, is where we also find some of the greatest misunderstandings of the discipline.

Unity in Science

Simply to say that psychology is concerned with human behavior does not distinguish it from other disciplines. Many other professional groups and disciplines—including economists, novelists, the law, sociology, history, political science, anthropology, and literary studies—are, in part, concerned with human behavior. Psychology is not unique in this respect.

Practical applications do not establish any uniqueness for the discipline of psychology either. For example, many university students decide to major in psychology because they have the laudable goal of wanting to "help people." But helping people is an applied part of an incredibly large number of fields, including social work, education, nursing, occupational therapy, physical therapy, police science, human resources, and speech therapy. Similarly, helping people by counseling them is an established part of the fields of education, social work, police work, nursing, pastoral work, occupational therapy, and many others. The goal of training applied specialists to help people by counseling them does not demand that we have a discipline called psychology.

It is easy to argue that there are really *only* two things that justify psychology as an independent discipline. The first is that psychology studies the full range of human and nonhuman behavior with the techniques of science. The second is that the applications that derive from this knowledge are *scientifically* based. Were this not true, there would be no reason for psychology to exist.

Psychology is different from other behavioral fields in that it attempts to give the public two guarantees. One is that the conclusions about behavior that it produces derive from scientific evidence. The second is that practical applications of psychology have been derived from and tested by scientific methods. Does psychology ever fall short of these goals? Yes, quite often (Lilienfeld, 2007; Lilienfeld, Ruscio, & Lynn, 2008; Lynn, Loftus, Lilienfeld, &

Lock, 2003). But, in principle, appropriate scientific standards justify psychology as an independent field. If psychology ever decides that these goals are not worth pursuing—that it does not wish to adhere to scientific standards—then it might as well fold its tent and let its various concerns devolve to other disciplines because it would be a totally redundant field of intellectual inquiry.

Clearly, then, the first and most important step that anyone must take in understanding psychology is to realize that its defining feature is that it is the data-based scientific study of behavior. Comprehending all of the implications of this fact is the primary way that we develop the ability to think straight about psychology. Conversely, the primary way that people get confused in their thinking about psychology is that they fail to realize that it is a scientific discipline. For example, it is quite common to hear people outside the discipline voice the opinion that psychology is not a science. Why is this a common occurrence?

Attempts to convince the public that psychology cannot be a science stem from a variety of sources. Much confusion about the actual discipline of psychology is deliberately fostered by purveyors of bogus psychology. There has grown up in our society a considerable industry of pseudoscientific belief systems that have a vested interest in convincing the public that anything goes in psychology and that there are no rational criteria for evaluating psychological claims. This is the perfect atmosphere in which to market such offers as "Lose weight through hypnosis," "Develop your hidden psychic powers," and "Learn French while you sleep," along with the many other parts of the multimillion-dollar self-help industry that either are not based on scientific evidence or, in many cases, are actually contradicted by much available evidence.

Another source of resistance to scientific psychology stems from the tendency to oppose the expansion of science into areas where unquestioned authorities and "common sense" have long reigned. History provides many examples of initial public resistance to the use of science rather than philosophical speculation, theological edict, or folk wisdom to explain the natural world. Each science has gone through a phase of resistance to its development. Learned contemporaries of Galileo refused to look into his new telescope because the existence of the moons of Jupiter would have violated their philosophical and theological beliefs. For centuries, the understanding of human anatomy progressed only haltingly because of lay and ecclesiastical prohibitions of the dissection of human cadavers (the Christian view was that the interior of the body was "God's province"; see Grice, 2001). Charles Darwin was repeatedly denounced. Paul Broca's Society of Anthropology was opposed in France in the nineteenth century because knowledge about human beings was thought to be subversive to the state.

Each scientific step to greater knowledge about human beings has evoked opposition. This opposition eventually dissipated, however, when people came to realize that science does not defile humanity by its investigations

but contributes to human fulfillment by widening the sphere of knowledge. Who now believes that astronomy's mapping of the galaxies and its intricate theories about the composition of distant stars destroy our wonder at the universe? Who would substitute the health care available in their community for that available before human cadavers were routinely dissected? An empirical attitude toward the stars or the human body has not diminished humanity. More recently, Darwin's evolutionary synthesis laid the foundation for startling advances in genetics and biology. Nevertheless, as we get closer to the nature of human beings and their origins, vestiges of opposition remain. In the United States, religious advocates continue to press for the teaching of creationism in the public schools, and surveys show that the scientific fact that humans evolved by natural selection is not accepted by a large portion of the public (Laden, 2008; Lerner, 2005; Shtulman, 2006). If evolutionary biology, with its long and impressive record of scientific achievements, still engenders public opposition, is it any wonder that psychology, the most recent discipline to bring long-held beliefs about human beings under scientific scrutiny, currently provokes people to deny its validity?

What, Then, Is Science?

In order to understand what psychology is, we must understand what science is. We can begin by dealing with what science is not. In this way, we can rid ourselves of the vast majority of common misconceptions. First, science is not defined by subject matter. Any aspect of the universe is fair game for the development of a scientific discipline, including all aspects of human behavior. We cannot divide the universe into "scientific" and "nonscientific" topics. Although strong forces throughout history have tried to place human beings outside the sphere of scientific investigation, they have been unsuccessful, as we shall see. The reactions against psychology as a scientific discipline probably represent the modern remnants of this ancient struggle.

Science is also not defined by the use of particular experimental apparatus. It is not the test tube, the computer, the electronic equipment, or the investigator's white coat that defines science. (If this were the case, there would be no question at all about psychology's status, because psychology departments in all major universities are full of computers, chemicals, and electronic equipment of all types.) These are the trappings of science but are not its defining features. Science is, rather, a way of thinking about and observing the universe that leads to a deep understanding of its workings.

In the remainder of this chapter, we shall discuss three important and interrelated features that define science: (1) the use of systematic empiricism; (2) the production of public knowledge; and (3) the examination of solvable problems. Although we shall examine each feature separately, remember that the three connect to form a coherent general structure. (For a more

detailed discussion of the general characteristics of a science, see the works of Bronowski, Haack, Medawar, Popper, Raymo, and Sagan.)

Systematic Empiricism

If you look up the word *empiricism* in any dictionary, you will find that it means "the practice of relying on observation." Scientists find out about the world by examining it. The fact that this point may seem obvious to you is an indication of the spread of the scientific attitude in the past couple of centuries. In the past, it has not always seemed so obvious. Recall the example from history of the refusal to look into Galileo's telescope. It was long thought that knowledge was best obtained through pure thought or through appeal to authority. Galileo claimed to have seen moons around the planet Jupiter. Another scholar, Francesco Sizi, attempted to refute Galileo, not with observations, but with the following argument:

> There are seven windows in the head, two nostrils, two ears, two eyes and a mouth; so in the heavens there are two favorable stars, two unpropitious, two luminaries, and Mercury alone undecided and indifferent. From which and many other similar phenomena of nature such as the seven metals, etc., which it were tedious to enumerate, we gather that the number of planets is necessarily seven. . . . Besides, the Jews and other ancient nations, as well as modern Europeans, have adopted the division of the week into seven days, and have named them from the seven planets; now if we increase the number of planets, this whole system falls to the ground. . . . Moreover, the satellites are invisible to the naked eye and therefore can have no influence on the earth and therefore would be useless and therefore do not exist. (Holton & Roller, 1958, p. 160)

The point is not that the argument is laughably idiotic, but that it was seen as a suitable rebuttal to an actual observation! We laugh now because we have the benefit of hindsight. Three centuries of the demonstrated power of the empirical approach give us an edge on poor Sizi. Take away those years of empiricism, and many of us might have been there nodding our heads and urging him on. No, the empirical approach is not necessarily obvious, which is why we often have to teach it, even in a society that is dominated by science.

Empiricism pure and simple is not enough, however. Note that the heading for this section is "*Systematic* Empiricism." Observation is fine and necessary, but pure, unstructured observation of the natural world will not lead to scientific knowledge. Write down every observation you make from the time you get up in the morning to the time you go to bed on a given day. When you finish, you will have a great number of facts, but you will not have a greater understanding of the world. Scientific observation is termed *systematic* because it is structured so that the results of the observation reveal something about the underlying nature of the world. Scientific observations

are usually theory driven; they test different explanations of the nature of the world. They are structured so that, depending on the outcome of the observation, some theories are supported and others rejected.

Publicly Verifiable Knowledge: Replication and Peer Review

Scientific knowledge is public in a special sense. By *public,* we, of course, do not mean that scientific observations are posted on community-center bulletin boards. Instead, we refer to the fact that scientific knowledge does not exist solely in the mind of a particular individual. In an important sense, scientific knowledge does not exist at all until it has been submitted to the scientific community for criticism and empirical testing by others. Knowledge that is considered "special"—the province of the thought processes of a particular individual, immune from scrutiny and criticism by others—can never have the status of scientific knowledge.

Science makes the idea of public verifiability concrete via the procedure of *replication.* In order to be considered in the realm of science, a finding must be presented to the scientific community in a way that enables other scientists to attempt the same experiment and obtain the same results. When this occurs, we say that the finding has been replicated. Scientists use replication to define the idea of public knowledge. Replication ensures that a particular finding is not due simply to the errors or biases of a particular investigator. In short, for a finding to be accepted by the scientific community, it must be possible for someone other than the original investigator to duplicate it. When a finding is presented in this way, it becomes public. It is no longer the sole possession of the original researcher; it is instead available for other investigators to extend, criticize, or apply in their own ways.

The poet John Donne told us that "no man is an island." In science, no researcher is an island. Each investigator is connected to the scientific community and its knowledge base. It is this interconnection that enables science to grow cumulatively. Researchers constantly build on previous knowledge in order to go beyond what is currently known. This process is possible only if previous knowledge is stated in such a way that any investigator can use it to build on.

By *publicly verifiable knowledge,* then, we mean findings presented to the scientific community in such a way that they can be replicated, criticized, or extended by anyone in the community. This is a most important criterion not only for scientists but also for the layperson, who, as a consumer, must evaluate scientific information presented in the media. One important way to distinguish charlatans and practitioners of pseudoscience from legitimate scientists is that the former often bypass the normal channels of scientific publication and instead go straight to the media with their "findings." One ironclad criterion that will always work for the public when presented with scientific claims of uncertain validity is the question, Have the findings been

published in a recognized scientific journal that uses some type of peer review procedure? The answer to this question will almost always separate pseudoscientific claims from the real thing.

Peer review is a procedure in which each paper submitted to a research journal is critiqued by several scientists, who then submit their criticisms to an editor. The editor is usually a scientist with an extensive history of work in the specialty area covered by the journal. The editor decides whether the weight of opinion warrants publication of the paper, publication after further experimentation and statistical analysis, or rejection because the research is flawed or trivial. Most journals carry a statement of editorial policy in each issue, so it is easy to check whether a journal is peer reviewed.

Not all information in peer-reviewed scientific journals is necessarily correct, but at least it has met a criterion of peer criticism and scrutiny. Peer review is a minimal criterion, not a stringent one, because most scientific disciplines publish dozens of different journals of varying quality. Most scientific ideas can get published somewhere in the legitimate literature if they meet some rudimentary standards. The idea that only a narrow range of data and theory can get published in science is false. This is an idea often suggested by purveyors of bogus remedies and therapies who try to convince the media and the public that they have been shut out of scientific outlets by a conspiracy of "orthodox science." But consider for a minute just how many legitimate outlets there are in a field like psychology. The publications *Psychological Abstracts* and *PsycINFO* summarize articles from over 2,000 different journals. Most of these journals are peer reviewed. Virtually all halfway legitimate theories and experiments can find their way into this vast array of publication outlets.

Again, I am not suggesting that all ideas published in the journals summarized in *Psychological Abstracts* and *PsycINFO* are necessarily valid. On the contrary, I emphasized earlier that this is only a minimal criterion. However, the point is that the failure of an idea, a theory, a claim, or a therapy to have adequate documentation in the peer-reviewed literature of a scientific discipline is a very sure sign. Particularly when the lack of evidence is accompanied by a media campaign to publicize the claim, *it is a sure sign that the idea, theory, or therapy is bogus.* For example, in a famous Pennsylvania court case in 2005 regarding attempts to teach creationism in school biology classes, one of the witnesses advocating for intelligent design (a form of creationism) admitted that "he was unable to name any peer-reviewed research generated by intelligent design, though the movement has been around for more than a decade" (Talbot, 2005, p. 68).

The mechanisms of peer review vary somewhat from discipline to discipline, but the underlying rationale is the same. Peer review is one way (replication is another) that science institutionalizes the attitudes of objectivity and public criticism. Ideas and experimentation undergo a honing process in which they are submitted to other critical minds for evaluation. Ideas that survive this critical process have begun to meet the criterion of

public verifiability. The peer review process is far from perfect, but it is really the only consumer protection that we have. To ignore it (or not to be aware of it) is to leave ourselves at the mercy of the multimillion-dollar pseudoscience industries that are so good at manipulating the media to their own ends. We pay a high price for ignoring the checks and balances inherent in the true scientific practice of psychology.

Empirically Solvable Problems: Scientists' Search for Testable Theories

Science deals with solvable, or specifiable, problems. This means that the types of questions that scientists address are potentially answerable by means of currently available empirical techniques. If a problem is not solvable or a theory is not testable by the empirical techniques that scientists have at hand, then scientists will not attack it. For example, the question "Will three-year-old children given structured language stimulation during day care be ready for reading instruction at an earlier age than children not given such extra stimulation?" represents a scientific problem. It is answerable by currently available empirical methods. The question "Are human beings inherently good or inherently evil?" is not an empirical question and, thus, is simply not in the realm of science. Likewise, the question "What is the meaning of life?" is not an empirical question and so is outside the realm of science.

Science advances by positing theories to account for particular phenomena in the world, by deriving predictions from these theories, by testing the predictions empirically, and by modifying the theories based on the tests. The sequence might be portrayed as: theory → prediction → test → theory modification. So what a scientist often means by the term *solvable problem* is "*testable* theory." What makes a theory testable? The theory must have specific implications for observable events in the natural world; this is what is meant by *empirically testable.* This criterion of testability is often termed the *falsifiability criterion*.

By saying that scientists tackle empirically solvable problems, we do not mean to imply that different classes of problems are inherently solvable or unsolvable and that this division is fixed forever. Quite the contrary: Some problems that are currently unsolvable may become solvable as theory and empirical techniques become more sophisticated. For example, decades ago historians would not have believed that the controversial issue of whether Thomas Jefferson fathered a child by his slave Sally Hemings was an empirically solvable question. Yet by 1998 this problem had become solvable through advances in genetic technology, and a paper was published in the journal *Nature* (Foster et al., 1998) indicating that it was highly probable that Jefferson was the father of Eston Hemings Jefferson.

This is how science in general has developed and how new sciences have come into existence. There is always ample room for disagreement

about what is currently solvable. Scientists themselves often disagree on this point as it relates to current problems of ambiguous status. Thus, although all scientists agree on the solvability criterion, they may disagree on its specific applications. Nobel laureate Peter Medawar titled one of his books *The Art of the Soluble* (1967) to illustrate that part of the creativity involved in science is finding the problem on the furthest edge of the frontier of human knowledge that will yield to empirical techniques.

Psychology itself provides many good examples of the development from the unsolvable to the solvable. There are many questions (such as "How does a child acquire the language of his or her parents?" "Why do we forget things we once knew?" "How does being in a group change a person's behavior and thinking?") that had been the subjects of speculation for centuries before anyone recognized that they could be addressed by empirical means. As this recognition slowly developed, psychology coalesced as a collection of problems concerning behavior in a variety of domains. Psychological issues gradually became separated from philosophy, and a separate empirical discipline evolved.

Cognitive psychologist Steven Pinker (1997) discusses how ignorance can be divided into *problems* and *mysteries.* In the case of problems, we know that an answer is possible and what that answer might look like even though we might not actually have the answer yet. In the case of mysteries, we can't even conceive of what an answer might look like. Using this terminology, we can see that science is a process that turns mysteries into problems. In fact, Pinker (1997) noted that he wrote his book *How the Mind Works* "because dozens of mysteries of the mind, from mental images to romantic love, have recently been upgraded to problems" (p. ix).

Psychology and Folk Wisdom: The Problem With "Common Sense"

We all have implicit models of behavior that govern our interactions and our thoughts about ourselves and other people. Indeed, some social, personality, and cognitive psychologists study the nature of these implicit psychological theories. Rarely do we state our theories clearly and logically. Instead, we usually become aware of them only when attention is drawn to them or when we find them challenged in some way. Actually, our personal models of behavior are not really coherent in the way that an actual theory would have to be. Instead, we carry around a ragbag of general principles, homilies, and clichés about human behavior that we draw on when we feel that we need an explanation. The problem with this commonsense knowledge about behavior is that much of it contradicts itself and is, therefore, unfalsifiable.

Often a person uses some folk proverb to explain a behavioral event even though, on an earlier occasion, this same person used a directly contradictory

folk proverb to explain the same type of event. For example, most of us have heard or said, "look before you leap." Now there's a useful, straightforward bit of behavioral advice—except that I vaguely remember admonishing on occasion, "he who hesitates is lost." And "absence makes the heart grow fonder" is a pretty clear prediction of an emotional reaction to environmental events. But then what about "out of sight, out of mind"? And if "haste makes waste," why does "time wait for no man"? How could the saying "two heads are better than one" not be true? Except that "too many cooks spoil the broth." If I think "it's better to be safe than sorry," why do I also believe "nothing ventured, nothing gained"? And if "opposites attract," why do "birds of a feather flock together"? I have counseled many students to "never to put off until tomorrow what you can do today." But I hope my last advisee has never heard me say this, because I just told him, "cross that bridge when you come to it."

The enormous appeal of clichés like these is that, taken together as implicit "explanations" of behavior, they cannot be refuted. No matter what happens, one of these explanations will be cited to cover it. No wonder we all think we are such excellent judges of human behavior and personality. We have an explanation for anything and everything that happens. As British writer Matthew Parris (2007) has said, "folk wisdom is such a cowardly thing" (p. 28). By this he means that it takes no risk that it might be refuted.

So sometimes our implicit psychological theories can't be refuted. We will see in the next chapter why this inability to be refuted makes such theories not very useful. However, a further problem occurs even in cases in which our folk beliefs do have some specificity, that is, even when they are empirically testable. The problem is that psychological research has shown that, when many common cultural beliefs about behavior are subjected to empirical test, they turn out to be false.

It is not difficult to generate instances of folk beliefs (or "common sense") that are wrong. Take, for example, the idea that children who excel academically or who read a lot are not socially or physically adept. This idea still circulates in our society even though it is utterly false. There is voluminous evidence that, contrary to "commonsense" folk belief, readers and academically inclined individuals are more physically robust and are more socially involved than are people who do not read (Zill & Winglee, 1990). For example, children high in scholastic achievement are more likely to be accepted by their peers than children low in achievement. People who are avid readers are more likely to play sports, jog, camp, hike, and do car repair than are people who do not read very much.

Many of our folk beliefs about behavior arise and take on a life of their own. For example, throughout the 1990s the folk belief developed in our society and in schools that low self-esteem was a cause of aggression. But empirical investigations indicated that there was no connection between aggression and low self-esteem. If anything, the opposite appeared to be the case—aggression is more often associated with high self-esteem

(Baumeister, Bushman, & Campbell, 2000). Likewise, an extremely popular hypothesis in the 1990s was that school achievement problems were the result of low self-esteem. In fact, it turns out that the relationship between self-esteem and school achievement is more likely to be in the opposite direction from that assumed by educators and parents. It is superior accomplishment in school (and in other aspects of life) that leads to high self-esteem and not the reverse (Baumeister, Campbell, Krueger, & Vohs, 2003, 2005; Stout, 2000).

Consider another commonplace expression of folk wisdom: that "children bring happiness to their parents." This statement might have some degree of truth if used to refer to how we view the effects of our children from the vantage point of retirement. People do indeed *look back* on their children as having brought them great happiness. The problem is that people tend to confuse the perspective of looking back on an event with the actual experience of the event. Having children turns out to be a case where the two perspectives are very different. Looking back on having children from old age does indeed make people happy. However, in terms of ongoing, moment-to-moment happiness (as opposed to retrospectively looking back), children actually make people less happy. There is now a fairly sizable literature using so-called experience-sampling methods to look at how happy people are at various points in time (Ali, 2008; Brooks, 2008; Gilbert, 2006; Gorchoff, John, & Helson, 2008; Wargo, 2007), and this research shows a number of trends, for example, that getting married increases happiness. This literature also shows that parental happiness drops with the arrival of the first child. It rebounds a little until the first child reaches adolescence, and then it drops even further. Marital happiness returns to childless levels only when the last child leaves home.

In short, the folk wisdom "children bring happiness to their parents," when subjected to scientific examination, turns out to have a number of complications. It is true only from the retrospective standpoint—"children bring happiness" when they have finally left home and we can appreciate the accomplishment of raising them! This is not, though, what the phrase is often used to imply. It is often used to imply that having children will bring you happiness right now—in your short-term future. This is where this "folk wisdom" is most egregiously wrong.

Another example of folk wisdom run amok is the folk myth that we use only 10 percent of our brainpower. Despite having absolutely no basis in cognitive neuroscience (see Beyerstein, 1999; Boyd, 2008; Higbee & Clay, 1998; Radford, 1999), this one has been around for decades and has taken on the status of what has been termed a "psycho-fact." Radford quotes columnist Robert Samuelson's definition of a psycho-fact as "a belief that, though not supported by hard evidence, is taken as real because its constant repetition changes the way we experience life" (p. 53).

Folk beliefs are not always immune to evidence. Sometimes, when the contradictory evidence becomes too widely known, folk psychology

("common sense") does change. For example, years ago, one widely held cliché about children was "Early ripe, early rot" (Fancher, 1985, p. 141). The cliché reflected the belief that childhood precocity was associated with adult abnormality, a belief sustained by many anecdotes about childhood prodigies who came to ruin in later life. In this case, the psychological evidence documenting the inaccuracy of the cliché has been absorbed into the general culture, and you will almost never hear this bit of folk "wisdom" anymore.

This last example also carries a warning by reminding us to beware of today's "common sense"—because it is not difficult to show that yesterday's common sense has often turned into today's nonsense. After all, common sense is what "everybody knows," right? Right. Well, everybody knows that women shouldn't be able to vote, right? Everybody knows that African Americans shouldn't be taught to read, right? Everybody knows that individuals with disabilities should be institutionalized out of the sight of society, right? In fact, 150 years ago, all of these beliefs were what "everybody knew." Of course, we now recognize this common sense of the past as nonsense—as beliefs based on totally unverified assumptions. But in these examples we can see the critical role that psychology plays vis-à-vis common sense. Psychology tests the empirical basis of the assumptions of common sense. Sometimes the assumptions do not hold up when tested, as we saw in many of the previous examples. From the examples discussed—and many more could be cited—we can see that psychology's role as the empirical tester of much folk wisdom often brings it into conflict with many widely held cultural beliefs. Psychology is often the bearer of the "bad tidings" that comfortable folk beliefs do not stand up to the cold light of day. Perhaps it is not surprising that many people would like not only to ignore the message but also to do away with the messenger.

Psychology as a Young Science

There has always been opposition to an empirically based psychology. Just 100 years ago, Cambridge University refused to establish a psychophysics laboratory because the study of such a topic would "insult religion by putting the human soul on a pair of scales" (Hearst, 1979, p. 7). Psychology's battle to establish its problems as empirically solvable has only recently been won. But as the science progresses, psychologists will address more and more issues that are the subject of strongly held beliefs about human beings because many of these problems are empirically testable. Psychologists now study topics such as the development of moral reasoning, the psychology of romantic love, the nature of racial prejudice, and the psychological and social determinants of religious beliefs. Studies of childhood sexual activity have incited much controversy (Hagen, 2001; Rind, 2008; Rind,

Tromovitch, & Bauserman, 2001). Some people object to empirical investigation in these areas (Hunt, 1999); yet there has been scientific progress in each one of them.

Past-president of the APA Gerald Koocher (2006) boldly warned us about the nature of psychological research by titling one of his presidential columns "Psychological Science is not Politically Correct." In the article, he discussed research on topics such as the causes of obesity, what determines political attitudes, the relation between religion and sexual behavior, and domestic violence. He pointed out that the research findings on each of these topics have proved controversial, but that "psychological science cannot be held to a standard of political correctness by social liberals or conservatives" (p. 5).

Levin and O'Donnell (2000) discuss how opposition to some psychological research is based on what they claim is a "need *not* to know." They describe a school board where parents were given the option of having their child educated in K–2 multi-aged classrooms or in their usual age-graded classrooms. The school board disparaged their teachers' suggestion for a research study on the issue because they thought that if the research study showed one or the other method to be more effective, parents would force them to switch to this type of instruction completely. As Levin and O'Donnell (2000) note, "the school board simply did not want to know!" (p. 66). Thus, we should be aware that psychological research is often denigrated not because people think it is bad but because they desire to avoid the implications of the information that it might produce.

Psychology is often in a no-win situation as a discipline. On one hand, some people object to calling psychology a science and deny that psychologists can establish empirical facts about behavior. On the other hand, there are those who object to the investigation of certain areas of human behavior because they fear that facts uncovered by psychology might threaten their beliefs. Skinnerian psychologists regularly deal with these contradictory criticisms. For instance, critics have argued that the laws of reinforcement formulated by behaviorists do not apply to human behavior. At the same time, other critics are concerned that the laws will be used for the rigid and inhumane control of people. Thus, the behaviorists are faced with some critics who deny that their laws can be applied and others who charge that their laws can be applied too easily!

Examples such as this arise because the relatively new science of psychology has just begun to uncover facts about aspects of behavior that have previously escaped study. The relative youth of psychology as a science partially explains why many people are confused about the discipline. Nevertheless, during the past four decades, psychology has become firmly established in the interconnecting structure of knowledge that we call science. Failure to appreciate this fact is the source of almost all of the confused thinking about psychology that you will encounter.