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Science as an Approach to Understanding

The work of science is to substitute facts for appearances and demonstrations for impressions.

—John Ruskin (1859)

Chapter 2 described how individuals use concepts and conceptual systems to achieve an understanding of the world, with the premise that scientists draw upon many of these same strategies to construct scientific theories. In this chapter, we delve more deeply into scientific thinking and theorizing. We begin by considering different approaches to understanding, such as theology, philosophy, jurisprudence, the arts, literature, and science. We describe the key characteristics that separate science from these other "ways of knowing." Next, we discuss core concepts in theory construction, including the definition of a theory and the difference between theories, models, and hypotheses. We next consider the different typologies that scientists use to characterize theories and conclude with a discussion of the qualities of a good theory, what constitutes a theoretical contribution, and ways to make a theoretical contribution.

APPROACHES TO UNDERSTANDING

There are many ways of gaining and organizing knowledge about one's world, only one of which is science. All these approaches to understanding involve internal conceptual systems that are communicated among individuals using an externally observable shared symbol system (e.g., words, gestures, mathematics). Being able to use such shared symbol systems opens the door to opportunities for improving and expanding personal understanding. It enables the individual not only to communicate his or her thoughts *to* others, but also to receive communications *from* others. These others may have a more useful way of looking at the world that may lead the individual to revise his or her thinking. In addition, communicating thoughts to others can help individuals clarify their logic through self-reflection during communication.

The existence of shared symbol systems also enables us to tap into the accumulated wisdom of the past. After all, a great number of the things that each of us experiences has been experienced, thought about, and discussed by others at earlier points in time. It is possible that we would find these conceptualizations useful in our own attempt to understand our world. We refer to these bodies of knowledge as *shared meaning systems*. For the present, this term is meant to refer to both the underlying conceptualization as represented in our minds and the externally visible symbols used to communicate regarding this conceptualization.

There are many examples of shared meaning systems. Mythology documents myths that are or were used to explain otherwise inexplicable natural phenomena (e.g., the sun dropping out of view in the evening and mysteriously reappearing the next day), imbuing these phenomena with meanings that made them appear less mysterious. Other perspectives also have evolved over the ages, including those in the diverse fields of theology, philosophy, jurisprudence, the arts, literature, and science, to name a few. Each reflects a different orientation to ordering and understanding the world we experience. The fact that these perspectives have persisted for centuries suggests that each provides a satisfying way of extracting meaning from, and coping with, the world for significant numbers of people. In some key respects, science is like any of the other approaches mentioned here.

Commonalities across All Shared Conceptual Approaches

At least three fundamental characteristics typify all shared approaches to understanding. First, each approach consists of concepts and relationships among these concepts. In this regard, all shared approaches—including science—are like the conceptual systems used by individuals. The basic difference is that the shared systems tend to be more elaborate, more abstract, more stable over time, and more explicit.

Second, all shared belief systems are limited in how much of the world they address. Indeed, if they possessed no such limitation, they would be forced to grasp all of the complexity of the ongoing world as it progressed, and that would be impossible. As a consequence, no single orientation (including science) has an exclusive franchise on arriving at comprehensive understanding. Nobel Prize–winning physicist Victor Weisskopf (1977, p. 411) observed:

> Human experience encompasses much more than any given system of thought can express. . . . There are many ways of thinking and feeling, each of them contains some parcel of what we may consider the truth. . . . Science and technology comprise some of the most powerful tools for deeper insight and for solving the problems we face . . . but science and technology are only one of the avenues toward reality: others are equally needed to comprehend the full significance of our existence.

Recognition of the limits of science has been expressed in many ways. Consider what psychologist Sandra Scarr (1985, p. 500) said:

> Science, construed as procedures of knowing and persuading others, is only one form of knowing by the rules of one game. There are other games in town, some like art more intuitive, some like religion more determined by revelation and faith.

A third feature of shared belief systems is that they generally serve prescriptive and evaluative functions. The *prescriptive function* can be thought of as guidance regarding how we *ought to* approach or respond to some aspect of our world or our experience. The formal systems of religion, for example, provide explicit guidance on such subjects as premarital sex and birth control. In certain instances, the formal system of science indicates what are and are not proper procedures to be followed. For example, scientists should subject theoretical propositions to empirical tests to gain perspective on the viability of the propositions. Prescription provides a basis for evaluation. Given that we have some notion of what should be done, we can evaluate how well what has been done corresponds to what should have been done. The *evaluative function* permits labeling something as being valid or invalid, reliable or unreliable, or proper or not proper relative to what has been prescribed. Shared systems thus provide a template or model against which to evaluate activities that purport to have been taken in accordance with that model.

Special Features of the Scientific Approach

If all shared belief systems consist of the same underlying foundation (concepts and relationships) and each can accommodate only limited portions of our environment, then what distinguishes science from these other approaches? The answer has to do with how the worth of the statements and inferences within the system is assessed. To be taken seriously, any shared system needs to demonstrate that it provides some useful way of describing or coping with the world about us. A variety of avenues is available for assessing this. Perhaps the most common strategy is that known as *consensual validation*. In this approach, the worth of a particular conceptualization is gauged by the degree of acceptance it is granted by others. The fact that other people believe that a particular conceptualization is correct is used as the basis for contending that it necessarily is correct. For example, in the legal context, if a jury agrees that some particular view must be correct (and this view has been sustained on appeal), then its verdict is accepted as being correct within the legal system. Consensual validation also typifies those religions where gaining and retaining adherents are interpreted as bearing on the validity of the underlying tenets. The fact that many believe in the religion is interpreted as an indication of its validity, since "so many people could not be wrong." Consensual validation also surfaces in the arts, where public acceptance might be seen as a form of validation of artistic endeavors.

Expert validation is a related avenue for assessing the value of a particular conceptualization. Here, the decision as to whether a particular conceptualization merits acceptance is determined by selected others who presumably have the knowledge and wisdom to discern what is correct and what is not correct. Examples include relying on professional critics to determine the validity of artistic conceptualizations; on judges to decide the truth of legal matters; and on religious leaders to decide the truth of religious conceptualizations. Another confirmation strategy, *internal validation,* involves the application of formal rules of logic to examine the concepts and relationships within a particular conceptual system. If these concepts and relationships withstand the rigors of intensive logical assessment, then the conceptualization is said to be confirmed. Such a confirmation strategy is often employed in philosophy and mathematics.

Although science also employs consensual, expert, and internal validation (i.e., standards of acceptance), the scientific approach can be differentiated from all others by the fact that it is the only one to place primary reliance on *systematic empirical validation*. Over the long run, scientific conceptualizations tend to be accepted only to the extent that they have been subjected to rigorous and systematic empirical testing and shown to be useful. We consider this important point in greater depth in the next section.

BOX 3.1. The Fringes of Science

Scientific theories are subject to many types of validation. Several critics of science believe that scientists are overly zealous in their application of one type of validation, consensual, and that this can hamper the advancement of knowledge. These critics contend that scientists are too quick to dismiss researchers and theorists "working on the fringes" and that the scientific community only takes seriously that which is acceptable to the prevailing views of that community. Stated another way, science is inherently conservative. As a result of relying on such consensual validation, there are many missed opportunities. A frequently cited example is that of Galileo. Based on his observations with the recently invented telescope, Galileo came to question many widely held beliefs about the universe, such as the Earth being at its center. Ultimately, much of what Galileo posited proved to be true, even though he was subjected to public ridicule and brought before the Inquisition in Rome.

It is, of course, true that strict adherence to prevailing views may blind the scientist to new insights and advances. But this does not mean that the scientific community should approach "fringe" claims without a healthy skepticism. Consider, in retrospect, the case of Galileo. Even though Galileo was ridiculed by the general public, his observations were carefully scrutinized by the scientific community. With the invention of the telescope, scientists had no way of knowing whether what could be seen through the lens was, indeed, accurate. At the time, there was no theory of optics, and what is taken for granted today about the behavior of glass lenses was unknown at that time. Galileo asserted the validity of his telescope by examining objects on Earth with it and demonstrating its accuracy when compared to the case where the objects were directly observable to the human eye. Unfortunately, some distortions occurred at times, such as double images and color fringes. In addition, Galileo observed that while the telescope magnified planets and moons, fixed stars appeared *smaller* in size. Without a theory of optics, Galileo was unable to explain these phenomena, and, as such, the scientific resistance to his ideas may not have been as irrational as commonly portrayed.

Scientists must think carefully about the factors that influence their judgments regarding the validity of a theory, and be explicit about the criteria that they are using when evaluating that theory. Many of the "fringe theories" that occur in the popular press (e.g., biorhythms, the Bermuda Triangle) simply do not hold up under careful empirical evaluation, despite claims by their adherents of being treated like Galileo.

THE ESSENTIALS OF SCIENTIFIC ENDEAVOR

At its core, science can be thought of as consisting of a *conceptual realm,* on the one hand, and an *empirical realm,* on the other. The conceptual realm entails the development of a conceptual system (consisting of concepts, constructs, and their relationships) that can be communicated unambiguously to others. The empirical realm refers to the process whereby the worth of the conceptualization is assessed through the conduct of scientific studies. For example, an organizational scientist might suggest a theoretical proposition (in the conceptual realm) that female applicants who are pregnant will be less likely to be hired for jobs than female applicants who are not pregnant. The scientist then subjects this proposition to an empirical test (in the empirical realm) by designing a study to discern if such bias occurs. For example, managers might be asked to evaluate videotapes of applicants with identical credentials and identical interview behavior, with the only difference between them being that one applicant is obviously pregnant and the other is not (for such a study, see Cunningham & Macan, 2007, who found evidence for such a bias).

Regardless of how detailed, formally explicit, or elegant they may be, by themselves, conceptual systems (such as theories, models, and hypotheses) are not inherently scientific. To be scientific, the systems, or subsets of them, need to be subjected to some form of empirical testing. As Pap (1962) has argued, and Carnap (1936, 1937) and Popper (1963) have concurred, "a scientific statement that claims to say something about the actual world . . . is meaningful if and only if there are possible observations whose outcome is relevant to the truth or falsehood of the statement" (Pap, 1962, p. 24). Science seeks to avoid *metaphysical explanations,* that is, conceptualizations that cannot be subjected to empirical tests. For a conceptual system to be considered scientific, corresponding efforts must be generated toward its empirical evaluation (see Popper, 1968).

As an example, the concept of unconscious influences on behavior had a major impact on psychological theory when the unconscious was first popularized by the theories of Sigmund Freud. However, scientists soon became skeptical of the use of constructs about the unconscious because the constructs could not be validly measured and statements about them could not be subjected to empirical evaluation. It was possible for constructs about the unconscious to be invoked post hoc to explain most any behavior; without the possibility of empirical tests, such explanations could never be falsified. Interestingly, there has been a resurgence in the study of constructs about the unconscious as predictors of behavior as new technologies have become available that purportedly measure facets of the unconscious (e.g., Blanton & Jaccard, 2008; Oswald, Mitchell, Blanton, Jaccard, & Tetlock, 2015).

Just as the testing of theoretical propositions is central to science, it is also the case that empirical systems typically need a corresponding conceptual system to organize them (see Kaplan, 1964, pp. 159–161). Any phenomenon or environment can be thought of as consisting of a great number of empirical relations. "Without some guiding idea, we do not know what facts to gather" (Cohen, 1956, p. 148). It is often said that research should be pursued without preconceived ideas. This is impossible. Not only would it make every research investigation pointless, but even if we wished to do so, it could not be done (Poincaré, 1952, p. 143). When collecting evidence, we must have some hypothesis or guiding ideas as to which evidence is relevant to the investigation at hand, since we can hardly amass all the evidence in the universe. A researcher interested in understanding the bases of poverty in the Maya living in the highlands of Guatemala cannot randomly collect information about the Maya to address this matter. Rather, the investigator thinks about different ways of gaining perspectives on the issue and, in doing so, inescapably imposes a conceptual system, no matter how rudimentary it might be, onto the problem at hand. The basic point is that no observation is free of at least some conceptualization, even a label to name it (Kaplan, 1964, p. 48). We return to this point in greater detail in Chapters 10 and 12.

The necessity for both conceptual and empirical systems cannot be overemphasized. Scientific theories are grounded in empirical tests of theoretical propositions. Without such tests, scientific theories are often said to only represent precursors of science, an argument we consider in more depth below. To be sure, there are notable controversies about the status of theory tests and matters of falsification (see Chapter 15 on theory revision). However, few would argue that a key characteristic of scientific theory is the central role of rigorous empirical protocols underlying the evolution of theory. Correspondingly, even the most applied researcher interested only in answering the question of the moment cannot escape the fact that, regardless of how latent, some form of conceptualization precedes and guides the data he or she collects and the interpretation he or she derives. The emphasis on empirical evaluation and the rigorous protocols by which such evaluation is accomplished are the sine qua non of science and distinguish it from all other approaches to generating understanding.

SCIENCE AND OBJECTIVITY

It is often asserted that scientists are objective in their approach to understanding and that the hallmark of science is its *objectivity*. In some respects, science is anything but objective. Whether consciously or not, the scientist brings to any setting a prior schema (or set of thoughts, beliefs, and assumptions) that is used to filter, interpret, and analyze the world about him or her. This is an inevitable feature of human nature and human thinking. The scientist's schema and values influence the selection and formulation of problems the scientist decides to study, the types of strategies the scientist uses to collect data (since such acts ultimately are determined by how a problem is formulated), and how data are interpreted so as to alter or strengthen the scientist's initial conceptualization.

If, at its very core, science has such subjective characteristics, from where does its reputation for objectivity come? The objectivity of science stems from the fact that the scientist's conceptualization has a corresponding external representation that makes that conceptualization available to others so that they can scrutinize, evaluate, and repeat (or *replicate*) the work of the originating scientist. It is not necessary that other scientists agree on what the implications of these empirically verifiable observations mean. What is critical is that other scientists agree on their empirical existence and could, if they so desired, reproduce them. This characteristic of science has been termed *intersubjectivity* (Babbie, 1973, pp. 18–19; Kaplan, 1964, pp. 127–128). The enterprise of science is predicated upon a foundation of intersubjectivity; in this sense, it is objective.

Although science is heavily influenced by the conceptual schemes of the scientist, there also are aspects of the scientific enterprise that are consistent with the spirit of objectivity. As Blumer (1969) maintains, science attempts to yield perspectives on the obdurate character of our social and physical environment. In doing so, scientists subject their propositions to empirical tests to determine the validity and utility of their statements. They strive to do so in ways that do not bias or prejudge the outcomes of their empirical tests, though they may not always be successful in accomplishing this goal. They consider competing conceptual schemes that lead to opposite predictions and then give preference to the schemes whose predictions follow from the empirical tests. Although pure objectivity is rarely achieved, it still represents a working goal for many scientists, the pursuit of which helps scientists choose between conceptual schemes.

THE PROCESS OF THEORY CONSTRUCTION

What Is a Theory?

As described in Chapter 2, as nonscientists we develop and use conceptual systems to better understand the physical and social world around us. When working as scientists, we do the very same thing. Such conceptualizations may be based on what we observe, imagine, or are stimulated to think about after engaging in mind games of our own, considering what others have said about the issue at hand, or examining empirical observations that have been made. The conceptualization is then given concrete expression via some external symbol system. That is, our ideas are converted into words, numbers, diagrams, and so on. The process of formulating conceptual systems and converting them into symbolic expressions is termed *theorization* or *theory construction*.

Social scientists have defined the term *theory* in many ways. Here are some examples:

> A theory is a symbolic construction. (Kaplan, 1964, p. 296)
>
> It will be convenient for our purposes to define a theory simply as a set of statements or sentences. (Simon & Newell, 1956, p. 67)
>
> Basically, a theory consists of one or more functional statements or propositions that treat the relationship of variables so as to account for a phenomenon or set of phenomena. (Hollander, 1967, p. 55)

Although theories differ in many respects, we contend that, at their core, all theories consist of concepts and relationships between those concepts. For this reason, it is sufficient for the purposes of this book to define a theory very simply: A *theory* is a set of statements about the relationship(s) between two or more concepts or constructs.

Scientific theories generally contain three types of propositions or expressions: (1) interesting and/or contributive propositions that have not yet been empirically evaluated but that can be subjected to future empirical tests in accord with rigorous scientific protocols; (2) propositions that have been subjected to prior empirical tests and that have some reasonable degree of acceptance based on that research; and (3) propositions that have not been subjected to empirical tests but that the theorist argues can be taken as givens in their own right (often also referred to as presuppositions or axioms). Our focus in this book is on the thinking strategies and heuristics that scientists use to develop the first type of proposition. As you read future chapters, you will see that scientific theorizing is much more than the simple application of a system of logic to derive theoretical expressions, a subset of which are then subjected to empirical tests. Rather, scientists use their past experiences, in-depth knowledge of a topic, intuition, flashes of insight, creativity, ability to see patterns that others do not see and, yes, even seemingly irrational thought to germinate the seeds of an idea that might ultimately yield a viable and useful conceptual system grounded in empirics.

If empirical evaluation is at the heart of science, are disciplines like theoretical physics reduced to being nothing more than pre-science? Theoretical physics is a branch of physics that uses mathematical models and abstractions of objects to explain and predict natural phenomena. It stands in contrast to experimental physics, which explores phenomena using experiments. Many principles in theoretical physics are, in fact, subject to empirical tests and, in this sense, can be considered scientific; other propositions are subject to acceptance or rejection purely on the basis of their mathematical properties in the system of mathematical logic; and still other propositions are untestable. This has resulted in debates about the scientific status of theoretical physics; see, for example, Smolin, *The Trouble with Physics* (2006), and Hossenfelder, *Lost in Math: How Beauty Leads Physics Astray* (2018), as well as the many reviews of them.

Theories, Models, and Hypotheses

A term often used by scientists when referring to the conceptual realm is *model*. The distinction between theories and models in the social science literature is not always apparent. As examples, various authorities contend that models are a *special type* of theory (e.g., Coombs, Dawes, & Tversky, 1970, p. 4; Kaplan, 1964, p. 263); are *portions* of theories (Sheth, 1967, p. 720; Torgerson, 1958, p. 4); are *derived from* theories (e.g., Pap, 1962, p. 355); are *simplified versions* of theories (e.g., Carnap, 1971, p. 54); represent *correspondence between* two or more theories (Brodbeck, 1968); or represent *specific interpretations* of theories (e.g., Green & Tull, 1975, p. 42). Others consider the terms to be synonymous (cf. Dubin, 1976; Simon & Newell, 1956). At times, the distinctions seem arbitrary and/or eclectic. The fact is that scientists have not reached consensus on the difference between a theory and a model. In our view, expressions of models, like expressions of theories, involve concepts and relationships between concepts. Accordingly, we use the terms *theory* and *model* interchangeably in this book. A *theoretical expression* refers to any external symbolic representation of an internal conceptual system, regardless of whether that symbolic representation is more properly considered a *theory* or a *model* by others and regardless of whether the representation is verbal, mathematical, pictorial/graphic, or physical. The theoretical expressions can be presuppositions/axioms, they can be assertions that have been subject to prior empirical evaluation, or they can be in need of empirical evaluation.

Another term frequently used in scientific theorizing is *hypothesis*. The nature of a hypothesis, relative to theories and models, also is somewhat ambiguous in texts on research methods. Many scientists define hypotheses as empirically testable statements that are derived from theories and that form a basis for rejecting or not rejecting those theories, depending on the results of empirical testing. For example, a researcher might want to the test the theory that people can better recall negative information about a person than positive information. This general proposition is translated into a hypothesis or prediction about what will happen in an experiment where college students are read a list of positive and negative adjectives (prechosen to occur with equal frequency in the English language) and asked to recall the adjectives 2 minutes later. The hypothesis is that the number of negative adjectives recalled by the students will be greater, on average, than the number of positive adjectives recalled. This hypothesis, stated in a form that is part of an empirical evaluation of a theory, was derived from the more general theoretical expression that the theorist seeks to evaluate. Others define a hypothesis as a theoretical statement that has yet to be empirically validated. For example, the proposition that "people can better recall negative information about a person than positive information" would be termed a *hypothesis* until it has been subjected to formal empirical testing.

Like theories and models, hypotheses are statements that involve concepts and relationships between them. For this reason, we often do not distinguish them from theoretical and model-based statements. Given this, we use the terms interchangeably in this book, recognizing that other social scientists may make distinctions between them and that when engaging in theory testing per se, hypotheses can stand distinct from theory (see Chapter 6).

Types of Theories

Philosophers of science have developed typologies of theories so as to better understand the range of theoretical expressions that occur in science. Examples include Albert Einstein's (1934) distinction between constructive and principle theories, Marx's (1951) distinction between reductive and constructive theories, and Kaplan's (1964) distinction between concatenated and hierarchical theories at either molar or molecular levels. More recently, theories have been characterized as humanistic, behavioristic, constructionist, structuralist, functionalist, and so on.

Although all theories focus on concepts and relationships between concepts, theories in the social sciences differ in the fundamental assumptions they make about human behavior. These assumptions lead theorists to think about the same problem in different ways. For example, a humanist may identify and conceptualize an entirely different set of concepts when analyzing school performance in children than the concepts that a behaviorist might consider. The humanist might focus on concepts such as how the child construes the school environment, the child's feelings about school, and the affective quality of the relationship between the teacher and the student. In contrast, the behaviorist might focus on the positive and negative reinforcers that the child is receiving and the nature of contingencies between performance of behaviors and administration of rewards and punishment. Neither conception is more "correct" than the other, although one theoretical approach ultimately might satisfy the criteria of what constitutes a good scientific theory better than the other. We view broad-based typologies of theories, such as those mentioned here, as different launching points for identifying concepts and relationships that we use to organize and understand our world. We discuss such perspectives in Chapter 12 (see also Slife & Williams, 1995).

The Role of Theory in Basic versus Applied Research

An often-heard distinction is that between basic and applied scientific research. The essential difference between these two types of research is difficult to identify. According to one perspective, basic researchers use theories, whereas applied researchers do not. Yet every scientist, even the "strict empiricist," cannot escape the fact that, regardless of how hidden, some form of conceptualization precedes and guides the data that he or she collects and the interpretations he or she derives from it. Hence, reliance on theory would appear to provide an unsatisfactory basis for distinguishing applied from basic research.

Another basis for distinguishing the two approaches emphasizes the intent of the researcher. When the intent is to address and hopefully solve an immediate real-world problem, the research is considered to be *applied*. In contrast, research conducted for the purpose of extending the boundaries of our collective body of understanding, not for the purpose of addressing a pressing problem, is termed *basic*. Theories are seen as being oriented toward basic or applied phenomena, depending on research objectives. According to this view, the applied and basic researcher could design and implement virtually identical studies; yet, because of different research objectives, one would be termed *applied* and the other *basic*.

Another criterion that often is suggested for distinguishing between basic and applied research focuses on the abstractness of the concepts in the conceptual network. According to this perspective, applied research is typically concerned with relatively narrow and circumscribed concepts that are domain specific. For example, the blue jeans manufacturer interested in expanding sales might commission a study to determine whether the buying public contained a sufficient number of people ready for jeans in new colors, styles, and patterns. However, though interested in learning more about such innovators, he or she most likely would not be interested in funding research to learn whether respondents were also innovators in regard to other consumer products (e.g., appliances, pens, foods). Understandably, the objective is to achieve some understanding of a concrete and limited problem. In contrast, basic research is typically interested in broader, less concrete concepts. In the present instance, basic researchers would likely strive to understand and draw inferences regarding innovators in general (i.e., across the range of consumer products) and how these innovative tendencies might be related to a broad spectrum of other concepts and constructs, usually ones that have been suggested and perhaps explored in prior research by others.

There seems to be no single basis sufficient for clearly distinguishing between basic and applied research. Perhaps the best approach is to note a set of attributes that, when employed in combination, seems to provide some basis for making such a distinction. From this perspective, *applied research* can be characterized as research that focuses on an immediate problem; relies on concepts that are relatively narrow in scope; and produces results that are not intended to extend a general body of knowledge. In contrast, *basic research* is characterized as research that is not directly focused on pressing real-world problems; tends to rely on concepts that are relatively broad in scope; and produces findings with the intent of contributing to and extending our basic understanding of the phenomenon in question. In the final analysis, we find the framing of research as either basic or applied to be somewhat of a false dichotomy because much research blends the two orientations to science. For extended discussions of applied versus basic theory and research, see Brinberg and Hirschman (1986) and Brinberg and McGrath (1985).

CHARACTERISTICS OF A GOOD THEORY

How do we know if a theory is a good theory? Several criteria have been proposed for evaluating theoretical expressions. If we assume that the purpose of a theory is to help us better understand our world, then a paramount consideration is whether it does indeed offer such guidance. From this perspective, a primary evaluative criterion is utility. Theoretical expressions are valued to the extent that they serve as useful guides to the world we experience, that is, to the extent that they enable us to achieve some understanding of our world. It is important to recognize that utility is a relative notion. Consider being adrift in the ocean with a leaky life raft. Unless a better life raft is available, we would be foolish to discard the one that leaks—it is the best we have. As another example, though a hand-drawn map may not be 100% accurate, it may be sufficiently accurate to be useful. If a theory is flawed in some respect but still provides unique and useful insights in other respects, it tends to be retained until something better comes along.

Consensual validation is a basis by which scientists often accept or reject theories. This term refers to the degree of consensus among the scientific community about the validity of the theory. If a theory enjoys widespread acceptance, then it is seen as being a "good" theory. The philosopher Karl Popper (1968) believed that adherents of what most scientists judge to be a "bad theory" eventually die off or leave science, rendering the theory obsolete with time.

Shaw and Costanzo (1982) distinguish two broad classes of criteria for determining a good scientific theory: those criteria that are necessary if the theory is to be accepted by the scientific community, and those criteria that are desirable but not essential to acceptance. In the former category, three criteria are crucial. First, internally, the theory must be logically consistent; that is, the theoretical statements within the conceptual system must not be contradictory, nor must the theory lead to incompatible predictions. Second, the theory must be in agreement with known data and facts. Third, the theory must be testable; that is, a theory, or the key components of it, must ultimately be subject to empirical evaluation.

The second class of criteria discussed by Shaw and Costanzo (1982) includes six criteria. First, a theory should be stated in terms that can be understood and communicated to other scientists.

Second, the theory should strive to be parsimonious, adequately explaining a phenomenon, but with a minimum of concepts and principles. Scientists refer to this criterion as Occam's razor, named after 14th-century English philosopher William of Ockham; this principle states that one "cuts away" extraneous concepts and assumptions so as to yield a theory that is parsimonious yet satisfactory in its level of explanation. All other things being equal, preference is given to theories that make fewer assumptions. The fewer the working parts necessary to get the job done, the better the theoretical system.

Third, while recognizing that theories are occasionally so novel that they upset the theoretical applecart (see Box 3.1 on page 25), a theory should be consistent with other accepted theories that have achieved consensus among the scientific community; that is, it should be able to be integrated into existing bodies of accepted theory. Having said that, many notable scientific advancements have occurred when a new theory contradicts accepted theory, so this desideratum should be applied with qualification.

A fourth desideratum is scope. Other things being equal, the greater the range of the theory (i.e., the more of "reality" that it encompasses), the better it may be. Though both Newton's and Einstein's theories of gravity enable us to understand a great many of the same things, the fact that Einstein's theory enables us to understand much more makes it a more powerful and valuable theory. That said, there are times when narrow-range theories tend to hold up better over time than broader-range theories. Also, as discussed in Chapter 4, scientific progress is often achieved by narrowing, not broadening, the focus of theories. Thus, this criterion is somewhat of a two-edged sword.

Creativity or novelty is a fifth criterion that is sometimes suggested for evaluating a theory. A theory that explains the obvious is generally not as highly valued by the scientific community as one that provides a novel insight into an interesting phenomenon.

Finally, many scientists suggest that a good theory is one that generates research activity—which often is a consequence of consensual validation of the theory. A theory that is rich in scope, explicit, interesting, and useful will probably generate a good deal of empirical research. Hence, a yardstick of a good theory is the amount of research it generates. Note, however, that some scientists (e.g., Skinner, 1957) have questioned this criterion, noting that many a theory has led investigators into research enterprises that have been a waste of time.

In sum, good theories, in principle, (1) increase our understanding of the world, (2) are accepted by the broader scientific community (but see Box 3.1), (3) are logically consistent, (4) are in agreement with known data and facts, (5) are testable, (6) are easily understood and communicated to others, (7) are appropriately parsimonious, (8) are consistent with other accepted theories that have achieved consensus (but see Box 3.1), (9) are relatively broad in scope, (10) are novel and original, and (11) stimulate research. When we evaluate the worth of theories as a whole, these criteria are typically invoked in one form or another. Brinberg and McGrath (1985) note that these desiderata sometimes conflict with each other. For example, parsimonious theories tend to be more limited in scope. As such, scientists often must make trade-offs as they construct theories to maximize what the scientific community values.

WHAT IS A THEORETICAL CONTRIBUTION?

One of the most common reasons manuscripts are rejected for publication is that they are judged by editors/reviewers to make an insufficient theoretical contribution. The question then becomes just what constitutes a "theoretical contribution"? Answering this question does not necessarily focus on evaluating a theory as a whole. Rather, the focus is on evaluating a specific product to determine if it is theoretically contributive. Judgments about theoretical contribution are inherently subjective, but most journal editors who have written editorials about the topic emphasize two general qualities, originality and utility (e.g., Corley & Gioia, 2011; Slater & Gleason, 2012). To these we add a third criterion, scope.

Originality

Webster's Dictionary defines *originality* as the quality of being novel or unusual. For journal editors, this quality often translates into the judged *value-added contribution* of a submission relative to extant knowledge. The degree of originality or "value additiveness" varies on a continuum, ranging from low to high. Corley and Gioia (2011) characterize the low end of the continuum as "incremental" and the high end as "revelatory." Huff (1999) makes the analogy of contributing to a current conversation (the low end) versus starting a new conversation (the high end). Conlon (2002) states that contributory theory provides a critical redirection of existing views. Mintzberg (2005, p. 361) argues that strong theoretical contributions "allow us to see profoundly, imaginatively, unconventionally into phenomena we thought we understood." Davis (1971), in his classic article "That's Interesting!", identifies what he believes separates interesting from uninteresting theories, arguing that contributions that are surprising, counterintuitive, and that deny common assumptions represent interesting theory, whereas those that simply affirm audience assumptions are of lesser interest: "The best way to make a name for oneself in an intellectual discipline is to be interesting—denying the assumed, while affirming the unanticipated" (p. 343). Reflecting on paper rejections, Rynes (2002, p. 312) takes Davis's orientation a step further by stating that "reviewers are judging the results not against prior literature, but rather against common sense. . . . " Bergh (2003, p. 136) also emphasizes the surprise element of theoretical contributions: "Is the contribution more of a common sense derivation, or does it represent a novel and unique insight?"

The morphing of originality into surprise value and counterintuition has been the subject of controversy in the social sciences. The criticism is that by emphasizing the clever and nonintuitive, we may miss the important and substantive essence of science that leads to a truly better understanding of the world about us. For example, noted social psychologist John Cacioppo (2004) comments on the field of social psychology as follows:

> We value the prize of a theory that makes non-obvious predictions, that illuminates flaws in social reasoning and interactions, that illustrates not only the inadequacy but the idiocy of common sense. Such work is unquestionably clever, but does the pursuit of the witty at the expense of the comprehensive put personality and social psychologists at risk of becoming the editorial cartoonists of the social sciences? (p. 116)

Cacioppo's concern derives from the growing number of theories and studies in social psychology that focus on cute, fun, clever, or counterintuitive demonstrations rather than on the nuts and bolts of building comprehensive theories of behavior. Novelty and originality are important qualities that editors and reviewers consider when they judge research as making a theoretical contribution, but they also must be careful about equating them with the elements of surprise and counterintuition.

Utility

Another criterion for theoretical contribution that journal editors often emphasize is that of *utility*. Actually, there are two types of utility: (1) utility in the sense of increasing our understanding of the world about us (described above) and (2) utility in terms of practical, real-world implications. Our discussion here focuses on the second type, a criterion that is particularly relevant to audiences/journals that have theoretical *and* applied interests. In such cases, in addition to theory, a premium is placed on tackling problems that affect practitioners/people in real-world settings, or as Hambrick (2005, p. 124) states, problems that derive from "the observation of real-life phenomena, not from scholars struggling to find holes in the literature." In some journals, it is not uncommon for editors to require or encourage reflections in the discussion of a study on "practice implications." Whetten (1989) has elaborated key questions reviewers use to evaluate articles, one of which is "Who cares?" The answer to this question generally focuses on the applied significance of the theoretical product.

Corley and Gioia (2011) lament the too-frequent disconnect between theory and practice. In their commentary, they analyzed differences across almost 20 years of two article types published in the *Academy of Management Review*: (1) the article in the journal formally chosen by the editors as the "best article of the year" and (2) the article in the journal published during that same year that was most cited by other scientists in subsequent years. In only three instances was the same article in both categories. A distinguishing feature Corley and Gioia identified was that the most heavily cited articles tended to focus on practical utility, but this was not necessarily the case for the "best" article. Corley and Gioia concluded that in their discipline (management), it is important for theories to be

> problem driven—that is, in some fashion addressing a problem of direct, indirect, or long-linked relevance to practice, rather than narrowly addressing the (theoretical) "problem" of finding the next mediator or moderator variable or filling theoretical gaps simply because they exist. When we focus mainly on the latter, we end up advancing theory for theory's sake, rather than theory for utility's sake. (p. 22)

When making judgments about practical utility, one might invoke different criteria depending on the substantive domain. What makes a prevention program aimed at neglectful parenting practical and useful might be different from what makes a counseling program for addicts practical and useful, which, in turn, might be different from what makes strategies for reducing racism practical and useful. For prevention programs, for example, criteria surrounding (1) program efficiency (e.g., minimizing cost, discomfort, hassles, and maximizing convenience and sustainability), (2) program effectiveness and the severity of the problem addressed, and (3) program reach (e.g., number of people affected, "defenselessness" of people affected) are central to judgments of program utility. Reviewers and editors rarely are explicit about the criteria they use to judge practical utility in a given domain, putting the onus instead on the author to build such a case.

One problem with relying too heavily on practical utility is that sometimes the implications of a scientific discovery may not be readily apparent and, indeed, may take years before the applied value becomes evident. In the early 1500s, mathematician Gerolomo Cardano developed the concept of imaginary numbers, which focus on the square root of negative numbers. At the time, his work was greeted with suspicion, as was the concept of negative numbers more generally. Little could it be known that imaginary numbers would be key to microchip design and digital compression algorithms responsible for today's digital music players. The marine biologist Osamu Shimomura studied the question of why jellyfish glow, a seemingly mundane topic. The work ultimately led to the development of a revolutionary protein tracking tool, the green fluorescent protein, that has transformed modern medical research. Shimomura received a Nobel Prize for his work.

Scope

A third criterion sometimes used by reviewers to judge the degree of theoretical contribution is *scope*, although doing so varies by discipline. If a theoretical proposition applies to a wide range of phenomena, then it may be judged as more contributive than if it is narrow in scope. For example, in psychology, the three most highly cited theoretical articles of all time are by Bandura on the construct of self-efficacy, by Fishbein and Ajzen on their theory of reasoned action (which addresses the impact of attitudes, norms, and perceived control on behavior), and by Barron and Kenny on mediation and moderation (Green, 2018; Ho & Hartley, 2016). Each of these theories can be applied to many different substantive domains and topic areas. In this sense, they have considerable scope. By contrast, an article that focuses on, say, changes in U.S. conservation attitudes over time likely will not be judged as impactful given its narrow scope. Chapter 4 discusses the trade-offs of constructing theories that are broad versus narrow in scope.

Combining Originality, Utility, and Scope

Factors other than originality, utility, and scope obviously come into play when evaluating the theoretical contribution of research. For example, if the offered theory is logically incoherent or logically questionable, it is not going to be judged favorably. However, assuming such coherence is in place, the originality, utility, and scope of the contribution seem to have high priority in the minds of editors and reviewers. One can think of the originality, utility, and scope of a theoretical contribution in the context of a three-dimensional space, as shown in Figure 3.1. This figure scales each dimension from 0 (low) to 10 (high) and shows four illustrative points in the dimensional space: (1) a contribution that is relatively low on all three dimensions (back lower left), (2) a contribution that is moderate on all three dimensions, (3) a contribution that is high on all three dimensions, and (4) a contribution that is high in originality but low in utility and scope (front lower left). When you seek to create or evaluate a theoretical contribu-

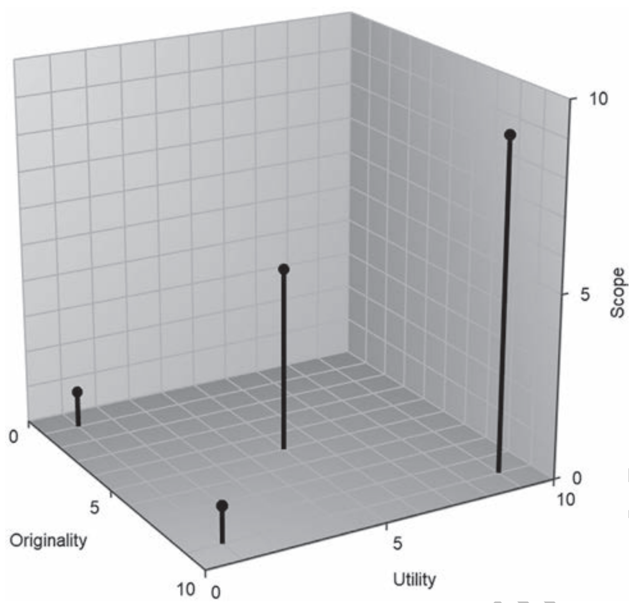

FIGURE 3.1. Originality, utility, and scope.

tion, you might think about where in this three-dimensional space it resides. Contributions that are low in originality, utility, and scope are unlikely to be well received in top-tier journals. This is not to say that research low in these qualities is unimportant. For example, replication studies are not original, but they can be important for scientific progress (see Chapter 15). Contributions that are high in originality, utility, and scope will likely be positively evaluated as contributive. As you construct theory and think about the phenomena you are interested in, how might you maximize the qualities of the originality, utility, and scope of your ideas, essentially moving your work to the upper right space of Figure 3.1? When you communicate your theory to others, how can you frame your presentation so that your project is perceived as being in that section of Figure 3.1? When you read an article and evaluate its theoretical contribution, think about how it fares on originality, utility, and scope. Be specific about where and why you would locate it where you do.

Ways of Making a Theoretical Contribution

As a preview to the remainder of this book, it might be helpful to list selected strategies you can use to make a theoretical contribution, all of which are elaborated in future chapters. We consider 16 such strategies. When you read articles in your discipline, you also can use this list as a guide to articulate the type of strategies the article used to make a theoretical contribution and how original you judge those contributions to be.

1. *Clarify, refine, or challenge the conceptualization of a variable/concept.* Theories work with variables and concepts. One way to make a theoretical contribution is to reframe or reconceptualize a variable/concept in novel ways. You might seek to make a

complex concept simpler or a simple concept more complex. As an example, ethnic identity tends to be viewed as a relatively stable construct that exhibits meaningful across-individual variability in strength; that is, some people identify with their ethnic group more strongly than others do. Instead of a stable ethnic orientation, we might think of the strength of ethnic identity as also having a more fluid, dynamic quality that can shift from one day to the next, depending on situational contexts and the goals of individuals in those contexts. In short, ethnic identity can be viewed as having both stable and transitory components; to explain behavior related to ethnicity, both dynamics need to be taken into account. Extending this idea a bit further, a person of a given ethnic group might be thought of as having multiple cognitive "portfolios" of ethnic identity (e.g., what it means to be Latinx), some of which become salient and actionable depending on the situation (Goldin & Jaccard, 2019; Pabón, 2010). Identifying those cognitive portfolios and the circumstances in which one portfolio becomes salient over another might be useful. Such a reconceptualization of ethnic identity thus might lead to innovative theory. Conceptual definitions are discussed in Chapter 5.

2. *Create a new variable or constellation of variables that are of theoretical interest.* Variables are human inventions and represent ways of categorizing or thinking about people or events. Social scientists sometimes invent or create new variables for the purposes of building new theories, or they create novel variable constellations that might be of interest and import. Chapter 5 describes examples of this strategy as well as heuristics for variable creation. An example of creating a compelling constellation of variables is the *dark triad of personality,* originally proposed by Paulhus and Williams (2002). The dark triad consists of three personality traits: Machiavellianism, narcissism, and subclinical psychopathy. Machiavellianism is the tendency to manipulate people for one's own gains; narcissism is a sense of grandiosity, entitlement, dominance, and superiority; and subclinical psychopathy is characterized by high impulsivity and thrill-seeking coupled with low empathy and low anxiety. The three traits comprising the "dark triad" share common features, namely, a socially malevolent character with tendencies toward self-promotion, emotional coldness, duplicity, and aggressiveness. Grouping these variables together and using a provocative label to characterize the grouping have led to considerable theorizing and research about them as a collective.

3. *Add one or more explanatory variables for an outcome that have not been considered in prior work.* Theoretical contributions can also be made by bringing to bear an explanatory variable that has not been studied in prior research. For example, in sociology, Idler and Benyamini (1997) drew attention to the construct of one's perceived health status as a predictor of mortality, arguing that it is a significant predictor independent of objective indicators of health and other covariates known to be related to mortality (e.g., age, socioeconomic status). Idler and Benyamini considered a range of interpretations that could account for the association and described a research program for "next steps" in building a theory of mortality that included one's perceived health status. Chapter 4 presents heuristics that can help you identify potentially new explanatory variables, and Chapter 7 describes strategies for embedding such variables in a broader theoretical network.

4. *Identify the mechanisms or intervening processes responsible for an effect of one variable on another.* When two variables are linked, theorists often want to know why this is so, that is, what is responsible for the relationship between them. For example, it is well known that there are substantial ethnic and gender differences in the occurrence of HIV infections in the United States. In 2017, Blacks in the United States represented 13% of the population but 43% of the new HIV diagnoses (CDC, 2018). Why? What are the sources of this health disparity? Is it because Blacks, due to poverty, have more limited access to health care? Is it because they make less use of condoms? Is it because of higher needle sharing when they are using illicit injection drugs? Men account for about 75% of individuals living with HIV. Why? What are the sources of this gender-based health disparity? Is it because men are more likely to engage in risky sexual behavior? Is it because men tend to have more sexual partners than women? Another way of making a theoretical contribution is to elaborate new perspectives on the mechanisms responsible for the association between two variables. Chapter 7 discusses this strategy in detail using the concept of causal mediation.

5. *Identify the boundary conditions of an effect of one variable on another.* Theoretical relationships often have *boundary conditions*. Another way of contributing to theory is to identify these conditions (Busse, Kach, & Wagner, 2017). Boundary conditions address the generalizability of a theory, with an eye toward identifying the limits of a theoretical proposition. In economics, for example, lowering the federal interest rate (the interest rate at which banks and credit unions lend reserve balances to other depository institutions overnight) typically leads to an expansion of the economy, but only under certain broader economic conditions. Identifying and elaborating what these conditions are would constitute a theoretical contribution. Ways of theorizing about boundary conditions are described in Chapters 6, 7, and 9.

6. *Identify variables that moderate the effect of one variable on another.* A more subtle variant of identifying boundary conditions is to identify variables that dampen or strengthen the effect of one variable on another variable. These are known more generally as *moderator variables*. As an example, numerous studies find that parents are not as happy as nonparents and that parenthood tends to have a negative effect on subjective well-being (Aassve, Goisis, & Sironi, 2012). Matysiak, Mencarini, and Vignoli (2016) hypothesized that the negative effect of childbearing on subjective well-being would be stronger when parents were experiencing higher levels of work–family conflict. That is, they hypothesized that work–family conflict moderated the adverse effect of having a child on parents' subjective well-being. The strategy of specifying moderator variables is discussed in Chapters 6 and 7.

An interesting form of this strategy is known as *meta-analysis*. Meta-analyses focus on multiple published studies all on the same topic that address the same theoretical relationship between two variables, such as the effect of the number of hours spent watching television programs with sexist content on sexist attitudes. Each study is treated as a separate data point, and specialized statistical methods are used to analyze the statistics reported in each investigation, say, the correlation between exposure and sexist attitudes, across all studies. Moderator variables represented by study characteristics are identified, and the reported correlations are tested to determine if they vary as a function of the hypothesized moderators. For example, a theorist might postulate cohort effects such that the effect of watching sexist television programs on sexist attitudes is stronger for studies conducted in the 1970s versus those conducted in the 1980s versus those conducted in the 1990s, with the effect becoming weaker with each passing decade due to changing societal contexts. This proposition would be tested using meta-analysis. Meta-analyses are often referred to as quantitative literature reviews because they review studies on a given topic but apply quantitative methods to summarize trends across the studies. For an introduction to meta-analysis, see Borenstein, Hedges, Higgins, and Rothstein (2009).

7. *Extend an existing theory or idea to a new context.* Many theories can be applied to new populations, new situations, and/or different problem areas (Pawson & Tilley, 1997). For example, theories have been offered about the causes and consequences of marital dissatisfaction among husbands and wives (Gottman, 1994). Do these theories apply to unmarried couples who live in cohabiting relationships? In 1960, an estimated 439,000 couples were cohabitating in the United States; by 2005, the number had risen to 4.85 million couples (an over-tenfold increase; Jaccard, 2009) and by 2015, it was over 7.5 million couples. Of interest might be how well theories of marital dissatisfaction "import" to dissatisfaction among couple members who are cohabitating.

Applying a well-articulated theory to a new context will not always be seen as innovative unless it is accompanied by new insights relative to the theory or to the substantive domain of interest. Fisher and Aguines (2017) describe seven tactics for elaborating existing theories when they are applied in new contexts: (1) horizontal contrasting, (2) vertical contrasting, (3) new construct specification, (4) construct splitting, (5) structuring specific relations, (6) structuring sequence relations, and (7) structuring recursive relations. *Horizontal contrasting* applies a theory from one context to another but where the level of analysis (e.g., the individual, the organization) remains the same. For example, a theory developed for one type of organization is applied to another type of organization; a theory of couple dissatisfaction for married couples is applied to cohabiting couples. *Vertical contrasting* extends a theory developed to explain constructs and relationships at one level of analysis to another level, such as adapting theories of individual-level decision making to organizational-level decision making, or vice versa. *Construct specification* involves adapting the definition of a theoretical construct in one context to reflect the realities of the new context, thereby advancing theory about the construct. *Construct splitting* splits existing constructs in one context into more nuanced, multidimensional portrayals demanded by the new context. *Structuring specific relations* describes new relationships between the theoretical constructs that are unique to the new context relative to the original context. *Structuring sequence relations* describes how the ordering between variables might change as a function of the new context relative to the prior context. For example, the sequence of steps involved in implementing new policies in hospitals might differ from one medical context to another (e.g., specialty versus general-medicine-focused hospitals). *Structuring recursive relations* involves identifying how reciprocal causal dynamics between theoretical constructs may change as a function of context. When one is seeking to make a theoretical contribution by applying an extant theory to a new context, it usually will be helpful to invoke one or more of these seven processes to strengthen the theoretical contribution.

8. *Identify nuanced functional forms of relationships.* Many theoretical propositions are framed in ways that imply linear relationships between variables. The phrases "as *X* increases, *Y* decreases" and "as *X* increases, *Y* increases" typically imply linear relations. However, variables might be related in nonlinear ways that have nontrivial theoretical and/or practical significance. For example, when mapping how attitudes relate to behavior, one might expect that for some behaviors, only when attitudes toward performing it are quite positive will people be energized enough to put forth the effort to perform the behavior. This suggests that below a certain threshold of attitudinal positivity, attitudes and behavior will be unrelated, but above that threshold, more positive attitudes will lead to higher levels of behavior (see van Doorn, Verhoef, & Bijmolt, 2007). Interventions that change attitudes may have little effect on behavior if that change occurs below the threshold, but they may have appreciative effects if the attitude change occurs above the threshold. Such nonlinear functions may account for inconsistent results in literature reviews of attitude-based interventions. For example, studies that fail to find intervention effects on behavior may have created change below the threshold, whereas studies that observed intervention effects on behavior may have created attitude change above the threshold. Thus, another way to make a theoretical contribution is to specify in more focused ways the function relating two or more variables and elaborating the theoretical and practical implications of that function. This strategy is discussed in Chapters 6, 8, and 11.

9. *Identify unenunciated/unanticipated consequences of an event.* Another way of making a theoretical contribution is to call attention to a new consequence or outcome in a theory, perhaps an "unanticipated consequence." For example, globalization has brought factories to many rural areas of developing countries with the promise of increased economic opportunities, higher income, and steady work. However, the introduction of factories into these communities has produced a host of social and cultural effects, including changes in eating habits, family dynamics, and work patterns that have yielded a mix of community-wide positive and negative outcomes (Goldin, 2009). If a theory does not include all consequences associated with a focal variable, identifying and elaborating new ones can be contributive.

Computer simulations are becoming increasingly popular as a means of generating and refining theory (see Chapter 9). Simulations can take many forms, but they typically deal with complex, large-scale systems that have both elements of randomness as well as dynamic interdependencies. In a strategy known as agent-based modeling, a theorist might create a large population of simulated "units" (e.g., people) on a computer, imbue them with certain attributes or qualities according to a set of computer algorithms/rules, and devise interaction and experiential learning rules for the units, all based on theory. The system is then set in motion on the computer, and the consequences and outcomes that result are noted. Such simulations, for example, are used to model and gain a deeper understanding of phenomena such as traffic congestion, crowd behavior in emergencies, and pollution dynamics, to name but a few. Often, unanticipated emergent outcomes will manifest themselves in the course of the simulation, and documenting these outcomes can make a theoretical contribution. (For an example in the social sciences, see the work on religious diffusion by Whitehouse, Kahn, Hochberg, and Bryson [2012] and the multiple commentaries on their article.) Simulation approaches to theory construction are discussed in Chapter 9.

10. *Enrich and deepen understanding of established quantitative associations.* Theoretical relationships in the social sciences are often tested using quantitative methods. An advantage of quantitative-based approaches is that they allow us to collect data on large numbers of people and to summarize data trends using convenient and revealing statistical methods. Such data also allow one to address complex multivariate questions in ways that the unaided human mind is simply incapable of. However, this efficiency and complexity often comes at a cost, namely, sacrificing levels of detail, richness, and insight that are better achieved through in-depth interviews and/or other qualitative methods. Another strategy for making a theoretical contribution is to identify an interesting theoretical proposition that has been established quantitatively, but then to conduct a qualitative study with respect to it in order to enrich, elaborate, build upon, or even revise it. For example, it is well known that cognitive-behavioral therapy (CBT) is a relatively effective psychosocial treatment for depression, a result that has been shown repeatedly in quantitative-based randomized trials (e.g., Driessen & Hollon, 2010). However, rarely has research conducted in-depth qualitative interviews and/or collected detailed observational data on individuals about their experiences before, during, and after CBT (CBT treatment usually extends over a period of several months). Both theoretical and practical insights are almost certain to emerge in the context of such data collection. For example, quantitative studies tend to find that patients who are married often respond better to CBT; this also is true of patients who are free of comorbid psychiatric disorders. Qualitative research might explore the bases for these documented differential responses to CBT to evolve rich theories surrounding them. Chapter 10 elaborates the concept of qualitative methods.

11. *Develop typologies/taxonomies.* Yet another type of theoretical contribution is to construct a meaningful *typology* or *taxonomy* and then to build theory or practical applications around it.[1] The construction of typologies/taxonomies can be pursued based purely on logic, or it also can use empirics. As examples, Greenberg (1987) categorized theories of organizational justice invoking two dimensions: (a) a reactive versus proactive dimension, that is, a focus on seeking to redress injustice versus a focus on striving to attain justice and (b) a process–content dimension, that is, a focus on the processes used by organizations to ensure outcomes such as pay and recognition are equitably distributed versus a focus on determining the extent to which there are equitable outcomes. Greenberg created a 2 × 2 typology based on the factorial combination of these two dimensions and then engaged in a theoretical analysis of each cell by and of itself

[1] Distinctions are often made between a "typology" and a "taxonomy," but we use the terms interchangeably here; see Chapters 10 and 11 for elaboration.

as well as the four types of theories considered collectively. In this case, the typology served as a means of theoretical synthesis.

In another study, Abraham and Michie (2008; see also Michie et al., 2013) developed a taxonomy of behavior change techniques used in health interventions after acquiring and reviewing the manuals of 195 behavioral interventions. Twenty-six different strategies were identified (e.g., handling time management; providing information about the benefits and costs of action or inaction; providing information about whether others would approve or disapprove of any proposed behavior change; prompting barrier identification and how to deal with barriers; providing general encouragement). The idea was to use this taxonomy to identify which techniques were most effective in different contexts and for different populations.

As a final example, in a qualitative study, Jaccard, Levitz, and colleagues (2018) interviewed contraceptive counselors who help women make decisions related to contraceptives. They explored how counselors felt about expanding the scope of their counseling to include family planning decisions surrounding the timing of a pregnancy relative to the women's current life circumstances and career goals. Based on the interviews, Jaccard and colleagues constructed a taxonomy of challenges and difficulties in implementing such counseling, which was then used to formulate training protocols for counselors and develop theory in this area.

The construction of typologies is discussed further in Chapters 4 and 11.

12. *Import or apply grand theories and frameworks from other disciplines.* Social scientists often distinguish between grand theories and midlevel theories. Grand theories are broad-based, comprehensive frameworks that represent ways of thinking about a wide range of phenomena and that have proven useful across decades of scientific inquiry. Examples include materialism, structuralism, functionalism, symbolic interactionism, postmodernism, and evolutionary perspectives, all of which are discussed in Chapter 12. Midlevel theories are narrower in scope and focus on specific phenomena, usually mapping relationships between variables or concepts in a more limited sense than grand theories. Another form of theoretical contribution is to bring one of the grand theories to bear in a substantive area in ways that provide new theoretical insights into that area. For example, if one is interested in health care delivery systems, what insights might be gained by thinking about such systems from the perspective of materialism, structuralism, and/or functionalism? Examples of this strategy for making a theoretical contribution include Acevedo (2007), Golding and Murdock (1978), Katz (1960), and Timmermans and Almeling (2009).

13. *Synthesize multiple theories into a unified framework.* Yet another form of theoretical contribution is to synthesize multiple theories into a single, more comprehensive theoretical structure that then leads to an even greater understanding of the phenomena of interest. For example, Fishbein and colleagues (2001) sought to integrate the theory of reasoned action, social learning theory, self-regulation theory, the health belief model, and subjective culture theory into a single unified framework for the study of health-related behaviors. Pound and Campbell (2015) characterize the synthesis pro-

cess as having three steps: (a) *synthesis preparation,* in which parts of relevant theories are extracted and summarized; (b) *synthesis,* in which the theories are compared for points of convergence and divergence and then brought together into a larger whole that resolves points of divergence; and (c) *synthesis refinement,* in which the synthesis is interrogated for further theoretical insights. Pound and Campbell provide examples that use the three steps as applied to sociological theories of health.

14. *Develop a theory of measurement.* Measurement is core to science. Although it is traditionally thought of as a methodological matter, measurement has a theoretical basis around which theory construction can take place (see Chapters 13 and 14). As such, one can develop and evaluate theories about measurement. For example, when people make self-reports of how often they have engaged in a behavior (e.g., voted Democratic, gone to church), they must (a) interpret and comprehend the question asked by the researcher, (b) make a cognitive judgment that constitutes their answer to the question, and then (c) translate the answer in their minds into a response format provided by the investigator. Theorizing about the processes of comprehending, judging, and translating judgments ultimately underlies theories of measurement. As such, contributions can also take the form of theorizing about measurement.

15. *Pit opposing theoretical explanations against one another.* Another strategy for making a theoretical contribution is to pursue a study that pits two competing theories against one another. This is a classic strategy that Platt (1964) called *strong inference.* As an example, Skurka and colleagues (2018) noted that courts in the United States have blocked the use of graphical warnings on cigarette packages based on the premise that they are unnecessarily emotional and scare rather than inform consumers. Skurka and colleagues identified several theories that made opposite predictions about the relationship between negative affect, health risk beliefs, and smoking decisions and competitively tested the theories against one another in multiple experiments. The studies yielded results consistent with theories that asserted informational value for affective information as compared to theories that did not posit such dynamics. Chapters 4 and 15 address the strategy of strong inference in more depth.

16. *Propose alternative explanations to established phenomena.* A related type of theoretical contribution is to posit an alternative explanation to an "established" theoretical proposition and then collect data to evaluate the viability of the alternative explanation. For example, it has been amply documented that adolescent religiosity and drug use are inversely related such that more religious adolescents are less likely to use illicit drugs (e.g., Wallace & Bachman, 1991). This usually has been interpreted in terms of the protective value of religion during adolescence. However, it is possible that this association develops not because religiosity has a causal influence on drug use, but rather, just the opposite. Perhaps youth use or do not use drugs for reasons that have little to do with their religiosity. Instead, as youth become more heavily involved with drugs, they may withdraw from activities that interfere with their drug taking or that go against their preferred predilection to use drugs, such as going to church. In other words, drug use causes decreases in religiosity rather than religiosity causing lower drug use. Which of these explanations is more likely to be operative is a matter of some interest. Theorizing about such reverse causal dynamics is considered in Chapter 7.

This list of strategies is incomplete, but it provides a sense of the myriad ways one can contribute to theory. Can you generate additions to this list given your substantive interests? Almost all of the strategies are viable for both qualitatively and quantitatively oriented social scientists. The remaining sections of this book provide the tools you will need to pursue one or more of the strategies.

SUMMARY AND CONCLUDING COMMENTS

Individuals are limited as to how much of their environment they can cope with and understand. To acquire deeper levels of understanding, individuals typically rely on shared conceptual systems. A number of different shared conceptual systems exist, including religion, philosophy, law, music, art, and science. Despite their unique variations, all conceptual systems can only provide partial understanding. Each is capable of providing a unique perspective, which may reinforce or expand upon the understanding generated by the others.

Science is generally distinguished from other shared conceptual approaches by the strategy it favors for evaluating its conceptual systems. This strategy, known as systematic empirical confirmation, requires gathering (or, more accurately, generating) relevant information from external observations that can be verified or disproved by observations made by others. In turn, systematic empirical confirmation is predicated upon theorizing. Theorizing involves conceptualizing some phenomena in terms of a set of expressions, encompassing concepts and relationships among them, and then expressing these ideas via a symbol system, typically words and/or numbers. Scientists have described a range of criteria for evaluating theories, some of which are deemed essential whereas others are found to be desirable. Theoretical contributions can take many forms, and as one contemplates devising or evaluating a specific theoretical contribution, one should potentially consider the criteria of originality, utility, and scope. Myriad strategies are available for one to make a theoretical contribution. These include (1) clarifying, refining, or challenging the conceptualization of a variable/concept; (2) creating a new variable or constellation of variables that are of theoretical interest; (3) identifying one or more explanatory variables that have not been considered in prior work; (4) identifying the mechanisms or intervening processes responsible for an effect of one variable on another; (5) identifying the boundary conditions of an effect of one variable on another; (6) identifying variables that moderate the effect of one variable on another; (7) extending an existing theory or idea to a new context; (8) identifying nuanced functional forms of relationships; (9) identifying unenunciated/unanticipated consequences of an event; (10) enriching and deepening the understanding of established quantitative associations; (11) developing typologies/taxonomies; (12) importing or applying grand theories and frameworks from other disciplines; (13) synthesizing multiple theories into a unified framework; (14) developing theories of measurement; (15) pitting opposing theoretical explanations against one another; and (16) proposing alternative explanations to established phenomena. As you focus on one or more of them, you should develop a compelling conceptual logic model for each. The process of theorizing is a complex enterprise that is difficult to teach. The remainder of this book provides the reader with heuristics that may prove useful in such endeavors.

SUGGESTED READINGS

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KEY TERMS

shared meaning system (p. 23)
prescriptive function (p. 24)
evaluative function (p. 24)
consensual validation (p. 24)
expert validation (p. 24)
internal validation (p. 24)
systematic empirical validation (p. 25)
conceptual realm (p. 26)
empirical realm (p. 26)
metaphysical explanation (p. 26)
intersubjectivity (p. 27)
theory construction (p. 28)
theory (p. 28)
model (p. 29)
theoretical expression (p. 29)
hypothesis (p. 29)
applied research (p. 31)
basic research (p. 32)
originality (p. 34)
utility (p. 35)
scope (p. 36)
boundary conditions (p. 39)
moderator variable (p. 39)
meta-analysis (p. 39)
horizontal contrasting (p. 40)
vertical contrasting (p. 40)
construct specification (p. 40)
construct splitting (p. 40)
structuring specific relations (p. 40)
structuring recursive relations (p. 40)
typology/taxonomy (p. 42)
strong inference (p. 44)

EXERCISES

Exercises to Reinforce Concepts

1. Explain how shared belief systems are useful in our attempt to understand our world.

2. Identify and explain the three fundamental commonalities of shared belief systems.

3. Explain how science is similar to other belief systems. How does it differ?

4. Distinguish between prescriptive and evaluative functions.

5. Identify and define the two basic realms of science. Which is more important and why?
6. Explain what is meant by the intersubjectivity of science.
7. What are the differences between theories, models, and hypotheses?
8. What are the differences between applied and basic research?
9. What are the characteristics of a good theory?
10. What are the elements of a theoretical contribution? Characterize each.
11. Identify strategies that you think are most useful for making a theoretical contribution.
12. What are the seven strategies for elaborating theory when applying it to a new context? Define each.
13. Why is the identification of nonlinear relationships important?
14. How are simulations useful for theory construction?
15. What are the three steps in theory synthesis? Characterize each.
16. In what sense does theory underlie measurement?

Exercises to Apply Concepts

1. From the literature of your choosing, find a theory and describe it. Evaluate that theory using the major criteria discussed in this chapter for evaluating theories. If you have difficulty applying one of the criteria, describe why. Identify other criteria, if any, that you might use other than those discussed in this chapter.
2. Find an article of your choosing and describe the approaches used in that article to make a theoretical contribution relative to the strategies identified in this chapter. Evaluate the quality of the theoretical contribution of the article relative to the criteria of originality, utility, and scope.
3. Pick one of the strategies for making a theoretical contribution and develop and describe a research project that uses it.