5

PSEUDOSCIENCE, SCIENCE, AND EVIDENCE-BASED PRACTICE

LEARNING OUTCOMES

After studying this chapter, you should be able to:

1. Explain why it is important to recognize examples of pseudoscience.
2. Distinguish examples of pseudoscience from true science.
3. Distinguish poorly supported psychological treatments and practices from evidence-based ones.

CHAPTER OUTLINE

WHAT DO YOU THINK?

Each year, millions of people with psychological problems seek professional help. Some want to improve themselves, others want to be happier, or still others just want to be better adjusted. In an attempt to achieve these goals, they read self-help books, undergo psychotherapy, or try chemical treatments.

People have spent millions of dollars on magnets that are advertised to reduce pain, restore balance, and enhance performance. They buy nutritional supplements to improve memory. Many take massive amounts of vitamin C to prevent colds and even cure cancer.

Do these treatments work? Are some of them pseudoscience? Could some treatments actually harm a person? How do you know?

Practice Thinking 5.1: What Do You Think?

Please explain how you know.

1. What is pseudoscience, and why study it?

2. Are some psychotherapies dangerous?

3. Are some therapies more effective than others? If so, which ones? How do you know?

4. Do self-help books and programs really help?

5. Can nutritional supplements improve your memory or cure psychological problems?

In 2000, 10-year-old Candace Newmaker was having trouble adjusting to her new life with her adoptive mother, Jeanne Newmaker. Nothing seemed to help the mother and daughter bond. Upon referral from a psychologist, Jeanne took Candace to Colorado for a $7,000, 2-week intensive program of attachment therapy. Candace's problem had been diagnosed as a failure to attach to her adoptive mother. Candace was referred to two other therapists (see Figure 5.1), who treated her with a rebirthing procedure that was supposed to help her become more closely attached to Jeanne. The girl was wrapped tightly in a blanket while four adults held her as she tried to wriggle her way through a crude model of the birth canal. She could not get through. Although Candace vomited, urinated, and cried out that she could not breathe, the therapists told her she was simply being weak and should try harder. After more than an hour of this "treatment," Candace suffocated from the ordeal (Lilienfeld, Fowler, Lohr, & Lynn, 2005).

AP Photo/Ed Andrieski

FIGURE 5.1 Unlicensed social workers Julie Ponder and Connell Watkins (center), who treated Candace Newmaker with a dangerous "rebirthing" therapy. They were convicted of reckless child abuse that resulted in Candace's death.

WHY LEARNING ABOUT PSEUDOSCIENCE IS IMPORTANT

It seems implausible that having Candace go through a simulation of the birthing process would help her bond more closely with her new mother. The assumption behind this program was that going through something that *looks like* the birthing process actually helps the person become properly attached, much as a child becomes normally attached to a parent following birth. This turns out to be an unwarranted assumption. It also illustrates inappropriate reasoning by the **representativeness heuristic**, a thinking error in which people assume that "like goes with like"—that is, a person will be cured by a treatment that looks like the problem (Gilovich & Savitsky, 1996; Kahneman & Tversky, 1972).

Clearly, Candace's therapists made thinking errors that had dire consequences for everyone involved in the process. Furthermore, the therapy they used seems to be pseudoscientific. **Pseudoscience** has been defined as "claims presented so that they appear scientific even though they lack support or plausibility" (Shermer, 1997, p. 33). Attachment therapy fits this definition because it is implausible

that a 10-year-old child going through a superficial simulation of the birthing process would experience what a newborn experiences. Nothing in science would lead us to believe that this procedure would promote a new attachment. More importantly, it is pseudoscientific because therapists maintain that it works, despite the fact that no high-quality research has shown attachment therapy to be effective (Mercer, 2014).

The unfortunate case of Candace Newmaker raises serious ethical issues about pseudoscientific practices. One concern is that Candace's therapists used a treatment that was not likely to be effective. An even greater ethical concern is that such practices may cause harm or even death (Lilienfeld, 2007). The ethical guidelines developed by the American Psychological Association (2002) make it clear that psychologists should both do no harm and use effective treatments. Candace's therapists followed neither of these guidelines. Indeed, the emergence of several types of new therapies in recent years has raised ethical concerns among psychological scientists and practitioners that some of these new therapies may be ineffective or even pseudoscientific (Lilienfeld, 1998; Lilienfeld et al., 2005).

The definition of pseudoscience seems straightforward enough, but finding criteria that infallibly distinguish pseudoscientific theories and practices from scientific ones has proved difficult (Bensley, 2002; Pigliucci & Boudry, 2013). Often, the boundaries between science and pseudoscience are fuzzy (Shermer, 2001) and their differences are simply a matter of degree (Lilienfeld, 2007). Accordingly, we should proceed with caution, keep an open mind, and reason carefully when deciding whether the current status of a field indicates it is a pseudoscience.

Other good reasons exist to study the differences between pseudoscience and science. First, attempting to make such distinctions can be useful in learning to think about science in general and psychological practices in particular (Herbert, 2003). In many ways, pseudoscience results from *not* following the rules, methods, and practices that science and critical thinking (CT) prescribe (Kalal, 1999). Consequently, studying pseudoscience should help you better understand the advantages of taking a scientific and CT approach to the study and practice of psychology.

Second, studying pseudoscience in relation to science and evidence-based practices should help you protect yourself and others from potentially dangerous practices, guiding you toward more effective, safer ones. This guidance is needed because a study by Bensley, Lilienfeld, and Powell (2014) found that psychology students' stronger endorsement of a more intuitive thinking style (Type 1 thinking) and their weaker endorsement of CT dispositions (Type 2 thinking) was linked to endorsement of more psychological misconceptions and less

ability to distinguish poorly supported and pseudoscientific practices from more scientifically supported ones.

Third, pseudoscience is found all over the world (Sagan, 1996) and popular interest in pseudoscience and poorly supported practices remains strong (Lilienfeld, Lynn, & Lohr, 2015). Using the number of Internet sites as an indicator of attention paid to a therapy, Olatunji, Parker, and Lohr (2005) found that the number of web hits for rebirthing/attachment therapy was 4,900 times the number of citations for it on PsycINFO, the major database indexing psychological research articles. The fact that the general public seems to pay much more attention to this pseudoscience than do those working in psychology raises questions about the scientific and psychological literacy of the general public.

Perhaps more or better science education is needed to address this discrepancy—yet belief in pseudoscientific ideas does not seem to decrease much as a result of students' taking ordinary psychology and science courses (e.g., Johnson & Pigiliucci, 2004; Walker, Hoekstra, & Vogl, 2002). One national study conducted in the United States found that although adults with more science education tend to accept astrology less, those adults also tend to accept UFOology more (Losh, Tavani, Njoroge, Wilke, & McAuley, 2003). UFOology is a pseudoscience maintaining the scientifically implausible claim that aliens travel many light years in spacecraft to visit Earth. Ideally, a critical examination of where pseudoscientific ideas came from and how to think about them would reduce belief in those ideas.

A BRIEF HISTORY OF PSEUDOSCIENCE AND SCIENCE

Astrology is the oldest example of a pseudoscience that is still practiced today. Originating in Babylonia at least 3,000 years ago, it appeared in similar forms among the ancient Greeks, Romans, and Egyptians. As people looked up in the night sky, they found patterns in the positions of the stars and planets—patterns that they associated with the myths of their culture. Do you see a pattern in the dots depicting stars in Figure 5.2 (on the next page)?

People are good at finding patterns in ambiguous and random displays, even when those patterns do not really exist—a phenomenon termed *visual pareidolia*. If you found a pattern in Figure 5.2, for example, it was probably different from the pattern found by the ancient Romans and Greeks. They saw Libra, the constellation corresponding to the scales of justice (see Figure 5.3), which was part of their mythology.

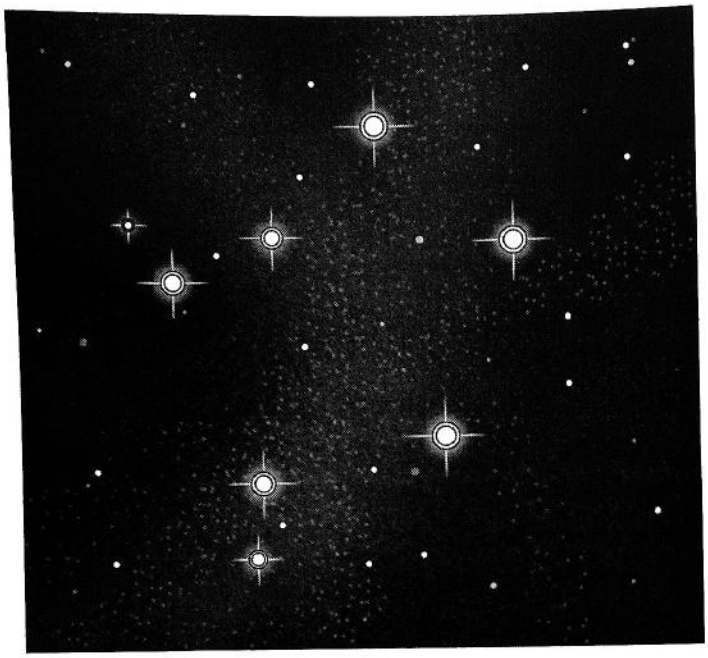

FIGURE 5.2 A star map containing a constellation in the dots. Do you see a pattern? Use your imagination.

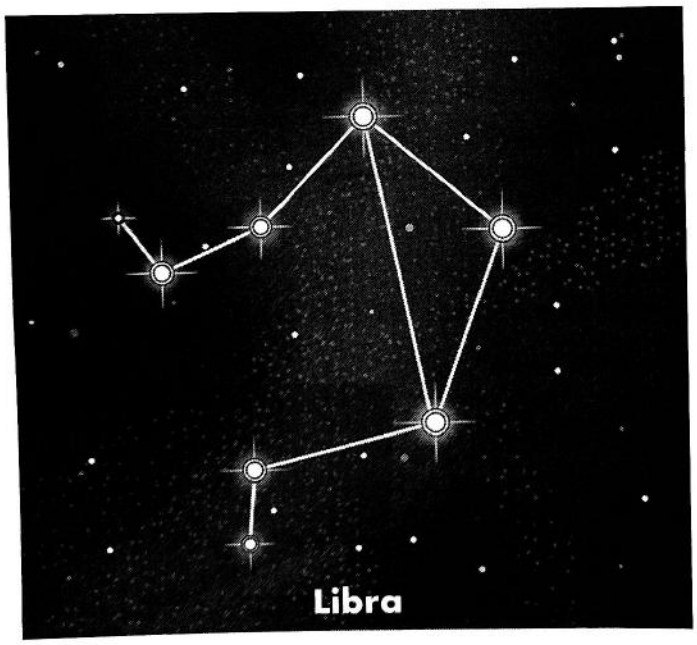

FIGURE 5.3 Libra, the scales of justice, a pattern that many Romans saw in the stars depicted in Figure 5.2.

Astrologers use the zodiac, a system in which sets of traits correspond to patterns of stars. The zodiac includes 12 different "signs" (i.e., group of traits linked to a particular constellation), each one exemplified by an object, person, or story from traditional myths. For example, a person born between September 23 and October 22 has the sign of Libra, with traits corresponding to the pattern of stars found in the constellation Libra, represented by the scales of justice held by Themis. In Greek mythology, Themis was a Titaness who helped establish the laws of proper conduct and was a counselor to Zeus. Consistent with this idea, Libras are often said to be balanced, intelligent, diplomatic, and polite but also gullible and indecisive (i.e., not good critical thinkers).

The astrologer's use of precise and complicated calculations based on observation of the stars and planets, and the fact that the word *astrology* ends in *-ology,* may make astrology appear to be a true science. Yet it is not. The astrologer's complex calculations are useless because they are based on the incorrect assumption that patterns in the stars and planets at the time of someone's birth determine that person's traits and future. *Astronomy,* a true science, tells us that the constellations are simply random groups of stars, regardless of the fact that 2,000 to 3,000 years ago (many centuries before modern science developed), ancient Greeks and Romans, steeped in the mythology of their cultures, saw what appeared to be animals, people, and objects in those stars. In 1975, 192 of the world's leading astronomers and other scientists, including 19 Nobel laureates, signed a proclamation stating that the claims of astrology have no scientific basis (Bok, 1975). Although the collective opinion of many notable scientists is certainly persuasive, we should make our own decision as to the scientific status of astrology.

TABLE 5.1 Distinguishing Pseudoscience From Science

In contrast to scientists, those who practice pseudoscience tend to:

1. Make predictions that are vague, untestable, and not falsifiable.
2. Not systematically check outcomes of predictions, paying more attention to evidence that supports predictions and ignoring negative evidence (confirmation bias). As a result, pseudoscientific theory changes little, and pseudoscience is not self-correcting.
3. Incorrectly use general rules of reasoning to evaluate claims and hypotheses. For example:
   a. Reverse the burden of proof and argue from possibility.
   b. Ignore the rule that theories and hypotheses must be consistent with data.
4. Not use accepted standards of evidence, methods, techniques, and terminology from related scientific fields (i.e., they lack connectedness with other scientific fields):
   a. Make implausible claims (not likely to be true, given what is known in science).
   b. Use low-quality evidence (e.g., anecdotes, testimonials, and statements of authority), rather than high-quality evidence (e.g., true experiments).
   c. Use obscure terminology (not conventionally used in science).

Table 5.1 shows a set of guidelines that can help us distinguish a pseudoscience, such as astrology, from a true science, such as astronomy. Table 5.1 lists a set of characteristics that pseudosciences tend to have. When a field shows more of the characteristics in Table 5.1, it is more likely to be pseudoscientific than truly scientific.

Practice Thinking 5.2: Using Criteria to Decide Whether Astrology Is a Pseudoscience

In the space provided, write the characteristic of pseudoscience from Table 5.1 that goes with each of the following statements about astrology.

1. The traits that astrologers describe seem unreasonable given what is known about personality traits identified by psychological research.

2. Astrologers use tables of the positions of the stars and planets at the time of a person's birth, rather than valid and reliable personality inventories, to make predictions about a person's traits and behaviors.

3. The predictions and trait descriptions used in astrology horoscopes are very general, so people find that the horoscopes seem to describe them well, especially when stated in positive terms (Glick, Gottesman, & Jolton, 1989).

4. Astrology has not changed its fundamental ideas in thousands of years, despite the fact that many studies have failed to support it, such as studies showing that astrological signs and readings do not predict the occupation that a person with a particular sign will have (Tyson, 2001).

Unlike scientists who make specific predictions, astrologers make general predictions and identify traits that people are likely to endorse—for example, "Being a Libra, you are usually diplomatic but sometimes appear to be indecisive in your efforts to maintain harmony." Although scientists, like astrologers, do sometimes make predictions from incorrect premises, scientists systematically check the outcomes of their predictions, whereas astrologers do not. If scientists find their predictions are in error, they will eventually reject the theory or change it to be consistent with their observations. Thus, science is a dynamic approach to knowledge that is self-correcting through continuous updating of its theories.

In contrast, astrology has remained mostly unchanged for centuries despite evidence that its predictions are usually wrong. Although no good scientific evidence supports astrology (Kelly, 1997), astrologers ignore these findings and tolerate inconsistencies between observation and theory. Instead of citing evidence obtained through the scientific process, they find support from personal experiences, the authority of astrologers, and other low-quality evidence. Astrology lacks connectedness with related fields owing to its failure to use successful measures and theories of personality and the instruments and theories of modern

astronomy; instead, astrologers make scientifically implausible claims and do not link those claims to established science.

Despite their weaknesses, pseudosciences have sometimes contributed to the development of true sciences. For example, over the centuries, astrologers made careful observations of the stars and planets, providing reliable data that astronomers later used to predict planetary movement. As the scientific approach developed, some scientists actually practiced astrology; even the astronomer Johannes Kepler (1571–1630), who discovered the laws of planetary motion, was forced to cast horoscopes for the wealthy and powerful to support his family, even though he doubted the validity of astrology.

Although the scientific revolution was well underway in the seventeenth century, superstition and pseudoscience lingered on (Wootton, 2016). Even the great physicist Sir Isaac Newton (1643–1727), despite his fundamental scientific discoveries about gravity and other forms of energy, was a serious student of alchemy. The alchemists tried to produce a mythical substance called the *philosopher's stone* that they thought could transmute substances into gold, prolong life, and heal the body. Although alchemy now seems implausible and pseudoscientific, the alchemists contributed to the development of chemistry, a true science, through their careful study of chemicals and substances. Because astrology and alchemy existed long before the development of astronomy and chemistry, they might be better viewed as "proto-sciences," or prescientific fields that contributed to the development of true science.

The eighteenth century spawned another pseudoscience called **mesmerism**, named after its developer, Franz Anton Mesmer (1743–1850), a Viennese physician and student of astrology. Mesmer's technique for influencing people's behaviors and experiences resembles the modern technique of hypnosis. After a slow start in Vienna, Mesmer moved to Paris, where his technique became popular among the French aristocracy. Dressed in flowing purple robes, Mesmer would ask people to place parts of their bodies, such as their legs, in a large bath as he swirled the water around and gave them suggestions such as "Your leg is relaxed or numb." Sometimes people experienced strange feelings, felt relief from pains, or fainted. Mesmer explained this outcome as being due to his magnetizing the water and changing the flow of animal magnetism in a person.

Marie Antoinette, the wife of King Louis XVI, and many other Parisian aristocrats went to see Mesmer. To investigate mesmerism, the king commissioned a committee of esteemed scientists led by the great scientist and inventor Benjamin Franklin, who was serving as ambassador to France at the time (Leahey & Leahey, 1983). The committee also included Dr. Joseph Guillotin, inventor of the

guillotine, and the great chemist Antoine Lavoisier, who was later beheaded by Guillotin's machine—as were the king and queen during the French Revolution.

In the best traditions of science, the committee conducted a systematic study of mesmerism. They tried it themselves and experienced no effects. They tested the water for the flow of electricity and found none. They also conducted several experiments on animal magnetism—medical experiments that are thought to have employed the first placebo controls (Best, Neuhauser, & Slavin, 2003). A **placebo** control involves administering a fake treatment, such as a sugar pill, to create the expectation that the person is receiving an active treatment. People who receive placebos often show improvement and relief of their symptoms even though they did not receive the active treatment that was expected to produce these effects (Beecher, 1955; Brown, 2013). A placebo serves as a control that allows the experimenter to test the effects of expectation. The mesmerism committee's placebo treatment involved telling one subject that she was to drink water that had been magnetized by the mesmerist when, in fact, the water had not been magnetized. She immediately fainted in response to drinking the water. Upon recovery, she was given water that *had* been magnetized, but the committee did not tell her so. When she drank it, she did not faint.

The committee also tested other subjects who were blind to their testing condition—that is, they were not told which treatment they had received. As a consequence, subjects were unable to detect which objects had been magnetized. Consistent with current research on hypnosis, the committee concluded that the effects of mesmerism were due to a combination of the expectations created by suggestions of the mesmerist and the imagination of the "mesmerized" subject. As we now know, hypnosis is not a trance or special state of consciousness distinct from ordinary consciousness, contrary to the popular psychological misconception (Lilienfeld et al., 2010).

By the nineteenth century, science had become firmly established as a useful approach to study the natural world, with its contributions including the discovery of the atom, the development of the periodic table of elements, and Darwin's theory of evolution. At the same time, new pseudosciences continued to develop as well. In the early 1800s, as the new science of psychology was developing, the anatomists Franz Joseph Gall (1758–1828) and Johann Spurzheim (1776–1832) developed the pseudoscience of phrenology. **Phrenology** posited that bumps and indentations on a person's skull indicate the specific characteristics and abilities of the person.

Gall developed the idea for phrenology when he reflected on his observation of a childhood schoolmate who had both a good verbal memory and protruding eyes (Leahey & Leahey, 1983). Gall began his exploration of phrenology with

the working assumption that the structures in the brain underlying its faculties could be revealed in the surface features of the skull. Phrenology evolved into a pseudoscientific movement after Spurzheim and other phrenologists began taking a philosophical approach to the brain's faculties. Specifically, they added and subdivided faculties based on few or no actual observations. Figure 5.4 shows a

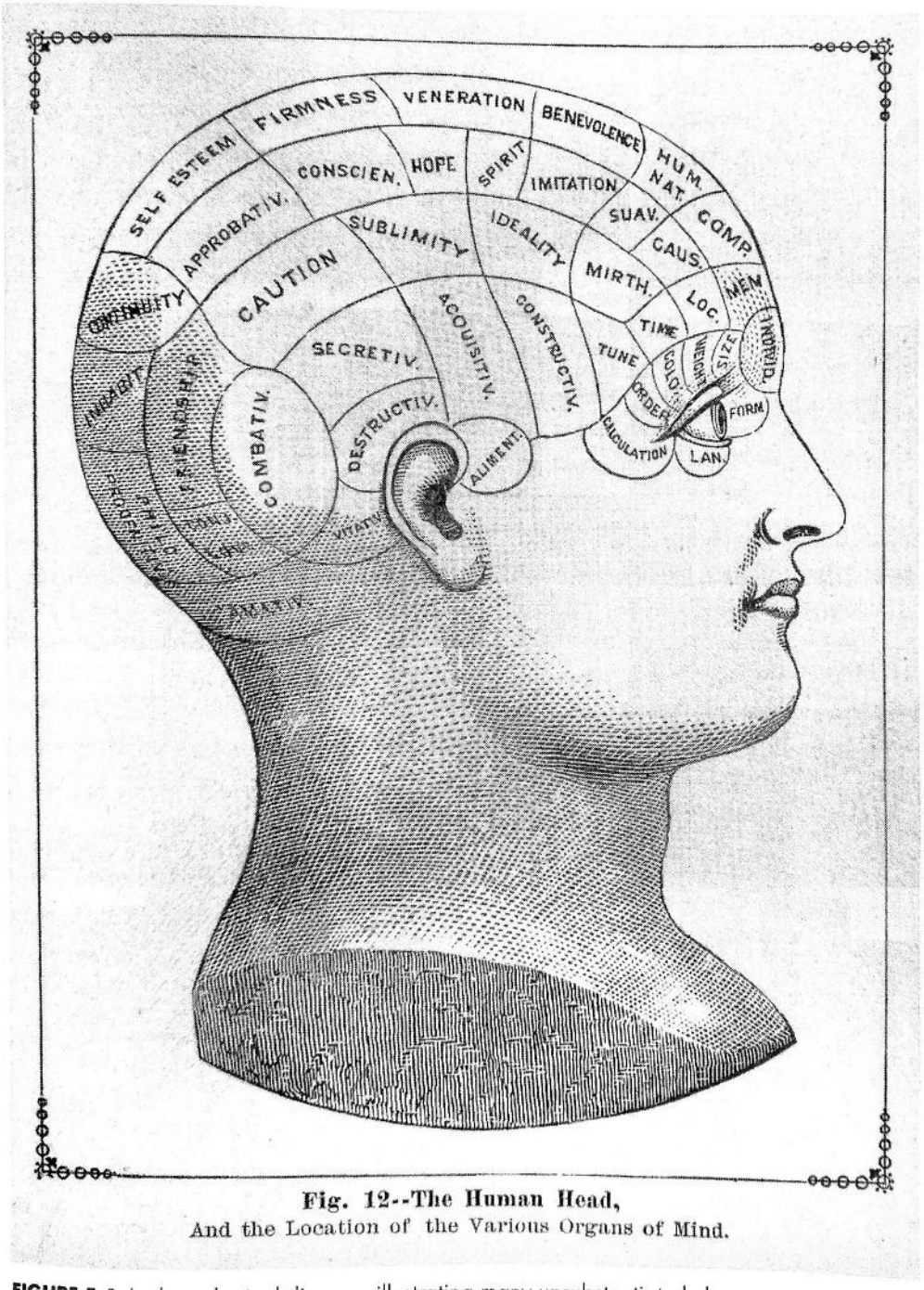

Fig. 12--The Human Head,
And the Location of the Various Organs of Mind.

Archive Photos/Stock Montage/Getty Images

FIGURE 5.4 A phrenological diagram illustrating many unsubstantiated characteristics.

phrenological map of the skull divided into many areas, each associated with a specific characteristic.

Phrenologists used the sophisticated-looking equipment shown in Figure 5.5 to measure the bumps and indentations on a person's skull, which made phrenology appear to be scientific. From the observations and information they collected about a person, they associated specific bumps and indentations with traits, such as

Topical Press Agency/Hulton Archive/Getty Images

FIGURE 5.5 This phrenological apparatus looks scientific—but is it?

benevolence and self-esteem. Although the equipment in Figure 5.5 looks sophisticated, the idea that relatively small bumps and indentations on the surface of the skull have anything to do with the contour of the brain underneath is implausible.

The brain is a gelatinous mass, and the skull need not have bumps or indentations to accommodate the rather small and specific brain areas that the phrenologists assumed corresponded to particular traits. In fact, the inside surface of the skull is relatively smooth and rounded. These facts were known, but apparently ignored, when phrenology began. From the perspective of current psychological science, phrenology was a complex theory with many untested assumptions. Psychology was in its preliminary stages as a scientific discipline in the nineteenth century and had no comprehensive, scientifically based theory of personality. Nevertheless, phrenologists proposed many traits, such as cautiousness and secretiveness, without scientifically establishing the existence of those traits.

Another reason phrenology was a pseudoscience is that phrenologists did not make systematic observations to develop a theory that could reliably predict a person's characteristics. Rather, they often found bumps and indentations *after* they thought they knew the traits of a person. In other cases, Spurzheim proposed many different traits corresponding to bumps and indentations without making any observations at all. Because the phrenologists did not test the predictions of their theory, they did not discover that it had no predictive power.

A story is told of how the great nineteenth-century physiologist François Magendie tested Spurzheim's use of phrenological theory to make predictions (Kolb & Whishaw, 1990). Magendie invited Spurzheim to his home to examine the preserved brain of the brilliant French philosopher and mathematician Pierre Laplace. Unbeknownst to Spurzheim, Magendie had replaced Laplace's brain with that of an intellectually challenged man. Spurzheim admired the substituted brain as if it had belonged to the brilliant Laplace. The fact that the leading phrenologist of the time could not use phrenology to accurately predict the traits of such a person raises serious doubts about phrenology's status as a scientific theory. Despite lacking a good scientific basis, phrenology became immensely popular in the United States, where post–Civil War Americans were attracted to moral and personal improvement techniques and had little knowledge of true science (Thurs, 2007).

Interest in the paranormal also increased in the latter part of the nineteenth century, leading to the development of *parapsychology* in the twentieth century, a new field with the stated goal of scientifically studying paranormal phenomena. The paranormal is often defined as any phenomenon that is beyond ordinary experience and cannot be explained by conventional science. For example, extrasensory perception (ESP), or the transmission of information without any use of the senses, is a paranormal event. But is parapsychology scientific?

Science is a very careful, deliberate, and conservative approach to knowledge. As such, it does not propose complex, untested ideas to explain phenomena that may have simpler and more empirically justified explanations. In contrast, practitioners of pseudoscience often propose ideas when simpler explanations are available that are based on what is already known. For instance, parapsychologists use psychic ability to explain incidents in which a person seems to know something that he or she would not ordinarily be expected to know. In many cases, the simpler, more plausible explanation of psychic feats is that the person is secretly receiving information from someone else or just making a lucky guess. These explanations are well documented, whereas nonphysical psychic abilities such as ESP have not been clearly demonstrated.

DISTINGUISHING MODERN EXAMPLES OF PSEUDOSCIENCE FROM SCIENCE

Pseudoscience merely appears to be a science; it lacks the characteristics that make a field or approach truly scientific. People who practice pseudoscience seem to just go through the motions of scientific practice. To illustrate this imitation of real science, the Nobel prize–winning physicist Richard Feynman compared pseudoscience with the beliefs and practices of islanders in the South Seas. During World War II, the scientifically uneducated natives saw wonderful goods arriving from the sky and assumed their technologically advanced visitors (i.e., supply planes) were benevolent gods. The natives thus engaged in rituals to recreate the situation: They imitated construction of runways, complete with setting fires alongside the simulated runways. They also built huts in which a man would sit while wearing two wooden pieces on his head to imitate radio headphones; they even stuck bamboo poles out of the hut to imitate radio antennae. The natives then waited for the next delivery of the gods' wonderful cargo—but, unsurprisingly, the planes never came. Although the natives went through the motions of the air delivery of cargo, their rituals did not capture the real practice of science and technology. In the same way, people who practice pseudoscience mimic the conduct of science, engaging in "cargo cult science" (Feynman, 1985).

We can apply the concepts outlined in Table 5.1 to analyze parapsychology and psychic predictions to determine whether parapsychology is a pseudoscience that merely goes through the motions of practicing real science. This analysis suggests that parapsychology meets several of the criteria for classification as a pseudoscience. Psychics who supposedly have precognition and the parapsychologists who study

them often do not make specific, testable, and falsifiable predictions. Rather, psychics often make very general predictions about the future that are difficult to refute. If a parapsychologist can interpret a variety of outcomes as supporting a psychic's prediction, then the predictions are not falsifiable.

A good example of how parapsychologists are reluctant to develop hypotheses that can be tested and potentially shown to be false can be found in a book by Rogo and Bayless (1979), in which they claim to have discovered that many people receive phone calls from the dead. It is extremely difficult to determine whether such calls really came from spirits, however, because the calls are unpredictable and brief. When observations cannot be made that address a question, it is not a testable, scientific hypothesis. The implausible claim that spirits can make phone calls (when they do not have physical hands to dial) is not testable. More "earthly" alternative explanations should be considered, such as that some confused person mistakenly made the call and then hung up.

Another reason why parapsychology seems to be pseudoscientific is the tendency of parapsychologists to make excuses for negative findings. For instance, some parapsychologists have argued that certain ESP experiments have failed to produce evidence for the existence of ESP because the skeptical scientists running the experiments created "negative vibrations" as they made their observations. This phenomenon purportedly disturbs the subtle and fragile effects of ESP, preventing the observation of ESP as long as the skeptical observer is present. This special pleading makes the ESP hypothesis unfalsifiable because a failure to find evidence for ESP is interpreted not as disconfirming evidence for ESP, but as interference from the act of scientifically studying it. In explaining away unwanted results, parapsychologists demonstrate the thinking error of inappropriate post hoc reasoning (see Chapter 4), making their hypotheses impossible to test and, therefore, impossible to prove false.

Like astrologers, psychics who predict the future often do not keep track of all the times their predictions do not come true. Rather, they tend to emphasize successful predictions and ignore unsuccessful ones, showing a strong bias toward confirmation of their predictions. Similarly, parapsychologists sometimes interpret their data using a confirmatory strategy called *psi missing*, in which a long string of incorrect (random) guesses is interpreted as too improbable to be anything but evidence that psi (the ability underlying ESP) is operating. In contrast, scientists take seriously the results of experiments that do not turn out as predicted.

After decades of research, ESP has still not been reliably demonstrated. A meta-analysis by Milton and Wiseman (1999) of 30 well-conducted studies

found that participants performed at approximately chance levels on ESP tasks. ESP seems to be unreliable and has, at best, a very minimal effect if it exists at all. Despite the many anecdotes and personal experiences offered to support it, well-controlled scientific experiments do not support psychic prediction. In this regard, comedian Jay Leno has asked, "How come you never see the headline, 'Psychic Wins Lottery'?" Nevertheless, believers in parapsychology continue to maintain that ESP and psi exist even though hard evidence to support them is lacking—a hallmark of pseudoscience (Bunge, 1984).

Practice Thinking 5.3: Providing Reasons Why a Field Is a Pseudoscience

For each of the following, list two reasons why the example may be classified as a pseudoscience.

Mesmerism

Reason 1: _____

Reason 2: _____

Phrenology

Reason 1: _____

Reason 2: _____

Parapsychology

Reason 1: _____

Reason 2: _____

THE DEVELOPMENT OF EVIDENCE-BASED TREATMENTS

The history of the treatment of mental disorders has been a mixture of prescientific, pseudoscientific, and even scary practices that have sometimes led to the more recent development of treatments that really work. For centuries, and

in some places even today, people have used various techniques to cast out evil spirits believed to cause strange and unacceptable behaviors in "possessed" people. Psychologists would now regard many of these unfortunate people as having suffered from mental disorders. Sometimes an effective technique, such as electroconvulsive shock therapy (ECT), may have developed from earlier efforts to shock some evil entity out of a person. ECT, which to some might seem barbaric, has been refined so that nowadays the patient is unconscious during treatment to minimize the distress. Clinical researchers have found ECT to be an effective treatment for depression that is resistant to other therapies (Pagnin, de Queroz, Pini, & Cassano, 2004). In contrast, other treatments—such as the psychosurgery practiced in the 1940s, in which an ice pick was inserted through the nose to destroy frontal areas of the brain in an effort to control aggression—have been discarded because they were found to be ineffective.

These examples raise the important question of how we find out which treatments really help people with psychological problems and which treatments are ineffective or might even be harmful. This concern reflects an increasing commitment among many psychologists to **evidence-based treatments (EBTs)**—that is, treatments for psychological problems whose effectiveness is validated through high-quality scientific research. Paralleling this emphasis on EBTs is the concern that some psychotherapists use treatments that have no scientifically demonstrated effectiveness and that might be pseudoscientific. To better understand the development of this emphasis, it is useful to briefly review the history of the movement toward EBTs in psychology and psychiatry.

In a review tracing the evolution of EBTs, Gordon Paul (2007) began with what he called the "prescientific era" in psychology, which lasted until the 1920s. During this time, different schools of psychology had their own approaches and made little effort to empirically examine the effectiveness of the treatments they advocated. The movement toward EBTs partly coincides with the development of behavior therapy and its many spinoffs, which borrowed heavily from learning theory and the behaviorist approach while testing treatments scientifically.

In 1924, Mary Cover Jones, a student of J. B. Watson, applied the behaviorist learning theory approach to help Peter, a young boy with a phobia (irrational fear) of rabbits. She first allowed Peter to observe other children playing with a rabbit without any negative effects. Then she exposed Peter to the rabbit when he was not showing fear. Over time, Peter was able to move closer and closer to the rabbit without showing fear. Later, Joseph Wolpe (1958) developed a behavior therapy called *systematic desensitization,* combining elements of Jones's treatment with a relaxation technique that Edmond Jacobsen (1935) had shown to be

effective in reducing anxiety. In systematic desensitization, a phobic person learns to move closer to a feared object or engage in a feared activity while being helped to relax. The behaviorists' early attempts to test the outcomes of treatments based on learning-theory principles were important to the scientific study of psychotherapy, but those early studies were often case studies and simple demonstrations.

After World War II, many clinicians, who had previously been trained in research but got involved in clinical and applied work during the war, became increasingly concerned about the best way to train their new students for clinical practice (Paul, 2007). This concern eventually led to an important conference in Boulder, Colorado, in 1950 that addressed graduate education in clinical psychology (Raimy, 1950). Out of this conference came the "Boulder Model," also known as the *scientist–practitioner model,* which proposes that graduate programs in clinical psychology should train psychotherapists to become both research scientists and practitioners.

Increasing attention to the scientific study of psychotherapy was followed by yet more conferences focused on the scientific basis of psychotherapy, but some clinicians continued to resist the idea that psychotherapy could be studied scientifically. Much debate centered on the "criterion problem," or how to determine what makes one outcome of psychotherapy better than another. Recall that critical thinkers seek to carefully define their terms and are often concerned with the criteria, standards, and conditions that must be met for a statement to be considered true. Increasingly, psychologists came to agree that demonstrating the effectiveness of psychotherapy would require careful use of scientific research methods like those applied in other parts of psychological science. In turn, clinical researchers needed to carefully design experiments that would allow them to unambiguously interpret the results of manipulating independent variables, such as the comparison of various treatments.

An important push in this direction came in the 1960s and 1970s, from clinical research that focused on behavior therapies. After conducting many studies, researchers discovered that cognitive versions of some therapies were effective as well. For example, covert desensitization, in which a phobic person simply imagines moving closer to the feared object, also helped some patients overcome their phobias. Recall from Chapter 1 that Bandura's social learning theory assumes that observing someone engaging in a behavior makes it more likely the observer will also engage in the behavior (especially if doing so was reinforced). This is likely a reason why Mary Cover Jones was successful in treating Peter—because Peter saw the other children playing with a rabbit without suffering any dire consequences and was subsequently able to imitate their behavior.

Still other types of cognitive behavior therapies were developed that could effectively treat depression. This led to refinements of the original behavioral learning theory, called *cognitive theories* of depression, and more generally to treatments called *cognitive behavior therapy* (Beck, 1963). Although the theory of how cognitive behavior therapy works still lags behind the therapeutic technology, scientific research has made some progress in this area, improving the theory's predictive and explanatory power (Beck, 2005). This lag of theory behind practice is common in the history of science. Researchers have discovered many effective treatments before formulating a theory as to *why* a particular treatment was effective. For instance, certain presurgical sedatives were observed to also help reduce psychosis in patients with schizophrenia—that is, to ease these patients' severe symptoms that reveal a disconnection from conventional reality. Subsequently, scientists began the careful, systematic study of the biochemical causes of schizophrenia that would explain *why* these drugs worked. This line of research ultimately led to the hypothesis that antipsychotic drugs block high levels of the neurotransmitter dopamine at certain receptor sites in the brain.

For many clinical researchers, the **efficacy** of a specific treatment came to mean how well people functioned after receiving that treatment when compared with other treatments for the same problem under well-controlled testing conditions. Specifically, the gold standard of efficacy research has become the **randomized-trial experiment** (Gaudiano, Dalrymple, Weinstock, & Lohr, 2015). In such studies, experimenters randomly assign clients with a certain psychological disorder to one of two groups: One group undergoes a specific treatment, while the other serves as a control group whose members either wait for treatment or receive some mock or alternative treatment. In this way, the effectiveness of treatments can be compared under controlled conditions, thereby reducing the chance that some extraneous variable might confound the results (see Chapter 4).

Clinical researchers use several strategies to control expectations and other potentially confounding variables to determine how effective a treatment actually is. For example, placebo groups are used to control for expectations created by the appearance of getting an effective treatment. In such a study, the experimental group receives the real treatment or therapy, and the placebo control group, which does not receive the treatment, is given a fake or treatment that looks like the active treatment but actually has no effect. By comparing the two groups, experimenters can be fairly sure that any observed effect was due to the treatment and not the expectations associated with receiving a treatment.

Another potential confounding variable, called **spontaneous remission**, can mask the true effectiveness of a treatment. In spontaneous remission, a person

recovers from a problem spontaneously over time without the aid of a treatment. You have probably observed yourself recover from a condition on your own (spontaneously) without taking any kind of remedy. If a person gets better during the same time that treatment is given, it is difficult to determine whether that improvement was due to the treatment or to spontaneous improvement; alternatively, *both* factors might contribute to the improvement. Once again, the best way to determine the true relationship is to randomly assign participants to a control group that does not get the treatment, in which some participants are expected to improve spontaneously. When the control group's outcomes are compared with those of the group whose members actually received the active treatment, any observed effects can be shown to be over and above the usual rate of spontaneous remission.

Efficacy of a therapy can be demonstrated by results from an internally valid, true experiment. Nevertheless, these results do not allow us to conclude that the therapy will work in real-world clinical settings. Thus, after efficacy is shown, the therapy should be tested in actual clinical settings with real people in studies of its effectiveness.

By the end of the 1970s, many studies had been done on the effectiveness of various psychotherapies, but new tools were needed to determine the relative effectiveness of specific treatments or kinds of psychotherapy. In 1980, Smith, Glass, and Miller reported results from a new type of study called a *meta-analysis* that allowed for the quantitative comparison of different treatments. As discussed in Chapter 1, a meta-analytic study is a kind of statistical analysis, usually reported in a review of the research that allows researchers to statistically compare the effect sizes of treatments.

For instance, in a simple meta-analysis, the effect size or the size of a treatment effect in a study can be calculated by dividing the difference between the means of two treatment conditions by a measure of the variability for the comparison. After calculating the individual effect sizes for various comparisons of interest, all of the relevant effect sizes can be averaged to find the overall effect size for a treatment. Because all the treatments have been converted to the same metric or measurement units, the average effect sizes for different kinds of treatments can be compared to see whether they are small, medium, or large.

Many meta-analyses have been conducted to compare the effectiveness of psychotherapies as treatments for specific disorders since the study by Smith and colleagues (1980), with much controversy swirling around the various results. One of the main controversies has been whether any psychotherapy can be shown to be more effective than others. Recent commentaries and meta-analytic studies

have tended to show that some treatments are more effective for specific problems and disorders than other treatments (e.g., Hunsley & Di Giulio, 2002). Although some EBTs have been found to be more effective for certain disorders, more research is needed on other therapies whose effectiveness remains less clear (Baker, McFall, & Shoham, 2009). In recent years, several books and articles have been published that make large-scale comparisons of psychotherapies for a range of disorders based on high-quality research (e.g., Chambless & Ollendick, 2001; Nathan & Gorman, 2007).

In contrast, when a pseudoscientific practice has been developed, its proponents fail to follow up with research that uses adequate controls to ensure the validity of their findings. As a result, they mistakenly conclude that the pseudoscientific theory presumed to underlie the effect has been supported when a placebo effect or other confounding variable might, in fact, have caused the improvement. In such cases, a person getting an ineffective treatment may report that the treatment was effective when it was actually the expectation, rather than the treatment itself, that led to the reported improvement.

This criticism applies to the use of many new therapies developed in recent years. Some of these treatments and practices have not yet been adequately tested, whereas others have been evaluated but failed to show effectiveness. In either case, the treatment is not well supported. Treatments that have been tested and shown to be ineffective may be considered pseudoscientific if they are still promoted as effective. A key concern about these new treatments is related to the profession's widespread acceptance of the idea that clinical practitioners should be trained to be scientists and be expected to behave as good scientists behave. Unfortunately, many clinicians continue to use poorly supported, pseudoscientific treatments, which contributes to what is perceived as a growing scientist–practitioner gap (Lilienfeld et al., 2015; Tavris, 2003).

EXAMPLES OF PSEUDOSCIENTIFIC AND POORLY SUPPORTED PRACTICES

The practices discussed in this section have several of the "marks" of pseudoscience or have not been adequately studied to determine their effectiveness. Some meet many of the criteria outlined in Table 5.1, indicating that a field or practice is pseudoscientific. At the very least, both professionals and clients should be skeptical about using such practices and treatments. Even if the treatment is harmless, a client who receives such a treatment may be less likely to get help than the same client would receive from a therapist who employs a more effective, evidence-based

approach. Devoting resources to pseudoscientific therapies certainly wastes time and money that could have been better spent on more effective treatment.

Freudian psychoanalysis, developed by Sigmund Freud, was perhaps the first psychotherapy to be underpinned by an elaborate theory of how it worked. It may surprise you to learn that some who have examined psychoanalysis have persuasively argued that Freud's famous therapeutic approach is pseudoscientific (e.g., Blitz, 1991; Popper, 1959; Van Rillaers, 1991). The philosopher of science Karl Popper found in discussions with Alfred Adler, one of Freud's students, that Adler could use psychoanalytic theory to account for observations from any case, even when data contradicted the original prediction. Recall that true scientists make specific predictions that are testable and falsifiable. In contrast, Adler and other psychoanalysts sometimes expanded the meaning of predictions or hypotheses to account for data that did not fit their predictions.

Adler considered the ability of psychoanalysts to explain any observation to be a strength of the theory, but Popper argued that it was just the opposite. According to Popper, this sort of "after-the-fact" explanation made psychoanalysis incapable of being falsified or refuted. By shielding itself from falsification, he claimed, psychoanalysis was a pseudoscience.

Closer examination of psychoanalytic theory shows that it is the theory itself that tends to make it hard to test and falsify. One key assumption is that psychological problems are due to unconscious motives resulting from traumas, conflicts, and other problems that may have occurred in a person's childhood. The psychoanalyst is charged with helping the patient become aware of these unconscious motives so that the patient can gain insight and overcome the obstacles they impose. This process is difficult because the therapist knows about the unconscious motives and conflicts only through interpretation of the statements and actions of the patient, who is not consciously aware of them.

Freud also interpreted dreams that patients reported as a way to uncover unconscious material, applying a psychoanalytic interpretation of what he thought were symbolic elements of the dream. Subsequent research on dreams has shown that they are often about mundane, everyday events that lack any particular symbolic meaning. Sometimes patients would object to Freud's interpretations, but Freud argued that a patient's resistance to his interpretation indicated that he was getting closer to uncovering the unconscious origin of the problem. Of course, an alternative explanation is that Freud was showing confirmation bias and using the rather general ideas of psychoanalytic theory to impose his own symbolic interpretations of the statements and dreams that he assumed reflected unconscious motives of which neither he nor his client was aware.

Another problem with psychoanalysis is that it has been mostly supported by case study data, a relatively low-quality kind of evidence—and sometimes not even by *good* case study data. For example, one of Freud's important cases was that of Dora; by his own admission, this case was based largely on his memory of their exchanges (Eisner, 2000). Moreover, Freud was not particularly interested in verifying the history of his patients; this failure to confirm the facts of a case further weakened his claims that some unconscious event from his patient's past was causing the problem. It is not even clear whether Freud accurately diagnosed Dora, given modern ideas about psychological disorders (Eisner, 2000). Despite the fact that psychoanalysis has been supported primarily by case study data and almost no higher-quality data from experiments, followers of Freud continue to maintain that psychoanalytic theory is correct and that psychoanalysis is effective.

Practice Thinking 5.4: Is It a Pseudoscience?

Use Table 5.1 to decide whether the approach in the following example is pseudoscientific. Write down reasons for your decision.

Developed by a science-fiction writer, this approach to therapy is based on the writer's observations of people and his philosophizing about the human condition of suffering. He reported his early findings and a description of successes with the approach in a science-fiction magazine. None of these case studies or any other research on the approach has been published in a peer-reviewed psychology or psychiatric journal, but testimonials from many of its adherents claim that the approach is effective.

The organization trains its counselors, called *auditors,* to interview and guide people who pay for these sessions as part of joining the organization. The auditing session involves use of an electropsychometer (e-meter) that works much like a galvanic skin-response device used to detect anxiety and stress. The auditor is said to help the person remove implants or problematic memory traces that lead to stress, anxiety, and other problems of the human condition. The approach claims that memory traces underlying human problems originated from "thetans" (extraterrestrial spirits) who were left here 75 million years ago by a galactic tyrant named Xenu. Thetans later entered the bodies of the humans populating Earth at the time. When these implants are removed, the person is said to be "clear."

In this respect, the approach resembles psychoanalysis, but its advocates have been critical of Freudian theory. Other published writings about the approach claim that Darwin's theory of evolution is misguided and that his theory originated in an ancient Egyptian myth about life originating from the primordial ocean.

Reason 1: _____

Reason 2: _____

Reason 3: _____

Reason 4: _____

Reason 5: _____

Conclusion: _____

Pseudoscientific Treatments for Autism

Autism is a serious condition usually associated with severe problems with language and communication, impaired intellectual development, and repetitive movements that sometimes become self-injurious behaviors. As you might expect, parents of autistic children are often desperate to find the cause of, as well as effective treatment for, this condition so that they can communicate better with their children. In recent years, the number of autism diagnoses has greatly increased, and the prevalence of the disorder is now about 1 in 100 children in the United States (Zaroff & Uhm, 2012).

It is not surprising, then, that many parents of autistic children were elated when in the early 1990s practitioners of **Facilitated Communication** (FC) claimed they could help autistic people learn to communicate as well as non-autistic people. According to FC theory, autism is not a language-ability problem, but rather a motor-control problem that is solved by having facilitators help autistic people steady their movements. In FC, a facilitator helps the autistic person communicate through a special keyboard. Amazingly, as soon as facilitators began to steady the hands of autistic people when typing on the keyboard, they observed that the autistic people could write articulate essays and even poems. Many cases were reported of autistic people showing normal and sometimes even gifted writing, suggesting their intellectual abilities had been greatly underestimated (Crossley, 1992).

When FC was tested in well-controlled experiments, however, it became clear that the facilitators—not the autistic children—were unconsciously authoring the communications (Mostert, 2001). Researchers experimentally manipulated the stimuli so that in some trials, trained facilitators were blind to (i.e., did not know) the target stimulus for the autistic participants; in other trials, they did know what the target stimulus was. Researchers consistently found that in trials in which facilitators knew what target their partners received, the facilitators typed that message; in contrast, in trials in which facilitators did not know the target, they did not type that message. When confronted with the evidence that they had authored the messages, facilitators claimed to be unaware of their actions.

Despite numerous studies that have failed to support claims of the effectiveness of FC, practitioners persist in using it, even though more effective treatments are available (Herbert, Sharp, & Gaudiano, 2002; Romanczyk, Arnstein, Soorya, & Gillis, 2003). In fact, upon further analysis, FC was shown not only to be ineffective but also to have done damage. Some facilitated messages had falsely claimed that the parents of autistic children had abused them, embroiling the parents in legal cases (Green, 2002). FC had also raised false hopes among parents of being able to at long last communicate with their children. Finally, FC had deprived autistic people of more effective treatment that was available, such as behavior therapy.

In the mid-1990s, new concerns about increases in autism cases led to other speculation about the source of autism. Some parents claimed that soon after getting the measles, mumps, and rubella (MMR) vaccine, their children had developed autism. In 1998, Dr. Andrew Wakefield published an article in the prestigious medical journal *The Lancet,* claiming that eight children who had received the MMR vaccine had developed autism. Wakefield and others initiated a campaign, conducted through the media, that urged people not to vaccinate their children. Despite a public outcry against vaccines, epidemiological studies reviewed by Offit (2008) clearly showed that greater use of vaccines was not related to the increased incidence of autism. Moreover, Wakefield's 1998 research was severely attacked for its low quality, and *The Lancet* eventually retracted the article. Unfortunately, the damage had been done: Many unvaccinated children developed measles and other potentially deadly diseases—and a few children even died from them.

Thought Field Therapy (TFT) is one of a number of recent therapies referred to as *power therapies* because they are said to produce fast-acting and strong results (Swenson, 1999). TFT and other power therapies, such as Ear Tapping Desensitization and Emotional Freedom Technique, assume that tapping certain

acupressure points or meridians will help a person rapidly overcome even severe psychological problems. TFT is based on ideas that Roger Callahan (1997) adapted from Chinese traditional medicine, which claim that energy in the body becomes blocked or unbalanced at certain points called meridians. Tapping these points can restore the balance of energy. Callahan (1997) reported that he discovered TFT when working with a client named Mary, who suffered from a phobia of water that left her sick to her stomach. After trying other techniques without success, he tried tapping the acupressure points under the eye that correlate to the stomach. Mary immediately reported that she no longer feared water.

TFT is implausible, given what is known about psychology and therapy. Proponents of this therapy claim that it can cure almost everyone, almost immediately, of fairly severe psychological disorders. This prospect is particularly attractive to insurance companies, which would much rather reimburse patients for mental health care that is completed in one or two TFT sessions, as opposed to a year's worth of psychoanalyst visits.

TFT is perhaps most implausible in its claims about the energy fields involved. The therapy's effects have been explained in quantum physics terminology, which is not usually applied to explain psychological processes. It has been said that TFT acts by subsumption of the micro state of energy perturbations and active information to eliminate negative emotion at the macro state level. This explanation may "sound" scientific, but it does not directly follow from quantum theory in physics, especially at the level of the emotions. Besides quantum theory, TFT has been explained in terms of energy moving through channels in the body like the *chi* of ancient Chinese medicine—a view of energy that has been supported neither by physics nor by scientific study of the body's functioning. TFT has not received empirical support from well-controlled studies.

Practice Thinking 5.5: Reasons Why a Therapy May Be Pseudoscientific

For each of the following treatment examples, list two reasons why it may be classified as a pseudoscience.

Psychoanalysis

Reason 1: _____

Reason 2: _____

Facilitated Communication

Reason 1: _____

Reason 2: _____

Thought Field Therapy

Reason 1: _____

Reason 2: _____

Self-Help Techniques

The self-help industry in the United States reportedly pulls in $8.5 billion per year in gross revenues (Salerno, 2005). Proponents of self-help treatments have made diverse claims about their effectiveness, such as that these techniques can cure autism, "turn back the clock," cure depression, or unlock the secret to living a fulfilling life. Self-help treatments often are presented in book form, although tapes, CDs, videos, and Internet sites have become increasingly popular formats. The origins of the self-help movement in the United States can be traced back to the 1600s, with the popularity and influence of these techniques greatly increasing in the later part of the twentieth century. In the United States, their appeal has been associated with the emphasis on positive thinking and an ethic of personal responsibility that are interwoven into American culture (Watkins, 2008).

Commercialization of self-help techniques has created media and financial empires like the one presided over by Oprah Winfrey. Although the self-help tips Oprah featured on her television program tended to be good (Kosova & Wingert, 2009), she also featured implausible approaches, such as *The Secret*. Proponents of *The Secret* claim that life is governed by the "law of attraction," maintaining that the universe vibrates with energy and that all the energy a person projects into life comes back to the individual in positive or negative form. This view is not just metaphorical to proponents of *The Secret*; that is, they believe that if people think positively, they will attract positive energy and cause positive things to happen. Proponents tell stories of how they used positive visualization to change physical reality, such as causing irreparably damaged tissue to heal.

Such stories often have other, more plausible and less miraculous explanations. A person may also have received medical treatment that turned out to be

more effective than expected or the severity of a medical problem may have been grossly overestimated. In other cases, when use of *The Secret*'s positive thinking principles failed to cure a person, the case has not been treated as a failure of *The Secret* but rather attributed to "God having other plans" for the person. As with creationism/intelligent design, introducing supernatural entities or forces that are not directly observable to explain observable events is a maneuver that makes predictions untestable and ultimately not falsifiable.

Applications of *The Secret* turned deadly when James Arthur Ray, a self-help superstar, attracted more than 50 people to a $10,000, five-day seminar at his Arizona sweat lodge. During a ritual procedure to overcome their fear of death, in which the participants were deprived of water in the sweat lodge during a 2-hour ceremony, 3 people died and 18 people were hospitalized. Ray was subsequently convicted of three counts of homicide.

The Secret is a prime example of the emphasis on positive thinking in self-help programs, but it is just one of the many instances. One of the first such approaches to receive wide attention was outlined in *The Power of Positive Thinking*, a book by the minister Norman Vincent Peale (1952). A more recent, related development has been the emphasis on self-esteem, in which a person's problems are usually assumed to result from not thinking positively enough about oneself. For example, low self-esteem has been suggested as the cause of problems such as violent behavior and poor academic performance. Many educators in the 1980s concluded that low self-esteem was the cause of poor performance, both in math and in school in general. What ensued were concerted efforts to raise students' self-esteem concerning their ability to do math and other schoolwork. After years of attempting to improve performance by raising self-esteem, U.S. students began to report that they felt happy about their math performance, even though their performance continued to lag far behind that of students in other developed nations.

Self-help books and materials offer several potential benefits. In the face of today's emphasis on managed care and limitations on how much insurance pays for mental health care, they could be an economical way to provide mental health services. Self-help can also increase people's self-efficacy or their evaluation of how well they can do some task or cope in general. Therapists often use a kind of supervised self-help as an adjunct to therapy when they have clients engage in guided practice outside the clinician's office.

But does self-help work? Self-help techniques are not always based on scientific research, so their true efficacy may be unknown (Watkins & Clum, 2008). Indeed, most self-help treatments have not been studied to determine

their effectiveness (Rosen, Glasgow, Moore, & Barrera, 2014). Steve Salerno, an investigative journalist, has uncovered some illuminating facts about self-help programs that have raised important questions about these approaches. Rodale Press, where Salerno served as a self-help editor, conducted a study of who bought self-help books and found that the same people tend to repeatedly use self-help programs, buying new books in 18-month cycles. This raises a troubling question: Why would the same people need to use a new book or technique if a previous self-help program was effective?

Unfortunately, although they seem like an economical way to extend therapy services, self-help techniques do not always work. In one study, therapists instructed clients to use a well-documented treatment procedure; 50% of the clients did not improve because they failed to carry out their instructional assignments, even though many of them could successfully carry out the treatment procedure (Rosen, Glasgow, & Barrera, 1976).

Another danger is that those individuals who use self-help materials are essentially diagnosing themselves. As will be discussed in Chapter 13, diagnosis is a difficult task that even clinicians sometimes do not perform well. It is doubtful that unsupervised laypersons would be able to accurately diagnose their own problems; they may, therefore, misidentify their problems and treat themselves for the wrong thing.

Alternative Medicine and Natural Cures

Recent years have brought a surge of interest in natural cures for physical and mental problems—a type of care sometimes called *alternative medicine*, to distinguish it from more conventional medicine, which is also known as *traditional medicine*. In reality, alternative medicine is sometimes more "traditional" than traditional medicine, in that alternative medicines are often based on treatments that have been passed along for centuries in mostly the same form.

Today, multibillion-dollar companies promote nutritional supplements as effective ways to improve mental functioning, mood, sleep, and memory, and even as cures for psychological disorders. Indeed, even the famed scientist Linus Pauling, a Nobel Prize winner in chemistry, recommended taking megadoses of vitamin C as a cure for the common cold, cancer, and psychological problems. The idea of taking megadoses of vitamins became known as *ortho-molecular medicine*. Despite efforts to show that megadoses of vitamins can reduce both physical and mental health problems, no reliable effects have been found from this practice.

Nevertheless, companies continue to try to cash in on the power of vitamins. A recent example is the vitamin supplement "Airborne"; its manufacturer

advertised that the supplement could prevent and effectively treat colds—that is, until the company was forced to recant these claims and pay a $23.3 million penalty for false advertising. Ginkgo biloba, a popular supplement for improving memory and cognitive function, may increase brain circulation, but its effect on memory is similar to the slight benefit produced by eating a candy bar or drinking a cup of coffee (Gold, Cahill, & Wenk, 2002).

A major problem with natural cures and nutritional supplements is that they often go untested. Although advertisers often brag that they are "clinically proven" to work, this designation has no standard meaning or recognition by the U.S. Food and Drug Administration. It could simply mean a company has given it to some people who reported that it worked, perhaps just showing a placebo effect.

Magnet therapy, in which a magnet is typically placed on or near the body to promote health, is an alternative treatment that generates more than $1 billion in annual worldwide revenues (Flamm, 2006). Magnets are often worn as a ring or bracelet, but magnet therapy may employ magnetized water or creams, too. The most common uses are to reduce pain or restore general well-being, but some proponents have even claimed that magnets can prevent or cure cancer. The commonly made claim that magnets work by improving blood flow is implausible and has not been supported by research (Polk & Postow, 1996). If the static magnets worked to attract red blood cells, then the skin under a magnet would turn red as blood flows to the region, but no such effects are observed.

Scientific studies comparing magnets with placebo (sham) magnets have not revealed any clear benefits of magnets, but testing with placebo controls is challenging (Flamm, 2006). Participants wearing actual magnets probably notice that their magnets attract small metal objects, such as paper clips, and so learn that they are in a real treatment group—which defeats the purpose of the placebo control. Nevertheless, the fact that the user's expectations and the placebo effect can be a part of so many different kinds of treatments, such as medical treatments, psychotherapies, and magnet therapy, makes it essential that researchers use good placebo control groups.

SUMMARY

Pseudoscience only appears to be scientific and makes implausible claims that lack the support of good scientific evidence. Numerous types of pseudoscientific practitioners, such as astrologers, mesmerists, and phrenologists, have often made

claims of psychological insights and benefits in the past. Practitioners of some new therapies, such as attachment therapy and Thought Field Therapy (TFT), continue to make pseudoscientific claims in the twenty-first century.

In general, those who practice pseudoscience make what they are doing look scientific, but they are not really engaging in science. They often make vague, untestable, unfalsifiable predictions and fail to systematically check the outcomes of their predictions, showing a confirmatory bias. They reason incorrectly when making their claims and hypotheses, and they do not use accepted standards of evidence, methods, techniques, and terminology from related scientific fields, making implausible claims and using low-quality evidence and obscure terminology.

Increasingly, psychology has emphasized the need for treatments that show efficacy—that is, treatments shown by high-quality, empirical research to be effective. Clinical researchers often consider randomized trials or true experiments to be the "gold standard" for determining the efficacy of treatments, especially when the treatments are methodically compared with sham treatments, placebos, and other appropriate control groups. Despite the greater attention paid by scientific psychology to the development of evidence-based treatments for psychological problems, the use of pseudoscientific treatments, such as Facilitated Communication (FC) and TFT, persists. Also, many people continue to use many pseudoscientific alternative treatments such as magnet therapy that lack support. Likewise, people often use self-help therapies that lack support, although some of the few that have been studied have been shown to be effective.

Practice Thinking 5.6: WHAT DO YOU THINK **NOW**? Please explain how you know.

1. What is pseudoscience, and why study it?

2. Are some psychotherapies dangerous?

3. Are some therapies more effective than others? If so, which ones? How do you know?

4. Do self-help books and programs really help?

5. Can nutritional supplements improve your memory or cure psychological problems?

REVIEW QUESTIONS

1. What is pseudoscience? How does it differ from true science? What is cargo cult science?
2. Why is it important to learn about pseudoscience?
3. Where have pseudosciences come from?
4. How is astrology related to astronomy? Alchemy to chemistry? Mesmerism to hypnosis?
5. Which criteria are used to distinguish pseudoscience from science? (See Table 5.1.)
6. What is an evidence-based treatment (EBT)? What are some examples of EBTs?
   - What is the "gold standard" for determining the efficacy of a treatment?
   - Why are placebo control groups needed?
   - What is spontaneous remission?
   - What is a blind control?
7. How do pseudoscientific practices differ from poorly supported practices?
8. Why do many psychologists believe that psychoanalysis is pseudoscientific?
9. Why might you think FC is pseudoscientific?
10. Why might you think TFT is pseudoscientific?
11. What are the advantages and disadvantages of self-help treatments and techniques?
12. What are examples of alternative medicine that are ineffective? Why are they ineffective?
13. Why might you think that magnet therapy is pseudoscientific?
14. What did this chapter discuss regarding psychological misconceptions?