are related to certain concepts, and therefore confusing principles with evidence for those principles. Moreover, they consider assignments as mere tasks, or requirements imposed by the instructor, instead of as ways to learn skills or understand concepts that meaningfully relate to the goals of the course or to the realities of life.

As an alternative to this surface method, Morgan proposes a deep approach, in which the student focuses on the concepts being studied and on the instructor's arguments as opposed to the tasks or directions for assignments. The deep approach encourages students to relate new ideas to the real world, to constantly distinguish evidence (data) from argument (interpretations of data), and to organize the course material in a way that is personally meaningful.

Brundage, Keane, and Mackneson (1993) have found that successful distance learners are able to do the following:

- Assume responsibility for motivating themselves
- Maintain their own self-esteem irrespective of emotional support that may or may not be gained from the instructor, other students, family, or friends
- Understand their own strengths and limitations, and ask for help in areas of weakness
- Take the time to work hard at effectively relating to the other students
- Continually clarify for themselves and others precisely what it is that they are learning and become confident in the quality of their own observations
- Constantly relate the course content to their own personal experience

One final thought: Studies indicate that the drop-out rate for distance learners is higher than that for students in traditional courses. In part this is because distance learners tend to underestimate their other obligations and the time it will take to successfully complete their on-line course. Before you begin, be sure that you allow enough time not only to complete your course, but to do so with a reasonable measure of enjoyment. Good luck in your adventure in distance education. Armed with the information in this introduction, your chances of success are good.

CHAPTER 8

DOING SOCIAL RESEARCH

Social analysis is the systematic attempt to explain social events by placing them within a series of meaningful contexts. We call this activity *social science*, and we conduct it using methods that are often quantitative in nature. These quantitative methods of research are much the same in social science as they are in any other scientific field. To understand them, we should begin with a brief look at what we mean by the terms *science* and *scientific method*.

8.1 THINKING SCIENTIFICALLY

We tend to use the word *science* too loosely, referring to things that are not strictly science. Hoover and Donovan (1995:4–5) describe three common uses of the term *science* that divert our understanding from what science really is. First, people often—and wrongly—think of science as technology. In fact, technology is a product of science. Technology results from the application of science to different tasks. For instance, the technology involved in sending people to the moon came into existence, over time, as people decided how to use discoveries they made through the application of scientific principles. Although the lunar module that landed in the Sea of Tranquillity is definitely a "piece of technology," it is not "science."

A second misconception is that science is a specific body of knowledge that discloses to us the rules by which the natural world works. To say that "science tells us" something is misleading. For example, it is not science that "tells" us smoking is dangerous to our health. It is people, who, investigating the effects of smoking tobacco on a variety of human pathologies, conclude that smoking is a very harmful practice. The body of knowledge these people produce is evidence,

accumulated through scientific inquiry, of the effects of smoking. It is important not to mistake the body of knowledge for the mode of inquiry that helps researchers to produce it.

Finally, Hoover and Donovan point out that it is also misleading to think of science as an activity conducted only by a specialized group of researchers called scientists. This notion implies that some people use the scientific approach to understanding reality while others do not. In fact, all people use some form of scientific thinking to aid them in their struggle to deal with the uncertainties of life. Sometimes the thinking process is a bit crude, as when we decide what to eat by determining through trial and error what tastes good. But it is scientific thinking nonetheless.

So if science is not simply technology or a body of knowledge available only to people we call scientists, then what is it? Let us define science as a method of inquiry, a process of thinking and asking questions by which we arrive at an understanding of the world around us. Conceived of in this way, science does not exist in machines or in books or even in the natural phenomena around us, but in the mind. More specifically, science is a way of formulating questions and investigating answers—a set of rules for inquiry created to help achieve valid and reliable answers.

Historically, the scientific approach to knowledge has not done well when competing with other approaches. This is largely because, throughout the centuries, knowledge acquired through scientific investigation often threatened established values, norms, and institutions by which those in power maintained control of their world—values, norms, and institutions founded on such approaches to knowledge as myth, dogma, and superstition. Those who used science to understand and predict events were often viewed negatively by the powerful. Galileo was censured by both church and state when he used the scientific method to arrive at conclusions that challenged existing beliefs about the center of the universe. Using science to support the conclusion that the sun was in fact the center around which all things revolved, his outcome flew in the face of the Roman Catholic dogma that held the earth to be the center.

So it is safe to say that science is never practiced in a social vacuum. Today, leaders in Western countries tend to rely on science, rather than superstition or dogma, to establish credibility for what they say and do. But the scientific approach to seizing and maintaining power is very new in the history of the world.

8.2 THE SCIENTIFIC METHOD

The goal of science is to explain reality. The scientific method attempts to explain reality through the development and testing of theories, which are general explanations for the existence or cause of certain classes of phenomena. For

example, two centuries before Christ, Ptolemy constructed a theory to explain the movement of the stars in the sky. His theory suggested that the sun and planets all revolve around earth. Ptolemy's theory, which described the general relationship of the planets and stars to earth, explained much of what could be observed in the sky at night. More precise observations, however, later began to cast doubt on Ptolemy's theory.

Once they are constructed, theories must be tested to see if they actually explain the phenomena that they are intended to explain. We test theories in a two-step process:

1. We create specific statements that should be true if the theory is correct.
2. We then devise tests of these statements. A statement devised to test a theory is known as a *hypothesis*. A substantial part of what social science does is to test research hypotheses.

The development of this two-step scientific method was a historical and cultural breakthrough. Accomplished slowly at the end of the Middle Ages by brilliant thinkers in different European countries, it stands as one of the watershed events that differentiate the ancient world from the modern. We will now briefly examine the elements of the scientific method.

8.2.1 Formulating and Testing Research Hypotheses

A research hypothesis is an educated guess. It is a declarative sentence stating that a specific relationship exists between two or more phenomena. Consider the following example of a research hypothesis: "When a person's anxiety rises, his or her intolerance of others increases." This hypothesis states that there is a specific relationship between two variables: (1) a person's anxiety; and (2) the person's tolerance of other people. In addition, the hypothesis states the nature of the relationship between the two variables: An increase in the first is associated with an increase in the second.

A researcher constructs a hypothesis for the sole purpose of testing whether it is "true"—that is, whether a certain relationship exists between two phenomena that the formulator of the hypothesis is investigating. Hypotheses help define the question that our research is trying to answer. Suppose that we want to know if family relationships are affected by economic conditions. Eventually, we would like to develop a theory that will help explain how different economic conditions lead to different ways in which family members relate to one another. But before we can understand general patterns of relationships and create a theory to explain these patterns, we must become much more specific in our inquiry. Hypotheses help us to select specific aspects of a problem or question and explore them one at a time.

For instance, in our example of the economy and family relationships, we might propose the following hypothesis: "When the economy is strong, the divorce rate

decreases, and when the economy is weak, the divorce rate increases." We notice, however, that there will be difficulties in testing this hypothesis. For example, what are "strong" and "weak" economies? Our hypothesis will need to be more specific. We will perhaps find that a combination of selected economic indicators, such as the rate of unemployment or the amount of manufacturing production, will help us to define strong and weak in economic terms. The problem has now become more, rather than less, complicated. How will we know if family relationships are influenced by only one of these factors and not others? What if only certain combinations of these factors, and not other combinations, might have an effect upon relationships? To answer these questions, we need to start with one simple hypothesis, then test others in a careful, systematic way. Our first hypothesis might be: "When the national unemployment rate is greater than 7 percent, the divorce rate will remain above 50 percent."

Two types of hypotheses are commonly used in social science. The first may be called *causal*, the second *relational*. Causal hypotheses attempt to show that one phenomenon causes another. Relational hypotheses, on the other hand, attempt to indicate whether two phenomena are related to each other in a specific way, without demonstrating that one causes the other. Testing our hypothesis ("When the national unemployment rate is greater than 7 percent, the divorce rate will remain above 50 percent") will indicate only whether a relationship exists between unemployment and divorce, not whether unemployment causes divorce. Relations between hypotheses may be either positive or negative. A positive relation exists when an increase in one variable is associated with an increase in another. A negative relation exists when the presence of one variable coincides with the lack of another variable.

After hypotheses are constructed, we test them by observing the behavior of the variables that they contain. For example, let us phrase our hypothesis like this: "Extended periods of unemployment increase the likelihood of divorce."

8.2.2 *Variables*

The phenomena being observed are designated as different types of variables. The dependent variable is the phenomenon that is in some way affected by other variables. In our example, divorce is the dependent variable.

The independent variable is the phenomenon that may have some effect on the dependent variable. In our example, the time period in which a person is unemployed is the independent variable and divorce is the dependent variable.

Antecedent variables are phenomena that act on or relate to independent variables. In our example, if we hypothesized that "extended periods of unemployment occur in states with fewer high-tech industries," then the number of high-tech industries in a state would be an antecedent variable.

Intervening variables are variables other than the independent variable that affect the dependent variable directly. In our example, if we said that "divorce rates decrease when it rains," then rain would be an intervening variable.

Identifying the dependent, independent, antecedent, and intervening variables is very important in conducting research because it helps you to carefully define the relationships that you are examining.

Hypotheses are constructed to find out what relationship, if any, exists between the independent and dependent variables. To test a hypothesis, therefore, you need to measure the amount of change in the dependent variable as you observe change in the independent variable. To do this, you must complete two tasks.

The first task is to find accurate measurements of the dependent and independent variables as they vary over time or in different circumstances. For measurements to be accurate, they must be both valid and reliable. Valid measurements measure the effects they are supposed to measure instead of measuring something else. Reliable measurements are those that can be made under different conditions and still yield the same result.

The second task is to determine the effects of antecedent and intervening variables on the dependent variable so that you will know how much effect the independent variable has had. For example, if the voter turnout is greater in one community than another, and the communities have different registration time periods, you must determine how much of the difference in turnout was due to the registration periods as opposed to other factors, such as the percentage of independent voters or the occurrence of rain.

Conducting a study that is reliable and valid requires an analysis that utilizes accepted statistical methods. The instructor for your course in social science research methods will help you determine the correct methods for your analysis.

8.2.3 *Problems for the Scientific Study of Society*

A hypothesis can often be difficult to test. When attempting to test hypotheses in social science, we often encounter three general problems:

Data insufficiency or incongruity. After we have stated our hypothesis, we may discover through investigation that sufficient data are not available. Sometimes the records that we need have not been kept consistently or accurately, or have been compiled according to different systems or categories. If we want to compare divorce rates in the United States and Italy, for example, we may find that the American and Italian governments have different reporting requirements and that the procedures used to validate data may be much more reliable in one country than in another.

Multiplicity and ambiguity of variables. It is often difficult to cope with the sheer number of variables that may affect the result of our study; likewise it can be difficult to isolate the effects of one variable from those of others. If we want

to find out what decreases the divorce rate, for example, we may need to try to sort out the competing effects of family histories, customs, religious beliefs, and economic factors.

Methodological uncertainty. The third problem with the scientific study of society originates in epistemology—that is, the study of the nature of knowledge itself. Testing hypotheses, an approach fundamental to the scientific method, is an inductive process. One requirement of induction is the examination of numerous specific cases in hopes of finding general principles that help explain or predict behavior. For example, if all known cases of oak trees have acorns, one may conclude that all oak trees have acorns. But there may be a flaw in this sort of reasoning. In his book *The Logic of Scientific Discovery* (1959), Karl Popper pointed out that to show that some examples of a certain phenomenon behave in a certain manner is not to demonstrate that others will also. Even if all known examples of a phenomenon behave in a certain way, there may be examples in the future that will deviate from the pattern. Thus, the fact that all known oak trees have acorns does not mean that an oak tree without acorns will never be found.

Furthermore, said Popper, scientific observation is always selective. We must choose to observe before the actual observation takes place, and when we do observe, our observation will always take place within a particular context. This fact suggests that hypotheses are observations not of reality but merely of one context, one view of reality. Hypotheses, therefore, are not genuine observations, but only bold guesses. Since we can never say with certainty that a hypothesis is true, Popper explains that the only time we can be sure of a hypothesis is when it is disproved. Scientific progress is thus made not by verifying hypotheses but by refuting them. Because of Popper's works and those of others, this is indeed the way research often proceeds: by working not to prove hypotheses but to refute them.

A hypothesis established precisely for the purpose of being refuted is called a *null hypothesis*. Returning to a previous example, if we wanted to prove that extended registration periods increase voter turnout, we would begin by testing a null hypothesis: "Extended registration periods do not increase voter turnout." If we can find a case in which an extended registration period does increase voter turnout, we will have disproved the null hypothesis. We will not have proven that extended registration periods always increase voter turnout, but we will at least have taken the first step by showing that extended registration periods can increase voter turnout. Science thus proceeds by disproving successively specific null hypotheses.

No matter how we decide to treat hypotheses, there is still a question about how useful they are when it comes to major scientific discoveries. According to Kuhn (1970), even the refutation of null hypotheses is not a viable strategy if one wants to achieve the occasional new perspective that revolutionizes

science. When Copernicus proposed his heliocentric theory of astronomy, the Ptolemaic model of the solar system was well entrenched in the scientific community. Kuhn calls established patterns of scientific inquiry *paradigms* and says that they are essential to the progress of science. A paradigm establishes the foundations of knowledge in a particular discipline until the paradigm is displaced by a new one.

Discrepancies in the Ptolemaic paradigm were met by increasingly complicated explanations devised to make observation conform to the theory. Copernicus's system was so different from Ptolemy's that it became a new scientific paradigm. At first, Copernicus's theory had little evidence from observation to support it. Kuhn argues that Copernicus did not come up with his new theory by disputing the Ptolemaic system. Instead of gradually and successively refuting hypotheses, Copernicus had a flash of intuition. A paradigm, for Kuhn, is never refuted by evidence; it can only be overturned when another one takes its place.

Social science, says Kuhn, needs a paradigm to establish its identity, its mission. Not having one, social science winds its way endlessly through a series of disagreements over methods and goals. Therefore, although the scientific method remains the normal way of adding to our common store of knowledge about society, the great breakthroughs of the future may as likely come from exceptional moments of human creativity as from the steady testing of statements within our normal range of exploration.

8.2.4 The Stages of Social Research

How do those who practice scientific inquiry go about "doing" social research? What are the steps involved in approaching a research problem scientifically? Actually, as we have stated, thinking scientifically and using science to help us make decisions are a part of our everyday life. However, if we wish to use this approach to aid in the investigation of problems that are germane to sociology, the scientific method is more structured and stepwise. Whether researchers are pursuing a problem in sociology, political science, criminal justice, psychology, or any area that relies on the scientific method, they use the following steps:

1. Define a research problem.
2. Formulate a meaningful hypothesis.
3. Conduct a literature review to determine what is known about the research problem.
4. Identify dependent, independent, and intervening variables.
5. Formulate a research design.
6. Conduct the study.
7. Analyze and interpret the results.

8.3 COMMON QUANTITATIVE RESEARCH DESIGNS

Four of the most common quantitative research designs utilized by sociologist are the following:

1. Surveys
2. Experiments
3. Scientific observation
4. Content analysis

These designs are outlined and discussed in Chapter 11.

PART III

HOW TO WRITE DIFFERENT TYPES OF SOCIOLOGY PAPERS