

Chapter 4

MARGINAL SCIENCE

Up to now, the examples we have studied all belong within the mainstream of the Western scientific tradition. In this chapter, by contrast, we examine several examples whose very status as science would often be questioned. It is important to gain experience in evaluating such examples because the popular media contain many instances of purportedly scientific reports whose conclusions are, in fact, highly questionable. Often no indication is given that these instances are any different from cases clearly within the mainstream practice of modern science.

Many textbooks on philosophy, logic, or science attempt to provide simple criteria that we could use to distinguish genuine science from **pseudoscience**. We will not follow this strategy because we think it is impossible to devise the required criteria. For example, it is often said that science involves experimentation and pseudoscience lacks experiments. However, there are no experiments in astrophysics, which everyone admits is a genuine science. On the other hand, parapsychologists do perform experiments, and many people would regard parapsychology as a pseudoscience. We suspect there are similar counterexamples for any simple criterion that might be proposed to sort the supposedly scientific sheep from the pseudoscientific goats.

Rather than seeking special principles to draw a sharp line between science and pseudoscience, we will simply apply to these new cases the program we have already developed. The question for us is not whether a particular inquiry is genuinely scientific. The question is simply whether the data cited do or do not provide evidence for a proposed hypothesis. We will find that there are types of inquiries for which the data cited typically turn out to be **inconclusive**. Such inquiries, we will say, are instances of **marginal science**. This leaves open the possibility that similar inquiries might one day move into the scientific mainstream.

The approach we are taking presumes only that there is some sort of model being proposed and that some data are being cited in support of the hypothesis that the proposed model represents the real world. So the only sorts of inquiries excluded from our approach would be those that either (1) deny using models to represent the world, or (2) deny the relevance of an appeal to empirical data in support of the corresponding hypotheses. In the

first case, we would say that we are not dealing with a scientific inquiry at all. Some studies of poetry could be examples of such nonscientific inquiries.

In the second case, if one makes no appeal to data about what has actually been experienced in the world, what could be the basis for claims that the proposed models do represent the world? In the past, many people have claimed to have ways of authenticating models as representing the world without appealing to empirical data. And some people still do. Claims regarding religious doctrines often take this form. This dispute can be both interesting and important, but we do not pursue it in this text. Science has become so prominent in Western culture that even advocates of the most outlandish hypotheses typically cite empirical data in support of their claims. In all these cases, we can apply our standard program for evaluating the proposed hypotheses.

It is a curious fact about modern culture that subjects on the margins of established science go through phases ranging from widespread interest to relative obscurity. At any particular time, a few will be relatively popular, whereas others languish. What follows is a survey of some perennial favorites.

4.1 FREUDIAN PSYCHOLOGY

Our first case, Freudian psychology, is clearly a marginal science. A century after Freud's early work, the categories of his theory have become part of everyday language. Yet the scientific status of his theories continues to be a subject of much debate within the scientific community.

Sigmund Freud was born in 1856 and lived most of his life in Vienna. He studied medicine and then spent more than a decade conducting research in neurophysiology. Unable to continue making a living doing research, he began attempting to treat people who, because he knew something about the brain and nervous system, came to him seeking help for various psychological disorders. He spent the rest of his life developing a theory of the mind and a technique (**psychoanalysis**) for treating people with psychological problems. Freud's theory and the clinical technique developed side by side over several decades until his death in 1939. His evidence for the correctness of the theory came primarily from his clinical practice. What follows is a partial sketch of Freud's mature theory.

FREUD'S THEORY

In Freud's model, the mind has several different structures, each with distinct characteristics and functions. One structure consists of three parts, the **unconscious** mind, the **preconscious** mind, and the **conscious** mind. The difference is a matter of awareness. We are not aware of things in our unconscious mind but are aware of things in our conscious mind. Objects of the preconscious mind can, with special efforts, sometimes be brought to awareness.

Another structure also consists of three parts: the **id**, **ego**, and **superego**. The **id** consists of primitive, primarily biological, desires whose fulfillment produces pleasure. The **superego** contains the rules of proper behavior that are learned from one's parents and others. It corresponds to what we normally call our "conscience." The **ego** is the part of the mind that engages the world and attempts to balance the demands of the **id** with the requirements of the **superego**. The **id** is mostly unconscious, whereas the **superego** is mostly conscious. These structures are pictured in Figure 4.1.

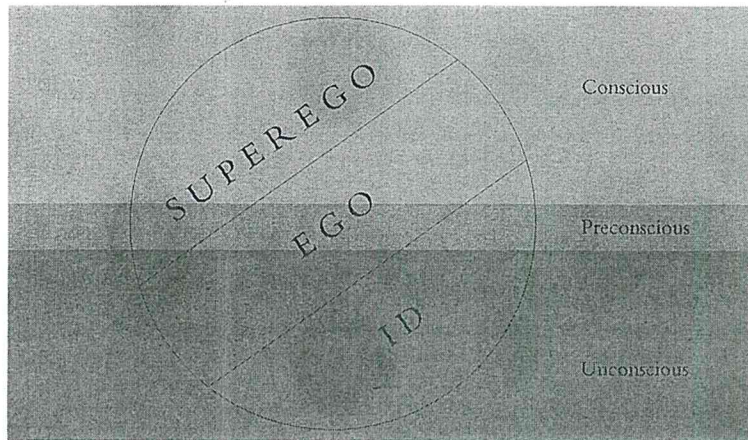


FIGURE 4.1

The elements of Freud's model of the human mind.

Freud also constructed a model of psychological **development** based on his model of the mind's structure. A young child, he said, is ruled primarily by his or her id. Early in childhood, boys and girls develop Oedipal, or Electra, complexes in which they form an emotional attachment to the parent of the opposite sex and reject the parent of the same sex. Thus, for example, Freud thought that little girls typically love their fathers and dislike their mothers. Successful ego development requires adapting to the demand of the superego that one identify with the parent of the same sex.

Caught between the conflicting demands of the id and the superego, the ego develops a number of **defense mechanisms** for coping with the stress. One is to **repress** the demands of the id by pushing them farther down into the unconscious. Another is to **project** thoughts or feelings from their real object onto another object. Operating defense mechanisms requires lots of psychic energy. In some cases, the ego may not be strong enough to cope successfully with the demands placed on it and loses touch with reality, directing the person to perform highly inappropriate, *psychotic* actions. Shakespeare's character, Lady Macbeth, always washing her hands, provides a classic example of such a psychosis.

Finally, Freud thought that psychological disorders could be cured if the patient could bring the source of the conflict into consciousness and come to understand its true causes. It is the job of the therapist, he thought, to help the patient perform this task.

THE CASE OF LITTLE HANS

Little Hans was the son of a Viennese physician who was also a friend of Freud's and a follower of his teachings. In the fall of 1907, 4-year-old Hans developed an extreme fear of horses, so much so that he refused to go outside, where there were many horses in the streets

pulling carriages. He even expressed the fear that a horse might come into his bedroom and bite him. His parents were much perplexed, so the father took Little Hans to see Dr. Freud.

Freud learned that Hans had spent the previous summer in a resort some distance from Vienna. There he had many playmates and spent much time alone with his mother during periods when the father was back in Vienna tending to his patients. Sometimes, when Hans was anxious about being alone in the dark, his mother let him spend the night in her bed. Hans was also alarmed when he heard someone else being warned not to get too close to a horse because it might bite him.

On returning to Vienna in the fall, the family moved to a larger apartment where Hans had few friends and his own bedroom. Earlier, he had shared his parents' bedroom. Hans's father now objected to his coming into the parents' bedroom in the mornings. And Hans spent much less time with his mother, there now being a nursemaid who would take him for walks in the park. On one of these walks, Hans was very frightened by a horse falling down in the street. It was shortly after this episode that Hans developed his extreme fear of horses. He expressed particular fear of the things the horses wore around their eyes and mouth.

FREUD'S HYPOTHESIS

Freud hypothesized that Hans was undergoing an Oedipal crisis. His id missed his mother's companionship and attention. But his ego was unconsciously afraid his father would be angry with him for wanting to spend more time with his mother. However, because Hans's superego had been taught that one should love one's parents, his ego repressed his fear of his father and displaced it onto horses. Why horses? Well, he had learned to fear being bitten by horses. Freud also thought that Hans must be associating the blinders and muzzles of the horses with his father's glasses and beard.

Applying his own theories to the case, Freud asked the child if his father's glasses and beard did not remind him of the blinders and muzzles of the horses. He then suggested to the child that maybe he really was afraid his father would disapprove of his desire for more time with the mother. Freud also asked the father to reassure Hans that he was not really angry at him for wanting more of the mother's attentions. Little Hans engaged in some symbolic defiance of the father. Over the next few days it seemed to the father that the symptoms did lessen somewhat. It was several months later, however, before the symptoms disappeared.

Analysis

Step 1. Real World. The real-world object of study is Little Hans and his fear of horses.

Step 2. Model. The model is Freud's model of psychological development in which little boys typically develop emotional attachments to their mothers and fear of their fathers. Because children are taught to love both their parents and boys to identify with their fathers, a psychological conflict may arise. To cope with such conflicts, a boy's ego may project the fear of the father onto another object, leading to abnormal behavior. So Freud suggested that Hans might be projecting his fear of his father onto horses.

Step 3. Prediction. Freud's model of clinical practice implies that bringing the true conflicts to consciousness and resolving them will eliminate the abnormal behavior. So the model predicts that by making Hans aware of the real source of his fear and reassuring him that nothing bad will happen if he admits his real feelings, his fear of horses will go away.

Step 4. Data. After treatment, Hans's fear of horses appeared to diminish and finally disappeared several months later.

Step 5. Negative Evidence? No. The data and the prediction do pretty much agree.

Step 6. Positive Evidence? Would the data have been likely to agree with the prediction even if Freud's model did not really fit the case? Are there other plausible models that would have yielded the same predictions?

Standard descriptions of this case do not mention other models, so we are left on our own to evaluate the question in Step 6. But it requires only a rudimentary knowledge of young children to come up with very plausible rival models.

Everyone knows that children desire attention and affection. By expressing fear of the dark, Hans gained the privilege of sleeping in his mother's bed. That tactic did not work with the father. Developing an extreme fear of horses, however, did gain Hans considerable attention, even from the father, who took him off to see his friend Freud. Having gained the attention he desired, Little Hans' symptoms gradually declined.

That the symptoms should go away in several months was, in any case, quite predictable, simply because children around the age of 4 are typically very changeable. They will outgrow most "phases" in a few months no matter what one does. Hans's fear of horses can be seen as a somewhat extreme phase but hardly that unusual for a 4-year-old.

The conclusion is that the results of this clinical case do not really provide much evidence for the correctness of Freud's theory (or for the efficacy of his method of treatment). Neither do they refute it. The data cited are inconclusive regarding the fit of Freud's hypotheses to the real world.

4.2 ASTROLOGY

Most scholars and scientists regard astrology as a marginal science at best. Yet polls indicate that as many as one-third of all Americans believe that there is something to the practice of astrology. Millions read their horoscopes in the daily newspaper. Special monthly magazines with more detailed daily horoscopes are available at news stands. There are also roughly 10,000 "professional" astrologers who make at least part of their living casting horoscopes and giving advice based on astrological lore.

The practice of astrology goes back to the Babylonians (about 2000 B.C.E.), to whom we also owe the beginnings of astronomy. The versions of astrology practiced today derive mainly from classical Greece (400 B.C.E. to 200 C.E.). The fact that the familiar signs of the zodiac are divided into earth signs, air signs, fire signs, and water signs is based on the Greek theory that everything is made of four basic elements: earth, air, fire, and water. The major classical works on astrology were written by the second-century Greek astronomer Ptolemy, the same person who developed the theory of the universe that Copernicus and Galileo challenged fourteen centuries later. Even some of the major figures in the Scientific Revolution of the seventeenth century, such as Johannes Kepler, combined the study of astrology with their work in astronomy.

At a time when the Sun, Moon, and planets were associated with gods (Jupiter, Mars, and so on) who were thought to influence human life, it was not unreasonable to suppose that the positions of the Sun, Moon, and planets at our birth might have some influence on our subsequent life. It also helps to believe that Earth is the center of the universe and not merely a middle-sized planet in orbit around a middle-sized star.

These beliefs have long since been given up. It is now well known that the gravitational force of the planets on Earth is minuscule. This book exerts a much greater gravitational

force on you right now than the planet Mars ever could. Where you now sit, the radio waves picked up by your portable radio are many times stronger than radio waves from Jupiter, and the magnetic field of the magnet that drives the radio's speaker is many times stronger than the magnetic field originating in any astronomical body other than Earth itself. There is just no good scientific reason to believe that there are any forces of the type assumed by astrology. Yet people continue to believe in astrology. Why?

In interviews with people who put at least some stock in astrological descriptions and predictions, the most common answer to the question why they believe in astrology is simply "it works." In saying that it works, people seem to be claiming that the descriptions and predictions based on astrological theories are realized in practice. What sorts of descriptions and predictions are these? Do they provide evidence that the models of astrological theory do fit the real world?

Looking up Ronald Giere's own sun sign (Sagittarius) in an astrological magazine, we find the following description:

It represents the intended capture of unknown knowledge, wisdom, truth, and perfection in the philosophies. It represents all things dealing with higher thought, which bring people greater awareness of themselves and their place in the universe. Education, courts, religion, and literature are represented here.

The daily "prediction" for a typical day reads something like this:

Your personality will glow; you'll attract much attention with charm and pleasing ways. Make work enthusiastic, especially if it is linked with younger people. Use ingenuity and skills that are at their height of performance. Be generous financially; contribute to a worthy cause. Health is excellent, and travel aspects are good. Carry out a plan you know is valuable in practical ways. Love breakups are possible, some dishonesty in another's attitude.

As a matter of fact, we find it fairly easy to interpret much of both the description and the prediction as being true of Ronald Giere in general and of his actions on a particular day. So let us analyze the relevance of this data for the hypothesis that astrological theories do fit the real world.

Analysis

Step 1. Real World. The subject matter includes the personality, attributes, and everyday actions of ordinary people, Ronald Giere included.

Step 2. Models. The models are those provided by traditional astrological theory in which the positions of the Sun, Moon, planets, and stars at the time of people's births determine (or at least influence) their later personalities, attributes, and everyday actions in ways described in these models.

Step 3. Predictions. The predictions in this case are those given in the excerpts quoted above.

Step 4. Data. The data are Ronald Giere's personality, attributes, and the actions he performed on the day in question.

Step 5. Negative Evidence? No. The data and the predictions do agree pretty well.

Step 6. Positive Evidence? Were the predictions likely to agree with the data even if the models of astrological theory do not provide a good fit to the real world? Yes. For reasons to be

discussed later, these predictions were fairly likely to agree with the data regardless of whether the models in question fit the real world. So the agreement between the actual data and the predictions fails to provide any evidence in favor of the hypotheses that make up astrological theory.

There are two general reasons why the predictions based on astrological models were likely to agree with the data concerning Ronald Giere's attitudes and activities even if these models exhibit little resemblance to the real world. These reasons deserve special attention because they highlight typical features of the predictions associated with many marginal sciences.

THE PREDICTIONS ARE VAGUE

The descriptions and predictions derived from astrological theory are stated in quite general terms. Anyone with a little imagination can easily see themselves in the descriptions. The description for Sagittarians, for example, seems to fit a university professor well. But read the description for Gemini:

It is the symbol of the negative and affirmative mental aspects; the combination of different ideas that are joined in an earthly and idealistic decision; an adaptable memory for facts; communication and the search for knowledge.

That fits Ronald Giere as well as the description for his own sign.

Similarly, the daily predictions and advice are formulated in a vague way that makes it easy to interpret them as both relevant and true. "You will attract much attention with charm and pleasing ways." How much attention? From whom? What kind of charm? What sorts of "pleasing ways"? Because answers to these questions are missing, this prediction is very likely to be classified as fulfilled for anyone on almost any given day.

Here we have an *alternative* explanation for the agreement between the predictions and the data. They agree because the predictions are framed in a vague form that can readily be interpreted as holding true for almost anyone. So a fairly good agreement between data and prediction is very likely quite apart from any fit between astrological models and the real world. There is, therefore, little basis for taking the agreement between data and predictions as providing evidence that the models of astrological theory fit the real world.

THERE ARE MULTIPLE PREDICTIONS

As exhibited in the previous excerpts, astrological descriptions and predictions generally have several parts. The typical daily horoscope contains at least a half-dozen predictions or recommendations. This increases the chances that one or two will stand out both as particularly relevant and correct. In general, it is fairly likely that one or two of a half-dozen vague predictions should be easily interpreted as having come true—regardless of whether the models of astrological theory bear any relation to the real world.

A standard deck of cards provides a useful analog model. There is only one chance in 52 of getting the ace of spades in a single draw. The chances of getting the ace of spades increase, however, if you are allowed to make several draws.

The fact that there are multiple predictions, in addition to each individual prediction being fairly vague, strengthens the *alternative* explanation of the agreement between the predictions and the data. If there are many predictions, that increases the chances of one or two appearing to be correct. If they are all fairly vague, that makes it difficult to argue that any particular prediction is clearly incorrect. The result is a strong impression

that the predictions are, by and large, correct. This impression, however, may be mainly a response to the vagueness and multiplicity of the predictions and have little bearing on the actual fit between astrological models and the world.

ASTROLOGY AS AN INTERPRETATIVE FRAMEWORK

When people say that astrology works, they may mean much more than simply that the descriptions and predictions of astrological theory seem to come true. They may regularly use astrological categories to *interpret* both their own actions and the actions of other people and find these interpretations highly satisfying. "Why is Linda always so self-assured?" "Oh, she's an Aries, and Aries are like that." Nevertheless, the fact that astrological lore can be used in this way may have little to do with how well astrological models actually fit the real world. It may simply be due to the extreme flexibility of the framework and to the fact that people who use it in this way seldom have any interest in noting, or remembering, cases in which specific predictions fail. It is an interesting and distressing fact that many people can find an interpretative framework such as astrology to be highly satisfying even though the models that underlie it may actually bear little resemblance to the real world.

4.3 EXTRATERRESTRIAL VISITATION

It is a recurring theme in American popular culture that Earth has been or is now being visited by aliens from another world. There are many variations on this theme. Within the community of people familiar with these matters, this is known as the hypothesis of *extraterrestrial visitation* (ETV). Strictly speaking, ETV is a special version of the broader view that there are genuine *unidentified flying objects* (UFOs). Those who believe in ETV think they have an explanation for the existence of UFOs. One might think there are genuine UFOs, however, without believing that they have an extraterrestrial origin.

As an example of this genre of theory, let us look at Erich von Daniken's *Chariots of the Gods?* This book is reputed to have sold more than 30 million copies in 35 languages. Whatever its scientific success, it has certainly been a commercial success.

Von Daniken claims that the ETV hypothesis is true and, moreover, that the supposed visitations took place early in human history. He thus proposes to explain various happenings in the early history of the human race as being the direct result of actions by these early extraterrestrial visitors. In support of his claims, he produces many examples of archaeological or anthropological findings that otherwise seem difficult to explain.

Many different cultures have myths about gods who came from the heavens and performed great feats. Why is it that so many cultures, widely separated in place and time, have myths of this type?

In Egypt and in Peru, there are huge temples, pyramids, and other structures constructed out of cut stones weighing many tons. How could ordinary men have constructed such things with only the simple tools then available?

The plain of Nazca in Peru exhibits what resemble roads cut in patterns. It is difficult to imagine why or how these were constructed.

On Easter Island in the Pacific Ocean, there are hundreds of stone statues weighing up to 80 tons erected a fair distance from the source of the rock from which they were carved. Who could have carved them? How could they have been moved and set up on a remote island that could not support more than a few thousand people?

Von Daniken has an easy answer for all these questions. These things are all explainable as the direct result of the activities of ancient astronauts. Von Daniken assumes that any beings capable of reaching Earth from somewhere else in the universe would have no difficulty performing feats such as building pyramids.

AN ALTERNATIVE MODEL

There is one obvious alternative explanation for the agreement between von Daniken's predictions and the data that is quite independent of any similarity between von Daniken's model and the real world. This is that von Daniken deliberately constructed his model to yield predictions agreeing with the known data. Such a process of model construction requires only imagination. Almost anyone can do it. Let us show you how.

Imagine a model in which there once was an advanced race of humanoids fairly similar to us who evolved on Earth several thousands of years before the earliest peoples now known to archaeologists and anthropologists. According to this model, these early humanoids developed a fairly advanced technology that made them superior to other evolving prehuman primates. Using their advanced technology, these humanoids moved out from their original home in the Middle East and established outposts in Asia, South America, Easter Island, and so on. We can imagine that they even developed large ships and airplanes. It was this race of early humanoids that was responsible for the statues, temples, and other unusual things that we now find in isolated parts of the world. Moreover, it is the memory of this race that is recorded in the myths of various peoples around the world. Unfortunately, when it came to social organization, these advanced humanoids were no wiser than present-day humans and began warring among themselves. Eventually, they destroyed themselves and most of their artifacts. All that remains are the few traces that present anthropologists and archaeologists cannot explain. This hypothesis makes all these things easily understandable.

This terrestrial model, which does not require ETV, predicts exactly the same data as von Daniken's model incorporating ETV. And this model is initially no less plausible than his. So the agreement between von Daniken's predictions and the data is *not* necessarily unlikely if his hypothesis is false. Thus, the agreement between the data and his predictions does not provide evidence that his model fits, no more than it provides evidence that the terrestrial model fits. Here, it is useful to remember Halley's successful prediction of the return of a comet 76 years later. In this case, ensuring the agreement between prediction and data was beyond the power of anyone's imagination. The only alternative to Newton's model was the improbable supposition that another, very similar, comet just happened to come by at exactly the right time, 76 years later.

WHAT ABOUT THE DATA?

Writers such as von Daniken often have a good intuitive sense of how scientific data are evaluated. He devotes many pages trying to convince the reader of the fantastic nature of the artifacts he describes. This is to make it seem that the existence of such things would be highly unlikely unless something like his hypothesis is accepted. Average readers, however, have little detailed knowledge of the things he describes. They are dependent on the author to supply the data. In this situation, the author may be tempted to distort or withhold known facts to make his case appear better than it really is. It seems clear that von Daniken succumbed to this temptation.

In his discussion of the statues on Easter Island, von Daniken cites the work of the anthropologist-adventurer Thor Heyerdahl. In the book cited, Heyerdahl reports actually observing some modern-day inhabitants of Easter Island carving, moving, and setting up statues similar to those originally found on the island. Using only a crude wooden sled, it took fewer than 200 men to move a 12-ton statue. Using large poles as levers and stones to prop it up, it took 12 men only 18 days to set up a statue weighing about 25 tons. Heyerdahl's book even contains a picture showing the statue in the process of being set up. Thus, most of what von Daniken says about this case is just plain false. There is a relatively simple, perfectly natural explanation of how these statues could have come to be where they are.

The moral for our purposes is that it takes more than good reasoning not to be misled into thinking that there is evidence for a hypothesis when, in fact, there is none. You have to learn when to be suspicious of what is presented as data and when to check further on your own. And you have to take the time to do it. In general, you should maintain a healthy skepticism regarding things that seem to go against most of what you already think you know. Sometimes you even have to consider authors' motives. Are they interested in learning the truth, or are they primarily concerned with attracting attention and selling books?

4.4 REINCARNATION

Reincarnation is the very ancient belief, found in many Eastern religions, that the "spirits" of people who die move to inhabit the new bodies of people being born. The spirits are said to be "reincarnated" in a new body. This is still a widely held belief, even in the United States. It has recently been popularized, for example, by the movie actress Shirley MacLaine.

What sort of empirical evidence could there be for such a belief? In this century, appeal is often made to evidence that has been produced by hypnosis. It is a fact that people under hypnosis sometimes recount stories that seem to be from another life. Professional hypnotists interested in such phenomena sometimes speak of "regressing" a person to an earlier life. The idea is that, under hypnosis, the spirit remembers events from an earlier incarnation.

IN SEARCH OF BRIDEY MURPHY

In the United States, the most famous case of regression is described in a book first published in 1956 entitled *In Search of Bridey Murphy*. The author, Morey Bernstein, was a businessman who first learned hypnotism as a hobby. In the book, he reproduces transcripts of tape recordings made during a half-dozen sessions with a woman given the fictitious name of Ruth Simmons. All the sessions were witnessed by several other people. Although Ruth Simmons was said never even to have visited Ireland, much less lived there, under hypnosis she related many details about her supposed early nineteenth-century life in County Cork, Ireland, as a woman named Bridey Murphy.

The transcripts contain detailed answers to a variety of questions about the whole life of Bridey Murphy. There was the time in her childhood when she and her brother Duncan pulled the straw off the roof of the family's barn. There was her marriage to Brian MacCarthy, whom she first met at the age of 17, officiated by Father John. And there was her death, childless, at the age of 66. There is even mention of small towns that do not appear on maps but do nevertheless exist. Moreover, she gave her answers in an Irish brogue

quite different from her normal speaking voice. After one session, she does an Irish Morning Jig as part of a posthypnotic suggestion. Although Bernstein does not come right out and say so, the clearly implied conclusion of the book was that the woman called Ruth Simmons was, in fact, the reincarnation of an Irish woman named Bridey Murphy. So reincarnation is a reality.

Analysis

Step 1. Real World. The focus of study is the analysis of tape recordings of Ruth Simmons under hypnosis.

Step 2. Model. According to the model, ordinary people are reincarnations of the spirits of other ordinary people who lived in other places at earlier times. In particular, Ruth Simmons is said to be the reincarnation of the spirit that earlier was incarnated in Bridey Murphy.

Step 3. Prediction. According to the model, people under hypnosis can sometimes recall details of their earlier incarnations. So maybe Ruth Simmons could recount details of her supposed earlier life as Bridey Murphy.

Step 4. Data. Under hypnosis, Ruth Simmons recounts, in an Irish brogue, details she says were from her earlier life as Bridey Murphy. Ruth also performs an Irish morning jig under hypnosis.

Step 5. Negative Evidence? No. The prediction and the data do agree.

Step 6. Positive Evidence? Would the data have been likely to agree with the prediction even if reincarnation does not occur? Are there other plausible models that could explain Ruth Simmons's ability under hypnosis to give details, in a brogue, regarding the life of a woman in Ireland nearly 200 years ago?

Surely there must be other, more ordinary ways that someone who had never been to Ireland could be able, under hypnosis, to recount details about nineteenth-century life in Ireland, even in a brogue. Near the end of his book, Bernstein does consider some such alternatives (e.g., that Ruth Simmons was recounting something she had heard or read). But such possibilities are quickly rejected as not compatible with the spontaneity of the answers given under hypnosis, her speaking with a brogue, and her being able to do an Irish jig. The book, however, does not provide the reader with enough information about Ruth Simmons' own early life even to suggest other alternative models for this case. So, readers are left to their own imaginations.

Might not Ruth Simmons have had a grandmother born in Ireland who could have told her granddaughter stories in a brogue about her earlier life in Ireland? This grandmother could even have taught Ruth the Morning Jig. To make this possibility more interesting, we could imagine that Ruth Simmons had a genuinely "split personality." One was her regular personality, and the other was an imaginary person she unconsciously constructed from her grandmother's stories. It is well known that multiple personalities can be uncovered through hypnosis and that the hidden personalities can speak quite spontaneously with different tones of voice. Nor should Bernstein himself have been unaware of this possibility. It was much discussed at the time he wrote his book. Indeed, one of the most famous cases of multiple personalities was described in the book *The Three Faces of Eve*, published just a year after Bernstein's book on Bridey Murphy.

Even with only such possibilities to rely on, one should regard the data presented as being inconclusive regarding the existence of reincarnation in the real world. A nice thing about this case is that we need not rest content with our imaginations. After publication of Bernstein's book,

a Chicago newspaper reporter took up the case and published his findings. He learned that Ruth Simmons was really a housewife from Colorado named Virginia Tighe. Digging into Mrs. Tighe's past, he learned she had an Irish aunt that had entertained her as a child with stories about Ireland. Moreover, in high school, Mrs. Tighe had been in a drama program in which she had learned to deliver lines in a heavy Irish brogue. Finally, a neighbor lady who had lived across from Mrs. Tighe's family for many years recounted how the young Virginia had been entranced by her stories of life in Ireland. The neighbor lady's maiden name was Bridey Murphy.

It does not matter for our purposes whether Virginia Tighe lied to Morey Bernstein or whether she really believed she had been regressed through hypnosis to an earlier life. Nor does it matter whether Bernstein himself was completely honest. Even taking his account at face value, we have a relatively ordinary alternative explanation of how, under hypnosis, Ruth Simmons could have come to relate the events she did and in the manner she did. She was remembering things that, as a child, she had learned from others and recounting them, under hypnosis, as her own experiences and in an accent she had practiced in high school.

4.5 EXTRASENSORY PERCEPTION

A 1990 Gallup Poll reported that nearly half of adult Americans believe in the existence of some form of **extrasensory perception** (ESP). In fact, the term *extrasensory perception* covers several different kinds of supposed phenomena. One is **clairvoyance**, the ability to "see" things not present (e.g., things far away). Another is **precognition**, the ability to "see" or "experience" things before they happen. A third is **telepathy**, the ability to "read" another person's mind. There is also a related idea, that of **psychokinesis**, the ability to change physical objects (e.g., bending spoons) just by thinking about them.

CLAIRVOYANCE

Let us focus on clairvoyance because it is a phenomenon that everyone can at least imagine thinking they have experienced. The typical "experience of clairvoyance" resembles the following scenario. Jack and Jill are best friends. One day, for no apparent reason, Jill experiences a sudden fright that convinces her that something terrible has happened to Jack. She tries to put the feeling out of her mind. Later that day, she learns that, in fact, Jack has been badly injured in an automobile accident. It turns out that the accident occurred right about the time she had the feeling that something terrible had happened. Jill finds herself seriously contemplating the possibility that clairvoyance is a reality. Does she indeed have evidence for this belief?

Analysis

Step 1. Real World. The focus of study is the experience of Jill while Jack is involved in an automobile accident.

Step 2. Model. According to the model, at least some ordinary people are clairvoyant on some occasions and can perceive events outside the range of their normal senses.

Step 3. Prediction. Jill should be able to sense Jack's accident.

Step 4. Data. Jill did have a clear feeling that something terrible had happened to Jack at what turned out to be the time of his accident.

Step 5. Negative Evidence? No. The prediction and the data do agree.

Step 6. Positive Evidence? Would the data have been likely to agree with the prediction even if clairvoyance does not occur? Are there other plausible models that could explain the coincidence of Jill's experience with Jack's real accident?

What makes this sort of scenario convincing as evidence for clairvoyance is the apparently extreme improbability of Jill's experience of dread occurring at about the same time as the very thing she dreaded was, in fact, happening. How could she have known something bad was happening to Jack other than by some form of ESP?

Just how improbable is something such as the coincidence of Jill's feeling with Jack's accident? Not as improbable as we might think. In the first place, feelings such as Jill's are typically somewhat vague. She did not have the distinct impression that Jack was in an automobile accident at the corner of Fifth and Main streets. She only had a strong feeling that *something* terrible had happened to Jack. Lots of things could have produced a similar coincidence. Second, this was most likely not the only time Jill had ever had a similar feeling of disaster regarding Jack. As in our case, she tried to put those feelings out of her mind. And when, in fact, nothing bad had happened, she forgot about the earlier feeling of dread. This time differed only in that something terrible did happen. Moreover, Jack's being in a bad accident is something that itself had some probability of happening regardless of whether Jill had any feeling that something terrible had happened. So there is a plausible alternative model, namely, that Jill's feeling of dread and Jack's accident happening at roughly the same time was just an ordinary coincidence. It was not something very likely to happen, but not something fantastically improbable either.

Finally, Jack and Jill are not the only people in the world. There are millions of people like them. Every day some of these millions of people have unexpected feelings of dread regarding their loved ones. And every day something terrible happens to some of those millions of people who are those loved ones. So, it is practically certain that, on any given day, some people who are the object of feelings of dread turn out to be people to whom something terrible does indeed happen. Of course, to those particular people to whom this happens, it seems like an amazing coincidence, something requiring an extraordinary explanation, such as clairvoyance. So, every day people are being convinced that clairvoyance is a reality. In fact, there may be nothing special going on at all. It is all easily understandable as the normally expected result of lots of ordinary people doing perfectly ordinary things.

SPEAKING OF PROBABILITY

This analysis of "clairvoyant experiences" required thinking about probabilities in somewhat sophisticated ways. It should come as no surprise that the most serious research on the possibility of ESP involves sophisticated statistical reasoning. Part Two of this book explores such reasoning in more detail.

4.6 THE BURDEN OF PROOF

By and large, the results of our evaluations in this chapter have been *inconclusive*. In most cases, we have concluded that the data cited do not provide evidence for thinking that the hypotheses put forward are true. It may seem to many people that this is unsatisfying. They would like to be able to conclude that the hypotheses in question are *mistaken*—the proposed models do not fit. Although understandable, this feeling is based on a misunderstanding both of our objectives and of the real power of the program that we have developed.

In debating, as in the law, there is a concept of the **burden of proof**. When a claim is disputed, the question is who has the responsibility for proving it true or false. That

party carries the burden of proof. As a *consumer* of scientific information, one should always take the position that the burden of proof is on the *producers*, or purveyors, of that information. They have to convince you that they are right. That means they have to provide you with data that constitute good evidence for their claims. You, like a jury, need only evaluate what they provide. Thus, if you conclude that the data supplied do not provide good evidence for their claims, you have done your job. You have reached the useful conclusion that you need not, at least for the moment, pay any more attention to their claims.

Being able to conclude that the data presented are irrelevant to whether the proposed model is correct is, in fact, a very powerful conclusion. It means that we can safely ignore the hypothesis in question. Of course, this leaves open the possibility that the hypothesis might still be true and that other data might provide strong evidence to that effect. Until presented with such data, however, we may remain uncommitted.

In written presentations and conversations, advocates of a particular point of view will often attempt to *shift* the burden of proof onto you, the audience. They will challenge you to prove that they are wrong. You should not give in to the temptation to take up the challenge. They want you to think that unless you can prove they are wrong, you must agree that they are correct. But this is simply not so. Your not being able to show that they are wrong does not mean that they are right. That is, your inability to produce evidence *against* their claims does not constitute evidence *for* their claims. It may only indicate your general ignorance of something about which you have every right to be ignorant. So remember, it is not your job to prove that they are wrong. It is their job to show that they are right.

In debate and the law, as in warfare, the advantage always lies with the defense. If you allow the burden of proof to shift to you, that will put you on the offensive side of the debate. This requires that you be able to produce data disagreeing with the predictions of their models. Not being especially up on the subject, you are unlikely to have such data on the tip of your tongue. And even if you can come up with some relevant data, advocates of the position are likely to reveal still more details about their models that render your data irrelevant to, or maybe even supportive of, their position. Far better to stick with the defensive position. Keep the burden of proof where it belongs—on the other side.

EXERCISES

Analyze these reports following the six-point program for evaluating theoretical hypotheses developed in the text. Number and label your steps. Be as clear and concise as you can, keeping in mind that you must say enough to demonstrate that you do know what you are talking about. A simple "yes" or "no" is never a sufficient answer.

EXERCISE 4.1

An Experiment with Time

Get yourself into a relaxed position and place a clock with a sweep second hand in your line of sight so that you gaze naturally on it without any effort. Gaze at the clock for a while, absorbing the rhythm of the second hand. Then close your eyes and imagine yourself in a relaxed position somewhere else, such as lying on a familiar, quiet beach. Imagine

as many details as you can to make the imagined scene as realistic as possible. Pretend you are really there listening to the waves. Now, very slowly, open your eyes and just let them gaze straight ahead. Do not attempt to focus on the clock. Just let it be unfocused in your line of sight. If you do it right, you may have the experience that the second hand seems to skip a beat or even seems to stand still for a second or two. Do not think about it or focus your eyes on the clock. That will destroy the desired effect. Regardless of whether you succeed in reproducing this effect, the experience as described seems plausible enough that we may suppose that some people should sometimes have had this experience. Assuming, then, that such a phenomenon exists, consider the following explanation of why it happens.

A person's psyche, sometimes called the "observer," can, at least briefly, leave the body and travel at the speed of light to distant places. So, if you imagine the scene realistically enough, your psyche is thought actually to be there observing the scene at the beach. While it is gone, your body remains home functioning normally except that there is no "consciousness" receiving the signals from your senses. The reason the second hand seems to stand still, on this account, is that your consciousness has momentarily left your body, and when it returns, it picks up where it left off. Your body, meanwhile, continues to follow the physical rhythm of the second hand. This produces the anomalous experience of seeming to see the second hand stand still while feeling that it should have moved forward. If one accepts this account, it could also help to explain the possibility of such things as clairvoyance, out-of-body experiences, and reincarnation.

EXERCISE 4.2

Transactional Analysis

Transactional analysis (TA) is a form of psychological therapy based on the theory that each person has a composite personality consisting of three parts: "child," "parent," and "adult." A person's "parent" personality is made up from that person's experiences with his or her own parents (or substitutes). It includes lots of don'ts and some dos. The "child" personality is made up of a person's earliest (mostly nonverbal) feelings, such as feelings of helplessness or curiosity. The "adult" personality develops as a person learns to control his or her own life. Associated with each component personality are particular ways of interacting with others. According to the theory, mismatches between people's various personalities lead to conflict and unhappiness.

Experience with patients is often cited as evidence for this theory. For example, a couple comes to a TA therapist. The therapist has them discuss some problem and observes how they interact. The therapist then formulates a hypothesis about their interaction. The husband, for example, might be seen as responding with his "child" personality, while the wife is seen as responding with her "parent" personality. Neither "adult" personality, the therapist reasons, is happy with the responses from the other person. The therapist infers that they will both be happier if the mismatch can be eliminated by both parties learning to respond directly each other's "adult" personality.

In several succeeding sessions, the therapist intervenes in discussions attempting to bring out the "adult" personality in both husband and wife. Typically, the couple benefits from the therapy in that afterward they are somewhat better able to communicate and are generally happier.

EXERCISE 4.3

Dianetics

Dianetics is a theory of the mind, together with a method for treating mental disorders, first expounded by a former science fiction writer, L. Ron Hubbard, in his 1950 book, *Dianetics: The Modern Science of Mental Healing*. According to Hubbard, the mind has two parts, an analytical mind and a reactive mind. The reactive mind cannot think or remember. All it can do is record sensory input when the analytical mind is unconscious, as in sleep. It is nevertheless a very good recorder of all sensory input: sights, sounds, smells, tastes, and textures. These recordings are called *engrams*. They are stored in a *reactive bank*. When, at some later time, the person experiences something similar to the stored engram, the engram may be "keyed into" the person's regular memory, so the person experiences something similar to what happened when the engram was originally recorded. For example, a person bumps his head and passes out. While he is unconscious, a nearby loud motor starts running. Later, if that person bumps his head in a similar circumstance but not so severely as to pass out, he may experience the sensation of hearing a loud motorlike noise, even if there is no motor around. One of the more interesting features of Hubbard's theory is that the reactive mind forms before birth, so that a person is born with engrams already in his or her reactive bank.

Dianetic therapy consists of having a person attempt consciously to key into engrams, the older the better, in a quiet setting with an "auditor" who gently asks leading questions. If an engram can be brought before the analytical mind in this fashion, it will be "erased" and no longer cause problems. A person for whom all debilitating engrams have been erased is said to be "clear."

In the half-dozen or so years after publication of Hubbard's book, hundreds of people trained as "auditors" and centers for dianetic therapy were set up in dozens of cities across the United States. Thousands of people claimed to be cured of a wide variety of mental symptoms after roughly 20 hours of treatment. Many were convinced of the soundness of Hubbard's theory.

EXERCISE 4.4

Predicting the Stock Market

When the stock market crashed in 1929, an economist with unorthodox views claimed that the crash proved his theory was right. He had predicted the crash a year before. It turned out that every year since 1921 he had been predicting a crash for the following year. But this did not prevent him from continuing to cite the 1929 crash as evidence for his views.

EXERCISE 4.5

Aquarians

According to astrological theory, Aquarians, those born between January 21 and February 18, are said to be generally scientific but eccentric (i.e., brilliant but unconventional). In support of this hypothesis, it is often noted that several famous scientists (e.g., Copernicus, Galileo, and Thomas Edison) were Aquarians.

EXERCISE 4.6**Near-Death Experiences**

The term *near-death experience* (NDE) was popularized by Dr. Raymond Moody in his 1975 book, *Life after Life*. He reported results of extensive interviews with roughly fifty people who had come very close to death, some even revived after being pronounced "clinically dead." Although different in many details, he found their experiences remarkably similar. Many had the experience of appearing to be calmly looking down on their own bodies ("out-of-body experiences"), perhaps watching physicians working frantically to revive them. Many had a sense of moving down a dark tunnel toward a light and then entering a place of incredible brightness and beauty. Many of his subjects were convinced that they had glimpsed a world beyond this one and found their views of life and death profoundly changed by the experience. Moody concluded that his research provides strong evidence that there is indeed life after death.

Several later researchers have mostly confirmed Moody's original observations. One cardiologist, for example, studied some 2,000 patients, most having suffered a heart attack. More than half reported having had experiences similar to those described by Moody. A psychologist found similar results with a sample of more than 100 cases. Some researchers even claim to have found similar results with patients in India, where religious and cultural imagery is very different from that in the United States.

Explanations of these observations, however, differ. In his 1974 book, *Broca's Brain*, the astronomer Carl Sagan promoted the idea that NDEs are, in fact, recollections of the experience of being born! Others suggest they are produced by abnormal brain chemistry resulting from the obvious physical and psychological stress of the situation. More recently, Susan Blackmore, in her 1992 book, *Beyond the Body*, offered the explanation that people's minds construct a memory of the situation that, because normal sensory input had been disrupted, they mistakenly take to be the memory of a real situation.

EXERCISE 4.7**Alien Abductions**

In the late 1980s, claims of abductions by aliens regained notoriety through the publication of several books such as Budd Hopkins' *Intruders* and Whitley Strieber's *Communion*. In both cases, the authors discuss ordinary-seeming people with apparently normal lives who nevertheless report, in all sincerity, being abducted by aliens, examined, and then released. In many cases, the abduction story was first revealed to the authors through hypnosis after the subjects had experienced memory gaps and abduction dreams. The subjects' stories exhibit similar scenarios. The aliens, for example, are typically small green or gray men. Their spacecraft are typically saucer-shaped. The fact that there have been no previous connections among most of the subjects is taken as evidence of the truth of their stories. How could they all tell roughly the same story if they did not know each other? Hopkins, Strieber, and apparently many others, are convinced that such abductions have actually taken place.

Others, of course, disagree. Psychologist Robert Baker argues that the agreement among the subjects is largely due to suggestions by the hypnotists themselves, both before

and during hypnosis. The general culture, including movies and books, provides a quite standard reservoir of images on which to draw. Moreover, Baker argues, dreams and memories revealed under hypnosis tend to reinforce one another, so that the subjects cannot honestly tell the difference between the content of a dream and that of a genuine memory of something actually experienced.

EXERCISE 4.8**Elijah and the Prophets of Baal**

Look up the story of Elijah and the Prophets of Baal in the Old Testament of the Bible, First Kings, Chapter 18. Assume that the events in question happened as reported. Treating Elijah's "two altars" proposal as a suggested crucial experiment, analyze the experiment in the standard fashion.

EXERCISE 4.9**When Prophecy Fails**

As part of a study of the dynamics of belief in groups, some social psychologists once infiltrated several small cults. Among the groups observed was one led by a woman who was given the fictitious name of Mrs. Marion Keech. The events described really took place. Mrs. Keech claimed to have made contact with extraterrestrial beings, and she regularly revealed to her followers what she claimed were messages from her contacts. One day, she said that her contacts had told her that they were going to destroy the world. She even gave a specific day on which this was supposed to happen. These extraterrestrial beings also told her, she claimed, that they would rescue her, and anyone else who wished to be saved, if they would wait at a designated location. On the appointed day, Mrs. Keech and her followers were at the designated place. The day wore on, but the world did not end. Finally, Mrs. Keech informed her followers that she had received a telepathic message from her contacts informing her that they had decided to spare the world from destruction because she and her followers had been so strong in their faith that the rescue would indeed take place. The psychologist undercover observer reported that the assembled followers returned to their homes apparently *strengthened* in their belief that Mrs. Keech was indeed in contact with powerful extraterrestrial beings.

EXERCISE 4.10**Pyramid Power**

The following case has been cited in support of the hypothesis that pyramids have special powers. A young woman who was having difficulty with her complexion was told to keep a pitcher of water under a pyramid and then wash her face in that water, with only the mildest soap, once in the morning and once in the evening. She was also told to put nothing else on her face, no creams or medications of any kind and no makeup. Although she has been in the habit of using makeup, she agreed to the experiment. Within two weeks there was a clearly noticeable improvement in her complexion.