Paradigms in Science

Over the centuries, philosophers and scientists have debated the nature of reality and how people can know that reality (Couvalis, 1997; Miller, 1987). These have been controversial issues for scientists who study the physical world, but they are even more contentious among social scientists, who study human beings and their psychological and social reality. Part of the reason for this heightened contention is the belief that human beings are different from the natural world of physical objects and events. People emote, remember, speculate, love, and hate—they think about what is happening to them and have feelings about it. People refuse to behave the way a scientist hypothesizes that they might. People do the unexpected or the unpredictable. Atoms, molecules, and chemical compounds do not have these elusive properties, and this is one of the reasons why natural scientists often can make certain nonprobabilistic predictions about what will happen: Under a certain set of conditions, all water molecules, for example, will freeze when the temperature drops below zero degrees centigrade. Thus far, however, social scientists have been unable to make such statements about social reality.

Another reason that the issue of how we know the world has been controversial among social scientists is that the scientists who study social reality are people themselves, with personal values, goals, desires, and reactions to what they observe. These personal matters may interfere with their ability to comprehend the world accurately. Going a step further, the scientific endeavor is itself a social process, part of the social world that social scientists attempt to understand. After all, scientific work can advance one's career, help one make a living, and move one up (or down) in the stratification system. In doing their scientific work, scientists may be influenced by a variety of social and psychological factors that routinely influence other human beings in their social endeavors.

What does all this mean? For one thing, science is a much more complicated—and, in many respects, a much messier—enterprise than many people recognize. For another, a number of competing perspectives exist concerning the issues of how society works and what implications this has for how the scientific endeavor works. In fact, historian Thomas Kuhn (1970), in a groundbreaking study of scientific work over many centuries, concluded that scientific activity is shaped by paradigms, which are general ways of thinking about how the world works and how we gain knowledge about the world. Paradigms are fundamental orientations, perspectives, or world views that often are not questioned or subjected to empirical tests. People may not even be aware that their thinking about the world is shaped by an orientation or world view. In his study of the history of science, Kuhn discovered that, although paradigms change over time, scientific research at any given moment was shaped by the paradigm that was dominant at the time. Research that fell outside that paradigm was considered to be inappropriate, irrelevant, oddball, or just plain wrong. In a sense, the world of paradigms falls outside the scientific realm in that issues are not accepted or rejected on the basis of empirical evidence; instead, some things are considered true—and others false—because it is obvious that that is how things work. Evidence supporting the paradigm will be accepted and competing evidence either ignored or rejected.

At the risk of oversimplification, we can classify the paradigms in the social sciences into two general categories: positivist approaches, and a number of different approaches that we will call nonpositivist approaches (Alford, 1998; Benton, 1977; Smart, 1976). Keep in mind that these viewpoints are not necessarily mutually exclusive; people may adopt ideas from more than one of them at the same time. In addition, one could agree with some parts of a paradigm but disagree with other parts of the same paradigm. We address this issue early in the book because it is a debate that arises repeatedly as we discuss different research methodologies.

Positivist Approaches. Positivism (sometimes also called logical empiricism) argues that the world exists independently of people's perceptions of it and that science uses objective techniques to discover what exists in the world (Blaikie, 1993; Durkheim, 1938; Halfpenny, 1982). Astronomers, for example, use telescopes to discover stars and galaxies, which exist regardless of whether we are aware of them. So, too, scientists can study human beings in terms of observable behaviors that can be recorded using objective techniques. Recording people's gender, age, height, weight, or socioeconomic position are legitimate and objective measurement techniques—the equivalent of the physicist measuring the temperature, volume, or mass of some liquid or solid. For the positivist, quantifying these measurements—for example, assessing the average age of a group or looking at the percentage of a group that is male—is merely a precise way of describing and summarizing an objective reality. Such measurement provides a solid, objective foundation for understanding human social behavior. Limiting study to observable behaviors and using objective techniques, positivists argue, is most likely to produce systematic and repeatable research results that are open to refutation by other scientists.

The natural and social world is governed by natural and social rules and regularities that give it pattern, order, and predictability. The goal of research in the natural and social sciences is to discover laws about how the world works and to express those discovered regularities in the deductive theories and propositions that are discussed in this chapter. As scientists conduct research, they move progressively closer to the truth, which involves uncovering the laws and patterns that underlie objective reality. So, at least in its ideal form, science is an objective search for the truth in which human values are a hindrance whose impact should be limited if not eliminated. Values can only interfere with the objective search for truth. For example, Emile Durkheim, an early sociologist, was a strong believer that sociologists could study the social world in much the same way that physical scientists could study the physical world. Durkheim believed that there were “social facts” that social scientists could observe and then use those observations to discover the social laws that govern the social world. He believed that once we discover these social laws, we will be able to both explain and predict human social behavior.

Of the various paradigms that we will review, positivism clearly is the most widely held view among natural scientists and, to a lesser degree, among social scientists. Among social scientists, those who adopt the positivist stance often tend to use certain kinds of research methodologies. For example, they tend toward quantitative research, which involves measurement of phenomena using numbers and counts. They also tend to use deductive and nomothetic explanations, experimental designs, and survey research. It is important not to oversimplify the link between a paradigm and the preferred research methodology, however, because positivists at times use qualitative research, which involves data in the form of words, pictures, descriptions, or narratives rather than numbers and counts. They also use inductive or idiographic explanations and field observations when these are appropriate to a research question.

Despite the popularity and dominance of the positivist paradigm, it has been subject to considerable criticism over the years. Some of this criticism arises out of empirical studies by social scientists of exactly how science operates (Galison & Stump, 1996; Lynch & Bogen 1997; Shapm 1995). What many of these researchers find is that what scientists actually do looks quite different from what the positivist paradigm says science should look like. This has led some critics to conclude that the positivist model is an idealized conception of science rather than an accurate description of it. Based on these and other concerns, alternative paradigms have emerged.

Nonpositivist Approaches. One prominent nonpositivist approach to science is what is called the interpretive approach. Interpretive approaches (also called interactionist or verstehen approaches) posit that social reality has a subjective component that arises out of the creation and exchange of social meanings during the process of social interaction. Social science must have ways to understand this subjective reality (Holstein & Gubrium, 1994; Smith, 1989; Wilson, 1970). Interpretivists argue that the objective, quantitative approaches of positivism miss this very important part of the human experience: the subjective and personal meanings that people attach to themselves and what they do. Reality is seen as something emergent and in constant flux that arises out of the creation and exchange of social meanings during the process of social interaction. Rather than seeing reality as something apart from human perceptions, interpretive social science sees reality—or, at least, social reality—as created out of human perception and the interpretation of meaning. These kinds of ideas led many nineteenth-century and early twentieth-century theorists, such as Wilhelm Dilthey, Ernst Troeltsch, and Max Weber, to conclude that social life cannot be understood by the same method that is used to study the natural world (Barnes, 1948).

Weber, for example, argued that we need to look not only at what people do but also at what they think and feel about what is happening to them (Weber, 1957, orig. pub. 1925). This “meaning” or “feeling” or “interpretive” dimension cannot be adequately captured through objective, quantitative measurement techniques. Researchers need to gain what Weber called verstehen, or a subjective understanding. They need to view and experience the situation from the perspective of the people themselves, “to walk a mile in their shoes.” They need to talk to the people at length and immerse themselves in their lives so they can experience the highs and lows, the joys and sorrows, the triumphs and tragedies as seen from the perspective of the people being studied. Researchers need to see how individuals experience and give meaning to what is happening to them. Interpretive research methods provide an understanding through empathy or fellow feeling, whereas positivist methods provide understanding through abstract explanation. Yet, the important point is that both methods provide an understanding of the world, and both are a part of the scientific enterprise.

Qualitative research methods attempt to gain access to that personal, subjective experience; for interpretivists, quantitative research by its very nature misses this important dimension of social reality. Positivists, for their part, do not necessarily deny the existence or importance of subjective experiences, but they do question whether the subjective interpretations of the verstehen method have scientific validity.

According to the interpretivist approach, regularity and pattern in social life does not result from objective social laws that exist apart from the human experience and are discovered by scientists. Instead, pattern and predictability arise out of mutually created systems of meaning that emerge from social interaction (Rabinow & Sullivan, 1987; Roscoe, 1995). Regularity and pattern are created and maintained by people; they are not imposed by external force. Proponents of interpretive approaches argue that qualitative research methods enable the researcher to approximate verstehen, an understanding of the subjective experiences of people. Of course, actual access to such experience is impossible; thoughts and feelings, by their very nature, are private. Even when someone says how he or she feels, the speaker has objectified that subjective experience into words and, thus, changed it. Researchers, however, can gain some insight into subjective experiences by immersing themselves in the lives and daily experiences of the people they study. By experiencing the same culture, the same values, the same hopes and fears, researchers are in a better position to take on the point of view of these people. Despite its focus on subjective experiences, however, such research is still empirical in the sense that it is grounded in observation. Qualitative researchers consider their qualitative observations and conclusions to be no less systematic or scientific than the more positivistic quantitative research techniques. Although positivists would argue that subjective meaning is difficult to quantify and study objectively, interpretive researchers would argue that it is, nonetheless, a key part of human social reality.

Another important difference between positivists and interpretivists has to do with the role of science: Positivists argue that scientists merely discover what exists in the world, but some interpretivists claim that scientists actually help create social reality through their scientific work (Knorr, 1981). As researchers make observations, gather data, and draw conclusions, their activities contribute to the construction of patterns of meaning. Scientific principles and laws about social behavior become another aspect of reality that can influence people's behavior. Even something as simple as computing the average age of a group creates a new reality: Instead of recognizing that some people in the group are 22 years old, others 34 years old, and still others 43 years old, we now say that the “average age of the group is 36.7 years.” This summary statement gives the impression—and creates the reality—that the group members share something in common in terms of age and that we know something very precise about their ages. That sense of commonality or precision, however, comes from the numbers created by the scientist, not from reality. In addition, though the average appears to be very precise, it actually is less precise than listing all the ages of the group members.

The interpretive approach focuses more on inductive and idiographic theory construction than on deductive and nomothetic approaches, considering the theories to emerge out of people's experiences rather than viewing them as abstractions developed by scientists. Understanding and truth come from an empathic grasp of the social meanings of a setting rather than from statistical analysis and abstract generalization to large numbers of cases. Once again, however, the link between paradigms and research approaches is not mutually exclusive. At times, interpretive social scientists do deductive and nomothetic theory construction, and they have even been known to use quantitative methods when appropriate.

Other nonpositivist characterizations of science exist as well. For example, critical and feminist approaches to research argue that science is inevitably linked to inequitable distributions of power and resources. These approaches posit that groups can and do use science to enhance their position in society, and that patterns of dominance and subordination may exist between researchers and those on whom they conduct research. Other nonpositivist critiques will be addressed in later chapters. At this point, we simply want to raise the controversy regarding positivist and nonpositivist views of science to stress that science and scientific research are more complicated than you might have originally thought. The goal for the student should not be to attempt to resolve these disputes or choose among the paradigms. Instead, the goal should be to understand the dimensions of the debate, recognize how the paradigms are similar to or different from one another, and comprehend the implications of each paradigm for the research process. In addition, the paradigms are not completely exclusionary of one another. All the paradigms agree with much of what will be covered in this book. For example, all the paradigms base their search for knowledge on systematic observation, and all agree that scientific work should be open and public. Of course, they may not always agree on what makes observations systematic, but there is not total agreement within each paradigm about that issue, either.

Another reason why the student need not adopt a preferred paradigm is that many researchers do not choose a particular perspective to follow exclusively (Alford, 1998). Many researchers find that each of the approaches offers some insights into social life and the scientific process that the others ignore. They move back and forth among the paradigms, using the best that each has to offer in understanding a particular aspect of human social life.