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Figure 4-1 Theory Building in Engaged Scholarship Model

Theory Building
Create, elaborate & justify a theory by abduction, deduction & induction

Engage knowledge experts in relevant disciplines & functions

Criterion - Validity

Problem Formulation
Situate, ground, diagnose & infer the problem up close and from afar

Engage those who experience & know the problem

Criterion - Relevance

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Chapter 4. Building a Theory

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Andrew H. Van de Ven
Carlson School of Management
University of Minnesota
321 – 19th Avenue S.
Minneapolis, MN 55455
avandeven@csom.umn.edu

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For our own sakes, we must attend as much to how scientific hypotheses are caught, as to how they are cooked. Norwood Russel Hanson (1959: 35)

It is not so much the world which is logical or illogical as men [and women]. Stephen Toulmin (2003: 5)

Introduction

This chapter examines the theory building activities illustrated in Figure 4.1 of the engaged scholarship process. The central objective of theory building is to develop plausible and interesting conceptual models that answer a question about the problem as formulated in the last chapter. A central theme of engaged scholarship is the close interplay between theory and reality. In the last chapter this theme emphasized that formulating a research problem requires robust theories and concepts. This chapter applies the theme to theory building. Building a theory requires intimate familiarity with the problem domain. Problem formulation and theory building go hand in hand. Another theme is engagement. Just as problem formulation requires involvement of those who experience and know the problem domain, theory building is greatly enhanced by engaging knowledge experts in relevant disciplines and functions.

<Figure 4.1>

Theory building involves three activities: (1) conceiving or creating a theory, (2) constructing or elaborating the theory, and (3) justifying or evaluating a theory. These activities entail different types of reasoning: abduction is used for conceiving a theory, logical deduction for constructing a theory, and inductive reasoning for evaluating a theory. Much can be learned about the scientific enterprise by examining these patterns of reasoning. While abduction is a different form of reasoning from deduction and induction, they are closely related. Peirce argued that abduction, which initiates theory, requires induction in order that the theory may be tested through its consequences. But these consequences are derived through the process of deduction (Mounce, 1997: 18).

Abductive reasoning usually begins with a surprising observation or experience. This is what shatters our habit and motivates us to create a hypothesis that might resolve the anomaly. Abduction is an inferential procedure in which we create a conjecture that, if it were correct,
would make the surprising anomaly part of our normal understanding of the world. For example, I might be astonished to find that ‘Mary is strong.’ But if I came up with a hypothesis that ‘All athletes are strong,’ then my anomaly would dissolve by concluding that ‘Mary is an athlete.’ This form of abduction represents the first of three kinds of reasoning in theory building (Lachs, 1999: 78-79).

The second step in constructing a theory uses deductive reasoning to elaborate and identify the consequences of the hypothesis so that it may be open to observation. Deduction involves arriving at a ‘result’ based on applying a ‘rule’ or hypothesis to a case. For instance the rule might say, ‘All athletes are strong’ and when applied to a case ‘Mary is an athlete’ produces a result ‘Mary is strong’ (Bartel & Garud, 2003). Section II of this chapter discusses basic principles of logical deductive reasoning to elaborate a theory.

Having deduced the conditional consequences of the claim, we can proceed to evaluate and test a theory using inductive reasoning. Section III of this chapter discusses how the logical ‘validity’ of a theory is typically evaluated in terms of the strength of its argument. In the next chapter we examine how the empirical ‘truth’ of a theory is evaluated in terms of how well the operational model of a theory fits observations of the world. This requires checking whether the predicted observations are reliable. In the process we repeatedly assess the probable truth of the hypothesis by determining the ratio of successful observations. The result is a judgment of probability. Scientific knowledge largely consists of such judgments, which means that we cannot know anything with certainty and that with time even our hypothesis might turn out to be false.

I discuss these three different theory building activities and modes of reasoning in sequential order. In practice, they represent an iterative cycle. The initial cycle tends to follow a temporal sequence of theory conception, construction, and evaluation activities using abductive, deductive, and inductive reasoning, respectively. Because these activities and modes of reasoning are interdependent, they mutually influence each other over time. The simple temporal sequence transitions into a multiple parallel progression in subsequent iterations of the cycle. Theory building typically requires numerous repetitions of the cycle. I have never experienced or witnessed completing the process of theory creation, construction, and evaluation activities in only one or two trials. Many different trials—often engaging other people—of creating, constructing, and evaluating a theory are needed to build a theory that withstands the criticisms of the status quo and thereby advances scientific and practical knowledge about the problem or question being investigated.

Not all scholars may choose to perform all three activities of creating, constructing, and evaluating theories. Some emphasize creating theories (e.g., Alvesson, 2003; Mintzberg, 2005), some constructing and modeling theories (e.g., Blalock, 1969; Whetten, 2002), while others focus on testing theories already constructed (Shadish, Cook, & Campbell, 2002; Singleton & Straits, 2005). Although scholars may express different preferences and styles in creating, constructing, and evaluating theories, all three activities are important skills for theory building. Not all research projects, of course, may require equal attention to all three theory building activities. For example, a study may only require theory evaluation if it is undertaken to test an existing theory already published in the literature.
I. Conceiving a Theory

The first step in theory building is conceiving the germ of an idea that may become a theory. This idea may be a ‘half-baked’ conjecture in response to an anomaly that violates our understanding of how things are expected to unfold. For example, most people view interruptions as impeding the work of teams in organizations. However my colleague, Professor Mary Zellmer-Bruhn, was surprised to find that teams she was observing in her field studies learned more when their work was interrupted by events, such as losing team members, changing tools and technology, and organizational restructurings. What explains this anomaly? She reasoned by abduction that interruptions might be occasions for teams to reflect on what they were doing and ‘get out of their ruts’ in following mindless routines. If this idea is correct, she concluded that interruptions may provide teams opportunities to learn new ways to do their work better, and thereby resolve the anomaly (Zellmer-Bruhn, 2003).

Unexpected things that trigger recognition of anomalies are frequently encountered, often on a daily basis. They prompt us to question our theories or understanding of the world. We cannot, of course, study all the anomalies we encounter. A central purpose of the problem formulation process discussed in the last chapter is to select priorities among the research problems and questions those that are most important to study.

By definition, anomalies represent disconfirmations of our theories. Being human and subject to all kinds of biases, including the confirmation trap, we may choose to deny or ignore anomalies. As Carlile and Christiansen (2004) state, ‘If you set out to prove your theory, an anomaly is a failure. But if your purpose is to improve a theory, the anomaly is a victory.’ This form of openness ‘allows us to transcend our particular viewpoint and develop an expanded consciousness that takes the world in more fully’ (Nagel, 1986: 5). Schon (1987) maintains that in situations of ambiguity or novelty, ‘our thought turns back on the surprising phenomenon, and at the same time, back on itself.’ This can be described as abductive reflection-in-action.

Such reflection, in fact, is one way that new knowledge is created. The logic of discovery or creativity (as distinguished from a logic of verification or testing) consists of a process of reasoning that Charles Peirce and Norman Hanson called abduction, also referred to as retroduction (Peirce, 1931-1958; Hanson, 1958). This form of reasoning begins when some surprising anomaly or unexpected phenomenon is encountered. This anomaly would not be surprising if a new hypothesis or conjecture was proposed. The anomaly would be explained as a matter of course from the hypothesis. Therefore, there is good reason for developing the hypothesis for it might explain the phenomenon along with its anomaly.

Abductive reasoning assumes that observations and facts are theory-laden; that is, viewed through a conceptual pattern. Part of this view is a function of the meanings we attach to the terms within a context; part of it is a function of the generalizations, hypothesis, and methodological presuppositions we hold in a context. The theories we might create to explain anomalies are enabled and constrained by our existing repertoire of theories and methods.

Locke, Golden-Biddle, and Feldman (2004) point out that prior scholarship is probably the most obvious inspirational resource for making sense of data. They explain this as follows.

In imaginative work, however, theory is not placed in a dominant and constraining relation to data from which it imposes and affirms a pre-considered order. Used as an inspiration resource to make new sense of data, theory is multidisciplinary, treated pluralistically, and is used to open up new possibilities.
When various theoretical frames are placed in tension with data, with each other, and with one’s own frame, the interaction of observation and variety in theories can provide new theoretical questions and refine research foci. The interactions can create opportunities for seeing new interpretations that conflict with prevailing views or originate in different perspectives. Further, taking a multidisciplinary approach to theory facilitates the purposeful creation of contradictory ideas by bringing to our work both our learning and the thinking from outside the discipline; as we integrate and recombine insights and work from other fields, we generate new insights and ideas, and can rearrange familiar concepts with new understandings. (2004: 3)

Given the theory-laden nature of observations and data, we do not view the world with a ‘blank slate.’ We view reality from our theoretical viewpoint or perspective. Theories put phenomena into meaningful systems. A theory is a pattern of conceptual organization that explains phenomena by rendering them intelligible. From the observed properties of phenomena, we reason our way toward a keystone idea from which the properties can be explained. Thus, instead of thinking of theory creation as being analogous to drafting on a clean sheet of paper, it is more helpful to think of it as one of erasing, inserting, revising, and re-connecting ideas scattered on many papers that are scribbled full of experiences, insights, and musings of ours and others. This analogy fits nicely with contemporary definitions of creativity as representing recombinations of old ideas in new ways (Van de Ven et al., 1999: 9).

Peirce and Hanson argued that a theory is not pieced together inductively from observed phenomena, nor is it deduced from axioms or premises; it is rather an abductive process that makes it possible to observe phenomena as being of a certain sort, and as related to other phenomena. Alvesson (2004) criticizes those who view ‘grounded theory building’ as an inductive process in which researchers are advised to approach field observations without preconceived theories and ‘let the data speak for themselves’ (Eisenhardt, 1989; Glaser & Strauss, 1967; Strauss & Corbin, 1994). He argues that this form of grounded theorizing from a ‘blank slate’ misconstrues the process of theory creation and gives an impression of rationality through emphasizing procedures, rules, and a clear route from empirical reality to theory via data, which are viewed as representing objective and impartial facts. Following Peirce and Hanson, I argue that researchers and practitioners create or discover theories through a process of abduction—not by induction or deduction. Nonaka observes that ‘people do not just passively receive new knowledge; they actively interpret it to fit their own situation and perspectives. What makes sense in one context can change or even lose its meaning when communicated to people in a different context’ (Nonaka, 1994: 30).

Whereas the process of abduction begins with recognizing a breakdown or anomaly, it ends with a coherent resolution. Agar (1986: 22) states that

- a coherent resolution will (1) show why it is better than other resolutions that can be imagined; (2) tie a particular resolution in with a broader knowledge that constitutes a tradition; and (3) clarify and enlighten, eliciting an ‘aha’ reaction from members of different traditions. . . . A successful resolution will also do more than resolve a single breakdown. The coherence that results must apply in subsequent situations.

Bruner’s (1973; 1996) work on learning as going beyond the information given is helpful in considering the creativity and generality of a coherent resolution. Like Peirce and Hanson, Bruner notes that a theory or model is a generic representation of the critical characteristics of a
phenomenon. For Bruner, this implies that grounding theories in reality requires going beyond the information given so that the hypothesis is formulated as having applicability beyond the situation in which it is observed. This kind of creative abductive leap leverages learning. It is learning about the critical aspects of a problem so that other things can be solved with no further research or learning required. It is fundamentally an ‘emptying operation’ in which the scholar strips or abstracts away idiosyncratic details of the situation observed in reality. In doing so he or she learns something generic about the problem that generalizes to a broader set or type of situations existing in reality.

An important qualification in carrying out Bruner’s emptying operation is that it threads a fine line between informed generalizability and mere speculation. The ability to perform this ‘emptying operation’ depends on a scholar’s repertoire of experiences and theoretical frameworks. A scholar with several years of experience in formulating research problems and going through the process of engaged scholarship is going to get better at performing an ‘emptying operation’ that is truly illuminating, as compared to a new researcher with little past experience or exposure to alternative perspectives of others about the problem domain.

Weick (1989) provides a useful way to think about Bruner’s (1996) ‘emptying operation.’ He credits Crovitz (1970) with the idea that models as described in journal papers include two kinds of words: those referring to general concepts that might appear in any paper (y-words), and words referring to substantive issues that are specific to particular articles (x-words). The ratio of x-words to y words suggests how much jargon the article contains. Jargon-laden articles have not been emptied in such a way that they might go beyond the information given. For example, if we delete the x-words (or reconceptualize them into y-words) and keep the y-words, then we have a generic structure for theorizing about subjects across many cases. The key point in Bruner’s suggestion of going beyond the information given through a ‘cleaning operation’ is to remove the idiosyncratic words and ideas that are incidental to our argument, and to focus instead on making connections between the y-words that are central to a generalizable argument. This process of emptying theories of incidental x-words is crucial, for they often prevent us from ‘seeing the forest because of the trees.’ Parsimonious theories are preferred not just because of simplicity, but more importantly because they tend to go beyond the information given by having been emptied of incidental details.

‘If a picture is worth a thousand words, then one well-wrought guess is worth a thousand pictures.’ A well-wrought guess, of course, is usually and rather grandly called ‘a hypothesis.’ What is important about a hypothesis is that it derives from something you already know, something generic that allows you to go beyond what you already know . . . . Being able to ‘go beyond the information’ given to ‘figure things out’ is one of the few un tarnishable joys of life. One of the great triumphs of learning . . . is to get things organized in your head in a way that permits you to know more than you ‘ought’ to. And this takes reflection, brooding about what it is that you know. The enemy of reflection is the breakneck pace--the thousand pictures. (Bruner, 1996: 129)

The time from recognizing an anomaly to proposing a resolution (or new theory) can vary greatly. Although Peirce wrote of abduction as being a flash of inspiration, Campbell (1988: 410) provides a more reasonable evolutionary account of the long process and time it often takes to conceive or create a theory that resolves a breakdown.
A problem is posed for which we must invent a solution. We know the conditions to be met by the sought idea; but we do not know what series of ideas will lead us there. In other words, we know how the series of our thoughts must end, but not how it should begin. In this case it is evident that there is no way to begin except at random. Our mind takes up the first path that it finds open before it, perceives that it is a false route, retraces its steps and takes another direction. . . . It is after hours and years of meditation that the sought-after idea presents itself to the inventor. He does not succeed without going astray many times; and if he thinks himself to have succeeded without effort, it is only because the joy of having succeeded has made him forget all the fatigues, all the false leads, all of the agonies, with which he has paid for his success. . . . The important thing to notice is that the good flashes and the bad flashes, the triumphant hypothesis and the absurd conceits, are on an exact equality in respect to their origin. (Campbell, 1988: 417)

Campbell (1988) took a ‘blind’ view of random variations. That is, saying that the origins of insights are random is to say that observers are often blind to the process and simply do not know how variations emerge. This overlooks the question of whether the statistical pattern in the emergence of new ideas follows a stochastic random process. For the individual scholars engaged in the task, the process of abduction is probably not random. Because observations are theory-dependent on our preferences, experiences, and academic backgrounds, we are predisposed to make particular insights. For instance, in the process of creating a theory sociologists take as a starting point the cultural, normative, or critical theories as opposed to rational choice theories. These theories, which become academic world views, program how problems and possible solutions are framed. So, while we may be blind to how variations evolve, they are guided by our penchant to explain phenomena based on our experience and discipline.

Taking his cue from Campbell, Weick (1989) describes theory building as an evolutionary trial-and-error process of thought experiments in variation, selection, and retention of plausible conjectures to solve a problem or make sense of a phenomenon. As applied to theory building, variation is the number of different conjectures we develop to make sense of a problematic situation. Selection involves developing and applying diverse criteria for choosing among these conjectures. Retention is the elaboration and justification we provide for the chosen conjecture (as discussed in the next section of this chapter). Because the theorist rather than nature intentionally guides this evolutionary process of disciplined imagination, theory creation is more like artificial selection than natural selection. Theorists both choose the form of the problem statement (as discussed in the last chapter) and declare when their thought trials have solved their problem (which is focused on here). Weick elaborates this evolutionary process of theory building as follows.

**Variations in Thought Trials**

As we have seen, when faced with an anomaly or problem, we generate conjectures to resolve it. By abductive reasoning we rely on the knowledge and experiences that we have or can access to come up with these conjectures, usually in the form of if-then statements. These thought trials in developing conjectures can vary in number and diversity; that is, the heterogeneity and independence of thought trials. Weick (1989: 522) argues that a greater number of diverse conjectures is more likely to produce better theory than a process that generates a small number of homogeneous conjectures.
Weick notes that ‘given the tendency of humans to exhibit grooved, habituated, redundant thinking this requirement is difficult to achieve unless disciplined imagination is applied to increase independence in the variations of our thought trials.’ One strategy that Weick advocates is to use a strong classification system in which an event or issue clearly falls into a category, or can be examined in terms of several clearly different categories. Variations in thought trials within one category should be associated with fewer breakthroughs than would variations that originate in more than one category (Weick, 1989: 522).

Those who argue for dialectical oppositions (Astley & Van de Ven, 1983), the cultivation of paradox (Quinn & Cameron, 1988), conceptualization at more than one level of analysis (Staw, Sandelands, & Dutton, 1981), and micro-macro linkages (Knorr-Cetina & Cicourel, 1981) can be viewed as people suggesting that heterogeneous thought trials are more likely than homogeneous thought trials to solve theoretical problems. (Weick, 1989: 522)

For example, Scott Poole and I have proposed four different ways for developing theories that resolve apparent paradoxes either between theories or between an anomaly observed in reality and our theories about the phenomenon (Poole & Van de Ven, 1989). First, accept the paradox or inconsistency, and learn to live with it constructively with the principle of balance between oppositions or ‘moderation in all things.’ Second, clarify levels of reference from which different perspectives of the problem arise (e.g., part-whole, micro-macro, or individual-society) and the connections among them. Third, take into account time for exploring when contradictory assumptions or processes each exert a separate influence on the problem. Fourth, introduce new concepts that either correct flaws in logic or provide a more encompassing perspective that dissolves the paradox. These four methods represent a classification system for conducting multiple independent thought trials in developing conjectures about an anomaly.

Developing a strong classification system of independent thought trials is greatly facilitated by obtaining the different perspectives of people from different disciplinary specialties, functional backgrounds, and role orientations. These people can participate in theory building activities in a variety of ways--as members of a heterogeneous or interdisciplinary research team, as research advisors, or simply as participants in a brainstorming meeting. Another way is to review the literature and examine the different approaches or perspectives that have been taken to address the problem. The point is that individual scholars have limited classification systems. Engaging and leveraging independent thought trials typically requires reaching out and either talking to or reading works by others who can offer perspectives and classifications of the problem domain that are different from our own. Weick (1989: 52) notes that any method ‘that short circuits memory, foresight, or preference in the generation of thought trials increases the independence of these trials.’

Selection among Thought Trials

How are we to choose from among the many conjectures or independent thought trials that might be obtained from engaging others’ viewpoints? Weick’s answer is the same as for thought trials--apply many diverse selection criteria in a consistent way to each conjecture. Specifically, he offers the following proposition.

The greater the number of diverse criteria applied to a conjecture, the higher the probability that those conjectures which are selected will result in good theory. Furthermore, selection criteria must be applied consistently or theorists will be left with an assortment of conjectures that are just as fragmentary as those they
started with. Every conjecture can satisfy some criterion. Thus, if criteria are altered each time a conjecture is tested, few conjectures will be rejected and little understanding will cumulate. (Weick, 1989: 523, italics added)

If theory creation improves when many diverse criteria are applied consistently to select conjectures, the next question is what criteria might be used? A lay person might answer by suggesting that the most important criterion is to select the conjecture that is valid—i.e., the one that withstands verification and testing. This answer, however, is premature and misdirected. It is premature in the sense that the validity of a conjecture can neither be determined by, nor is it the motivation for, abductive reasoning. While verification and testing conjectures are central evaluation criteria of inductive reasoning, validation is not a criterion of abductive reasoning.

Hanson (1958) distinguished between the reasons for accepting a hypothesis from the reasons for suggesting a hypothesis in the first place. The former are reasons for verifying a hypothesis, whereas the latter are reasons that make a hypothesis a plausible type of conjecture—the logic of discovery or creation. Abduction is a creative hypothetical inference framed to solve a problem. It is not mere extension of ordinary experience. Rather it offers a perspective quite different from the ordinary one. Indeed, it offers a new conception of the matter of which an object is composed, on which, for certain purposes, will replace the ordinary conception. Moreover, the new conception is not final. Further inquiry will reveal problems that can be solved, only by framing a fresh conception. (Mounce, 1997: 17)

A criterion of validity may misdirect and censure our selection of conjectures to only those that are believed to be valid. To be valid, the conjectures are likely to be uncreative, already known and obvious. Hence, they do not advance new understanding of the problem or anomaly. This is not to say that the validity of a conjecture should be ignored all together. After all, the purpose of abductive reasoning is to create conjectures that may resolve the problem or reframe the phenomenon being investigated in a new way. Instead, it is to recognize that valid conjectures are difficult, if not impossible, to determine at the time of their conception. However, as discussed later in the chapter, attempts to verify conjectures selected and determine which should be retained may occur sometime later. Thus, the abduction of conjectures and hypotheses does not depend on their validity.

This process of abductive reasoning amplifies a conclusion drawn by Weick (1989: 525) that ‘plausibility is a substitute for validity’ in selecting conjectures. If it is not possible to determine the validity of a conjecture at the time of its conception, then plausibility is the next best option. A conjecture is plausible when it appears to be reasonable, believable, credible, or seemingly worthy of approval or acceptance, even though it may or may not be true (Random House Unabridged Dictionary). Plausibility is in the eyes of the beholder. It is a multidimensional criterion reflecting our unique assumptions and interests. Weick, for example, discusses his plausibility criteria as the extent to which a conjecture is interesting, obvious, connected, believable, beautiful, or real, in the problem context.

In general, the extent to which a conjecture is plausible is largely based on subjective judgments of people who are engaged in the process and have different experiences with and knowledge of the problem domain. Diverse experiences and knowledge provide a base of assumptions for assessing conjectures of trials that mimic experimental tests. Relying on Davis’s
analysis of how one’s assumptions trigger judgments of what is ‘interesting’ and ‘classic,’ Weick describes the assumption test of a conjecture as follows.

The assumption is a distillation of past experience. When that assumption is applied to a specific conjecture, the assumption tests the conjecture just as if an experiment had been run. When a conjecture is tested against an assumption, the outcome of that test is signified by one of four reactions: that’s interesting (assumption of moderate strength is disconfirmed), that’s absurd (strong assumption is disconfirmed), that’s irrelevant (no assumption is activated), and that’s obvious (a strong assumption is confirmed). Those four reactions are the equivalent of significance tests, and they serve as substitutes for validity. The judgment that’s interesting selects a conjecture for retention and further use. That judgment is neither capricious nor arbitrary because it is made relative to a standard that incorporates the results of earlier tests. That standard takes the form of an assumption, and the conjecture is compared with this standard during theorizing. (Weick, 1989: 525)

When a conjecture confirms a strongly-held assumption, it may be viewed as either obvious or classic. But what appears obvious to one person may be viewed as classic to another. Thus, Weick (1989) raises the question: For whom might a conjecture not be obvious? An answer to this question can help identify the boundary conditions inside of which a conjecture appears plausible but outside of which it does not.

To appreciate the implications of this plausibility criterion for selecting conjectures, it is helpful to summarize the basic architecture of interesting and classic theories, as described by Davis (1971; 1986). Basically, a classic work speaks to the primary concerns or assumptions of an audience, while an interesting theory speaks to the secondary concerns of an audience. Davis (1986) describes the common attributes of a classic theory as follows:

- It starts with an anomaly that a fundamental problem exists (in society, for example) that needs to be explained.
- Through abduction it identifies a novel factor that caused the anomaly, and traces the ubiquitous affects of the factor on society. This factor collides with and undermines an assumption that the audience holds or values dearly.
- An elaboration of the theory provides hope by suggesting a way to control or live with the factor. The theory is simple enough on the surface for generalists to appreciate, but has a subtle core that is sufficiently ambiguous and complex to challenge and motivate specialists to engage in further research to refine the theory.

In contrast, Davis (1971) discusses how interesting theories negate a secondary assumption held by the audience and affirm an unanticipated alternative. An interesting theory has the following architecture: It begins with a claim that what seems to be X is in reality non-X. However, if non-X is viewed as a small difference from X, then the theory is boring or trivial. If non-X is viewed as very different from X, then the theory is discredited as an absurd ‘crackpot’ idea of a lunatic. Interesting theories deny weakly-held, not strongly-held, assumptions of the audience.

Davis’ descriptions of classic and interesting theories have important implications for selecting conjectures. First, the reputation of a conjecture hinges on knowing the assumptions of the intended audience or users of a study. Second, a necessary (but not sufficient) condition for an interesting or classic study is the formulation of a conjecture that denies a weakly- or
strongly-held assumption of the intended audience. Therefore, the more we engage and the better we know our audience, the better we can select and frame our conjectures to the prevailing assumptions of the intended audience of our work.

II. Constructing the Theory

Once the germ of a promising conjecture has emerged through a process of abduction, our mode of reasoning switches to deduction to elaborate the conjecture and construct it into a complete theory. Constructing a theory involves articulating and elaborating a conjecture into theoretical terms, relationships and conditions when they apply. Basic principles of logical deductive reasoning provide the toolkit for theory construction. Whereas abduction is a mode of reasoning for conceiving of a theory, logical deduction provides the tools for constructing the theory.

With the demise of positivism in the philosophy of science came a skepticism of using mathematical logic, such as a first order predicate calculus to deduce hypotheses from theoretical premises or axioms. Most philosophers have concluded that axiomatic theorizing may be fine for mathematical puzzles, but is not appropriate for theorizing about real-world phenomena where few, if any, axioms or scientific laws exist from which social theories can be derived (Giere, 1999; Toulmin, 2003). But syntactical techniques of axiomatization should not be confused with more general semantic techniques used to formalize a theory (Suppe, 1977: 114). Indeed sound logical reasoning remains as important as ever to elaborate the semantic meaning of theories and identify the boundaries of concepts and their relationships.

Logic provides the language and core principles needed to articulate the ‘anatomy’ of a theory. This section reviews this language of terms used to describe theories, and the principles of logic for relating the terms. They reflect the norms and conventions that have evolved over the years to guide logical reasoning, to distinguish the logician’s notions of ‘validity’ and ‘truth,’ and to search for plausible alternative models or theories for explaining a research question. ¹

A theory simplifies and explains a complex real-world phenomenon. A good theory not only describes the who, what, and where of a phenomenon being investigated, but also explains the how, when, and why it occurs (Whetten, 1989). A theory is an explanation of relationships among concepts or events within a set of boundary conditions. Figure 4.2, adapted from Bacharach (1989) is a diagram of the core components in this definition of a theory. These components include terms (concepts, constructs, variables, or events), relationships among terms (propositions and hypothesis), assumptions (boundary conditions within which these relationships hold in time, space, and value contexts), and explanations (arguments that provide reasons for the expected relationships).

Another aspect of a theory is the level of abstraction of terms and relationships. Terms vary from those that are abstract and theoretical to those that are concrete and observable. As Figure 4.2 illustrates, a theory may be viewed as a system of concepts, constructs and variables or variables, in which the abstract concepts and constructs are related to each other by propositions, and the more concrete variables or events are related to each other by hypotheses.

¹ I confess that some readers of earlier drafts of this section found it somewhat dull and dense reading. Although I made attempts to improve the readability of this section, I also think that this review of the principles of logic that serve as building blocks for theory construction may not become interesting and meaningful until they are put to use, as I will do in later chapters. Useful and more extended discussions of the logic of scientific reasoning are provided by Kaplan (1964), Stinchcombe (1968), Freeley (1976), Giere (1984), Ramage and Bean (1995) Singleton and Straits (1999), and Toulmin (2003).
This entire system is bounded by a vast number of assumptions, with only the most important or obvious ones stated explicitly, while the vast majority of assumptions remain implicit and tacit. This section discusses each of these components of a theory.

Terms and Definitions

The most basic element of logical analysis is the term. A term is whatever is meant by a word or phrase (Singleton & Straits, 1999: 41). We can stipulate the meaning of a term, but cannot affirm or deny that it is either true or false.

A useful convention in social science has been to distinguish the meanings of terms by their levels of abstraction, ranging from broad and general to narrow and specific. Anthropologists would say that abstract descriptions of a term tend to be etic (from afar), general (broad impersonal scope), and less embedded in context. At the other end of the scale, concrete descriptions of a term tend to be emic (up-close), particularistic (often uniquely personal), and situated in a specific context. Following Kaplan (1964), the meanings of the following terms are often distinguished by their levels of abstraction.

*Theoretical Concepts:* An abstract term that is semantically defined by its association or usage with other terms that are not directly observable.

*Theoretical Constructs:* A middle-range term that references constitutive components of a concept, but the component parts are not directly observable.

*Observable Variables or Events:* An operational term specifies the activities or operations necessary to measure it.

For example, the *social structure of an organization* might be defined at theoretical (concept or construct) and observable (variable or event) levels of abstraction as follows:

- At the most abstract conceptual level an organization’s social structure might be defined as the formal (not informal) configuration of roles and authority relationships existing among participants within (not outside of) an organization. A role refers to the expected set of behaviors of a person occupying an organizational position, and authority refers to the formally prescribed power relationships among roles in an organization.

- At a construct level, organizational social structure might be analytically separated into three components of authority relationships among roles: (1) centralization of decision making authority; (2) formalization of rules, policies, and procedures; and (3) complexity, or the number and interdependence of role relationships.

- At a concrete level, the formalization of rules (one construct of the social structure concept) might be observed by measuring the number and specificity of rules in job manuals for various role positions in the organization.

Kaplan’s classification of terms into these three levels of abstraction is useful for distinguishing between grand theories (relations among very general and abstract concepts),

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2 The definitions in this example are based on a Weberian view of bureaucracy, as discussed by Hage (1995). These definitions would be very different if one adopts alternative theories of social structure (c.f., Scott, 2003: 18-20). This example introduces the paradox of conceptualization, discussed later--good theories are necessary to classify and define concepts, but robust concepts are needed to develop good theories.
middle-range theories (relations among theoretical constructs or events that are less general and more specific than concepts), and operational theories (relations among observed variables or incidents). I discuss Kaplan’s three levels of abstraction when discussing the merits and demerits of grand, middle-range, and operational theories at the end of this chapter.

A more simple way to classify terms by levels of abstraction is to distinguish between theoretical and observable terms. This classification satisfies most theory building purposes. For example, as Figure 4.2 illustrates, Bacharach (1989) refers to concepts and constructs as theoretical terms, and variables as an observable term. In this usage, propositions are considered statements of relationships between concepts and constructs (i.e., among abstract theoretical terms), while hypotheses are defined as relationships between variables or events (i.e., among concrete observable terms).

As the example of defining organizational social structure illustrates, there are two basic ways to define the meanings of terms at different levels of abstraction: semantic and constitutive definitions. A semantic definition describes the meaning of a term by its similarities and differences with other terms. Reference to synonyms and antonyms, as well as metaphors and analogies are useful heuristics for developing semantic definitions. A positive semantic definition of concept A, for example, would be to say that it is similar to concepts B, C, and D. A semantic definition by negation of the concept A would be to say that A is not like concepts E, F, or G. For example, the definition of the concept of organizational social structure included the positive semantic terms of formal role and authority relationships within an organization, and by negation excluded informal external organizational relationships. Both positive and negative semantic definitions are required to clarify the meaning of a concept. Positive definitions identify the properties of a term, while definitions by negation locate the boundaries of a term. ‘Terms that are defined by negation are determinate; those defined without negation are indeterminate’ (Osigweh, 1989).

A constitutive definition describes a term with reference to its component parts. For example, concept A consists of a1, a2, and a3 components. Constitutive definitions entail descending the ladder of abstraction. For example, the construct and variable constitutive definitions of the concept of organization social structure above descended the ladder of abstraction by specifying some of the component theoretical and observable terms of the concept.

Semantic and constitutive definitions respectively classify the meaning of a concept by extension and intention, or more commonly referred to as breadth and depth. While semantic definitions are used to clarify the properties of a term, constitutive definitions identify the boundaries of a term. These definitions are used to articulate and reason across levels of abstraction of the terms used. By ‘theoretical’ I mean an abstract formulation of a term, and by ‘observable’ I mean a concrete formulation of that term.
definitions specify the meaning of a concept by extension (i.e., how it is similar to and different from other concepts at the same level of abstraction), constitutive definitions locate the meaning of a concept by intention (i.e., what component terms comprise the concept at lower levels of abstraction, and what more aggregate terms the concept is a member of at high levels of abstraction).

Osigweh proposes two maxims for descending and climbing the ladder of abstraction with a term. First, descend the abstraction ladder from a universal concept to specific situational constructs by spelling out the attributes that characterize the concept. Second, climb the ladder in a way that retains precision by decreasing the number of attributes and properties that are instantiated or embedded in the intended meaning of a term (Osigweh, 1989: 585). Osigweh (1989) advises making concepts travel so they fit precisely a variety of applications; don't stretch their meaning beyond reason.

The purpose of defining terms, of course, is to classify the subject matter into clearly distinct and important categories. Just as classification of phenomena is critical to problem formulation, it is central to theory construction. What makes definitions of terms significant is that they classify the universe into ways that are critical to a theory; or as Plato said, they ‘carve at the joints.’ ‘A significant concept so groups or divides its subject-matter that it can enter into many important propositions about the subject-matter other than those which state the classification itself’ (Kaplan, 1964: 52).

Inherent in classifying a phenomenon into significant concepts is the paradox of conceptualization. Kant emphasized that concept formation and theory formation in science go hand in hand. As noted in the last chapter, the appropriate conceptualization of a problem already prefigures its solution. ‘The proper concepts are needed to formulate a good theory, but we need a good theory to arrive at the proper concepts’ (Kaplan, 1964: 53). The better the subject matter is classified, the better the theory. The better the theory, the sharper the classification of the subject matter.

Kaplan (1964) cautions, however, against being overly compulsive about clear-cut definitions. All definitions and classifications of concepts remain ambiguous in two respects--semantic openness and operational vagueness.

Semantic openness refers to that fact that the meaning of many terms can only be specified in relation to how they are used together with other terms. As a consequence, ‘what begins as the effort to fix the content of a single concept ends as the task of assessing the truth of a whole theory’ (Kaplan, 1964: 63). The theory as a whole is needed to give meaning to its terms, even those parts of the theory where the terms in question do not explicitly appear. Concepts are implicitly defined by how other concepts and propositions in a theory are treated. The semantic (or systemic) meaning of a concept is always open, for the set of classifications and propositions making up a theory is never complete. Furthermore, the semantic meanings of terms are dynamically open, for they inevitably change with time.

Even at the concrete level some operational vagueness will still remain after we provide clear constitutive definitions of terms. ‘Facts are indefinitely indefinite: however fine a mesh we use, finer differences slip through the measurement net. And the more discriminations we make, the more opportunities we create for classification errors between borderlines’ (Kaplan, 1964: 65). Thus, even though the objective of semantic and constitutive definitions is to clearly specify the meaning and usage of terms, they always remain vague in some respects. Lines are and must be drawn for the pragmatic purpose of being sufficient to address the problem. Kaplan notes that
the demand for exactness can have the pernicious effect of inducing premature closure of our ideas and a dogmatic (rather than a critical) attitude. Tolerance of ambiguity is important for scientific inquiry.

**Relationships among Concepts**

A proposition is a declarative sentence expressing a relationship among some terms. Logicians distinguish the following four kinds of propositions. They provide deeper insights on defining terms and formulating relationships among them.

1. A **categorical proposition** denotes or assigns things to classes (i.e., categories), such as Aristotle did when he claimed, ‘all men are mortal.’ We make categorical propositions when assigning observations into categories, such as discussed in the last chapter when diagnosing problems by classifying social behaviors into problem or disease categories.

2. A **disjunctive proposition** classifies things into mutually exclusive categories. A disjunctive proposition such as ‘this person is either a man or woman’ seems unproblematic because human beings only consist of two genders. However, a statement that classifies a student as ‘either very bright or studies a lot’ is dubious because these categories are not mutually exclusive and the student may fit neither categories. Disjunctive propositions are divergent; they differentiate classes of things or theories. A disjunctive proposition is the forerunner of a ‘crucial proposition’ (discussed later).

3. A **conjunctive proposition** classifies things into multiple categories that the things reflect, such as ‘Jane read this and found it interesting.’ Conjunctive propositions are integrative; they connect things or bridge terms. A conjunctive proposition is the logic underlying survey questions with multiple response categories, whereas a disjunctive proposition underlies questions with answer scales that force respondents to select only one of multiple options.

4. A **conditional proposition** consists of two simple statements joined by the words ‘if’ and ‘then.’ For example, if today is Friday, then tomorrow is Saturday. In a conditional proposition, the ‘if’ statement is the **antecedent** and the ‘then’ statement is the **consequent**. A conditional proposition asserts that the antecedent implies the consequent. The consequent is true if the antecedent is true. In scientific discourse, conditional propositions are often used to specify relations between the antecedent and the consequent either by definition or by cause.

   A constitutive definition of a term is a conditional proposition where the consequent follows from the antecedent by the very definition of the antecedent. For example, if the figure is a triangle, then it has three sides. Scholars typically descend the ladder of abstraction by using **deductive conditional propositions** to define the constitutive components of concepts into constructs and then into observable variables or events. A highly condensed example might look like this:

   **IF:** The concept of organization social structure consists of the degrees of formalization, centralization, and complexity;

   **AND:** The construct of formalization is observed by the number of rules and degree to which people follow rules (variables);

   **AND:** The construct of centralization is indicated by the variables, discretion people have deciding what and how work is done;
AND The construct of complexity is indicated by the degree and number of interdependencies among organizational participants in doing their work;

THEN: Organization social structure is operationally defined as the number of rules, degree of rules followed, task discretion, and indicators of task interdependence among organizational participants.

Construct validity is a term frequently used in social science that has specialized meaning to logicians. The construct validity of deductive conditional propositions is established by showing that each consequent follows its antecedent by the very definition of the antecedent. The consequent is true if the antecedent is true.

In a causal conditional proposition, the antecedent causes the consequent. A physical science example is that if metal is immersed in nitric acid, then it will dissolve. A social science example is that if an organization grows in numbers of employees, then the structure of the organization will differentiate into more departments and hierarchical levels at decreasing rates (Blau & Schoenherr, 1971). In these examples of ‘if-then’ conditional causal propositions, the antecedent (immersing metal in nitric acid or increasing the number of employees) causes the consequent (the metal dissolves or the organization structure differentiates). The logical structure of many hypotheses in the social sciences are of this form of causal conditional propositions. As discussed later, the ‘validity’ of a causal conditional proposition is established by argument, whereas its ‘truth’ is established empirically.

The principles discussed above for traveling the ladder of abstraction for concepts also apply to relationships. I noted that propositions and hypotheses differ by levels of abstraction: propositions are relationships among theoretical concepts or constructs, while hypotheses are relationships among concrete observable variables or events. Notwithstanding the varying usage of the terms ‘proposition’ and ‘hypothesis’ in many journals, it is important to distinguish abstract theoretical propositions from concrete observable hypotheses of a theory. Kaplan noted this by distinguishing between concatenated and hierarchical forms of theories.

A concatenated theory tends to consist of many concepts that are related into a configuration or pattern of hypotheses. As the bottom of Figure 4.3 illustrates, this pattern often converges on some central concept or dependent variable, with each of the independent variables representing a factor that plays a part in explaining the dependent variable. As a result, a concatenated theory is also called a ‘factor theory’ (Kaplan, 1964: 298). Less complementary adjectives include ‘bullet’ or ‘laundry list’ theories (Bromiley, 2004). As these adjectives suggest, concatenated theories often consist of numerous hypotheses that are seldom generalized to more abstract theoretical propositions. Explanations of concatenated theories tend to focus on individual hypotheses among the independent, dependent, moderating, or mediating variables in the structural causal model as illustrated in the bottom of Figure 4.3. Concatenated theories tend to focus on only one level of abstraction—usually the concrete level of variables and hypotheses. Seldom are attempts made to generalize and travel with the hypotheses that relate observable variables to more abstract propositions that relate theoretical constructs. As a result, concatenated theories tend to provide a broad and extensive, rather than deep and intensive, understanding of a phenomenon.

<Figure 4.3>

In contrast, a hierarchical theory is one whose hypotheses are presented as deductions from (or inductions to) one or a few basic propositions following the principles for developing

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causal conditional propositions. As the top of Figure 4.3 illustrates, the hierarchy represents logical relationships among concepts or constructs as the ladder of abstraction is ascended by inductive reasoning or descended by deductive reasoning. Following Osigweh’s (1989: 585) maxims, we climb the abstraction ladder by extending the breadth of hypotheses into more general propositions, while reducing their connotation (thereby increasing simplicity).

Concatenated and hierarchical theories reflect different rungs on the ladder of abstraction. Concatenated theories often reflect operational hypotheses among observable variables, while hierarchical theories are propositions among theoretical constructs. Concatenated theories can be transformed into hierarchical theories by climbing the ladder of abstraction. As we climb we rise to fewer and more general propositions as we move from conclusions (hypotheses) to the premises that entail them (propositions and assumptions) (Kaplan, 1964: 298).

Logical Deductive Reasoning

In logic an argument is a set of two or more propositions of which a conclusion is claimed to follow either necessarily or probably from the premises. An argument provides a way to explain our reasoning for a theoretical proposition or an observable hypothesis. The hypothesis is the conclusion or the claim of the argument. All the other statements that we use to justify the hypothesis are the premises of the argument. Once the reasoning for a hypothesis is formulated, then it can transformed into the logical structure of an argument. A hypothesis is justified by showing that it is the logical conclusion of a valid argument (Giere, 1984: 33).

The most common kind of argument studied by logicians is the syllogism. It is an argument composed of three propositions: two premises and the conclusion that the premises logically imply. The basic structure of a syllogism is as follows.

- major premise: All men are mortal
- minor premise: Socrates is a man
- conclusion: Therefore, Socrates is mortal

To analyze the logical structure of reasoning for a theory, we first identify the premises (i.e., reasons, evidence, and assumptions) given for a hypothesis (the conclusion), and arrange them into this syllogistic structure in order to determine the validity or invalidity of the argument. Whereas terms are judged as to their meanings, and propositions primarily as to their truth, syllogisms are judged in terms of their validity (Wheelwright, 1962: 14). The validity of a syllogism depends solely on the relationship between its premises and its conclusions. We do not need to know whether the premises or conclusions are empirically true. We only need to know whether the conclusion would be true if the premises were true. The validity or invalidity of a syllogism is independent of the truth of its premises. Hence, as Singleton and Straits (1999: 43) discuss, we can have a valid syllogism consisting of false propositions:
All students are MBAs. (false)
Some robots are students. (false)
Therefore, some robots are MBAs. (valid, but false)

And it is possible to have an invalid syllogism consisting of true propositions:
All butterflies can fly. (true)
All crows are birds. (true)
Thus, all crows can fly. (not valid, but true)

Validity refers to the relation between premises and conclusion, which can be determined by examining the logical structure of the argument. Logicians typically substitute the letters ‘p’ for the antecedent and ‘q’ for the consequent of conditional ‘if-then’ propositions, and ‘r’ for additional premises in the case of a chain argument. These symbols are applied below to recognize the form of reasoning in a few of the most common types of conditional arguments used in scientific reasoning. The notes below each argument explain why the first three conditional arguments have a valid form, while the last two are not valid.

**Forms of Syllogisms  Causal Conditional Arguments**

1. **Affirming the antecedent**
   
   If p, then q
   p
   Therefore, q

   Notice that the first premise says that q (success) will be true if p (practicing TQM) is true. The second premise asserts that p is true (ACO practices TQM). If this conditional statement is true and if the antecedent is true, then the consequent must be true also—which is just what the conclusion states. In short, it is impossible that q be false if both premises are true. This satisfies the definition of a deductively valid argument.

2. **Denying the consequent:**
   
   If p, then q
   Not q
   Therefore, not p

   The first premise is the same as in the first argument. But the second premise says that q (success) is not true. So, p (practicing TQM) cannot possibly be true either. If it were, q (success) would be. But q is not. As noted below, this deductive form of denying the consequent turns out to be quite similar to inductive arguments used in scientific reasoning to reject a hypothesis.

3. **Chain argument (hypothetical syllogism)**

   If p, then q
   If q, then r
   If p, then r

---

4 TQM is an abbreviation for Total Quality Management, which includes a variety of quality management practices such as those advanced by Deming, Juran, and Six Sigma, which have been adopted by many companies worldwide.
Conditional chain arguments like this can be constructed with any number of premises. There are two requirements for a valid chain argument: (1) the consequent of each premise must be the antecedent of the next premise, and (2) the conclusion must have the antecedent of the first premise as its antecedent and the consequent of the last premise as its consequent. The chain argument is one of the simplest and most common ways to logically derive hypotheses from propositions.

4. Fallacy of affirming the consequent:

If p, then q
q
Therefore, p

If a firm practices TQM, then it will be successful.
ACO is successful.
ACO practices TQM.

This argument proceeds with the second premise, affirming the consequent of the conditional first premise. Arguments of this form often sound quite convincing, but are not valid.

5. Fallacy of denying the antecedent:

If p, then q
Not p
Therefore, not q

If a firm practices TQM, then it will be successful.
ACO does not practice TQM.
ACO is not successful.

This form of conditional argument proceeds with the second premise denying or negating the antecedent of the first premise. Although invalid, such arguments can also sound very persuasive. Arguments of this form are invalid by the meaning of conditional statements. ‘The conditional statement says that the truth of the antecedent is sufficient for the truth of the consequent. It does not say that the falsity of the antecedent is sufficient for the falsity of the consequent’ (Giere, 1984: 62).

There are many other forms of deductive arguments besides conditional arguments. Readers are encouraged to review them in Giere (1984), Ramage and Bean (1995) and Freeley (1996). In general, Singleton and Straits (1999: 48) provide the following three useful rules for assessing true and false premises, valid and invalid arguments, and true and false conclusions.

- If all the premises are true and the argument is valid, the conclusion must be true.
- If all the premises are true and the conclusion is false, the argument must be invalid.
- If the argument is valid and the conclusion is false, at least one premise must be false.

These statements are useful to remember for evaluating deductive reasoning. Applying them can help you become an excellent reviewer of proposals and arguments that may deal with subjects you know little about. Freeley (1996, Chapters 8-10) provides a useful review of tests, cogency, and obstacles to clear syllogisms or arguments.

This section has briefly reviewed how logicians can analyze relations among propositions irrespective of their truth. Scientists have the broader goal of establishing knowledge about the empirical world. They evaluate both the validity of their reasoning and the empirical truth of their statements. It is easy to see the relevance of deductive logic to scientific inquiry. ‘The reasoning from theories to hypotheses should be deductively valid, for if the argument by which a testable conclusion is deduced is invalid, then it is pointless to investigate the truth of the conclusion or the hypothesis’ (Singleton & Straits, 1999: 50, italics added).

III. Justifying the Theory
The foregoing review of basic components and logical principles for theory construction has introduced most of the key ideas for justifying a theory. Theories can be justified in two ways: by testing their empirical fit with the world using inductive reasoning, and by presenting rhetorical arguments of the logical validity, credibility, and persuasiveness of a theory. Both of these approaches are necessary to justify the empirical and conceptual bases of a theory. Hence, they compliment, and do not substitute for, each other. The next two sections discuss these two approaches for justifying a theory.

Inductive Reasoning in Science

The prior section noted that in order to be valid, the conclusion of a deductive argument cannot go beyond the content of the premises. Deduction therefore ‘only tells us things we know already,’ even though we may not have realized that before the deductive reasoning process unfolded (Kemeny, 1959: 113). Induction, on the other hand, involves the drawing of conclusions that exceed the information contained in the premises. As Bruner (1973) discussed, because science seeks to establish general knowledge that goes beyond the data given, it must use inductive reasoning. Inductive reasoning presents a claim that the conclusion is probably true if the premises are true. In its simplest form, an inductive argument has the following logical structure.

\[
\begin{align*}
\text{All observed members of } p \text{ are } q & \quad \text{X\% of observed members of } p \text{ are } q \\
\text{Therefore, all } p \text{ are } q & \quad \text{Therefore, X\% of } p \text{ are } q
\end{align*}
\]

As discussed below, inductive generalizations are stronger the more the observed instances and members of \( p \) vary.

This general form of inductive arguments is one reason why scientific reasoning cannot yield certainty. Even if we could be certain of our premises, the best inductive scientific argument would not guarantee the truth of our conclusion. Thus, the very nature of scientific reasoning introduces an unavoidable possibility of error. Giere (1984: 45), like Bruner (1973), points out that another characteristic of inductive arguments is that they are knowledge expanding; that is, their conclusions contain more information than all their premises combined. It is because of this feature of inductive arguments that science can be a source of new knowledge. These error and expansion features of inductive arguments are related. It is only by giving up the certainty of truth that inductive arguments can be knowledge expanding.

A hypothesis can be rejected because (as we have seen) it is valid to inductively deny the consequent:

\[
\begin{align*}
\text{If } p, \text{ then } q & \quad \text{If the hypothesis is true, then the predicted fact is true} \\
\text{Not } q & \quad \text{The predicted fact is not true} \\
\text{Therefore, not } p & \quad \text{Therefore, the hypothesis is false. (Valid)}
\end{align*}
\]

But a hypothesis cannot be proven because that would amount to the fallacy of affirming the consequent:

\[
\begin{align*}
\text{If } p, \text{ then } q & \quad \text{If the hypothesis is true, then the predicted fact is true.} \\
q & \quad \text{The predicted fact is true.} \\
\text{Therefore } p & \quad \text{Therefore the hypothesis is true. (Not valid)}
\end{align*}
\]
There may be more than one explanation for an observed result; other hypotheses may explain the result as well.

If a theory can only be disproved and never proven, how might we gain confidence in the plausibility of a theory? In a nutshell, the answer is (1) develop many diverse tests of the hypothesis, and (2) rule out plausible alternative hypotheses. These two strategies strengthen the inductive conclusion that the hypothesis is more probable in comparison with alternatives, although by deduction it can never be proven to be true.

*The greater the number and variety of tests that do not reject a hypothesis, the more credible it is.* The idea of strengthening conclusions by increasing the number of diverse applications of a proposition represents the theory justification analogue of the theory creation idea discussed before of expanding variations in thought trials. A greater number of diverse conjectures (hypotheses) is not only more likely to produce a better, but also more convincing theory than a process that generates a small number of homogeneous conjectures or hypotheses. For example, a proposition on work participation and productivity that applies to a wide range of situations and levels (such as for individual employees, work teams, organizational democracy, and larger community networks) is clearly preferable to one that only applies to a single object. A theory with a greater ratio of diverse hypotheses to propositions is more plausible than one with a low ratio (Bacharach, 1989: 509). That is, a theory with a proposition that sustains five diverse hypotheses is more credible than when it can justify only one or two homogeneous hypotheses.

The credibility of a theory is a function of its probability of rejection. A hypothesis must be improbable of being true relative to everything else known at the time excluding the theory being tested (Giere, 1984: 103). Although we can never prove the truth of a theory, our confidence in its plausibility or credibility increases when it is subjected to tests that are more likely to be rejected. Vague or commonplace hypotheses are difficult to reject and, as a result, are less credible than hypotheses that are highly unlikely (but not impossible) to be true given our existing state of knowledge. As Singleton and Straits (1999: 53) note, ‘Larger numbers of observations produce stronger inductive arguments if the generalization is limited in scope and precision. And generalizations consistent with established knowledge are more probable than those that are not consistent.’

Fortunately, at the time of theory building, the degree of strength or credibility of inductive generalizations can be designed into the theory. Singleton and Straits (1999: 52-53) discuss five useful design principles that should be taken into account simultaneously when building theories.

1. *Similarity of observations.* The more the observable hypotheses that are derived from a theoretical proposition are alike, the weaker the theory.
2. *Dissimilarity of observations.* The more ways that observed instances of hypotheses differ from one another, the stronger the argument.
3. *Scope and precision of generalization.* The more sweeping the generalizations from a theory, the less likely it is to obtain supporting evidence. Inductive generalizations can be altered in two ways: by specifying the entities or things to which the hypotheses apply, and by changing the precision of inductive conclusions. Stating that all or X% of people are satisfied is more precise but less probable than the conclusion that ‘most people are satisfied.’
4. **Number of observations.** The greater the number of observed instances, the stronger the argument. However, if the additional observed instances are all alike (as in 1 above), then the probability of the conclusion will not change.

5. **Known relevance.** The greater the relevance of the generalization to prior knowledge, the stronger the argument. When inductive conclusions are not compatible with well-established knowledge, then they are viewed as being less probable (Singleton & Straits, 1999: 52-53).

*Another way to increase the credibility of a theory is to rule out plausible alternative hypotheses.* The comparative method is perhaps one of the most basic principles for advancing scientific knowledge. The credibility or truth of a theory is not determined in an absolute sense by evaluating whether a hypothesized relationship exists or not. As discussed in Chapter 6, statistically significant tests of null hypotheses are seldom significant in practice because prior research may have already found evidence for the relationship. The important question is whether the proposed relationship represents a substantial advance over the current state of knowledge. The credibility of a theory is judged by comparing it with rival plausible alternative theories at the time of the investigation. At a minimum, to be credible a new theory should provide a better explanation for a phenomenon than the status quo explanation. Suppe (1977) and Giere (1999) cite Bacon for his initial proposal to compare rival plausible alternative theories. The better a theory survives both logical and empirical comparisons with rival theories, the more plausible and credible the theory.

Fortunately, the number of alternative theories that actually provide rival explanations for a given phenomenon in the literature at any given time tends to be very small. In my particular field of organization and management studies, I typically find only two or three theories seriously contending as rival alternative explanations for a given research question. In his historical review of the sociology of knowledge, Collins (1998) found no more than five or six theories competing to explain a phenomenon at a time. The more that one of these rival alternative theories can be disconfirmed through logical arguments or empirical tests, the more credible the surviving theory is. The greater the number of comparative tests with rival theories to which a theory is subjected, the more credible it is.

Stinchcombe (1968) discusses how this basic inductive process of science should lead scholars to design crucial experiments where evidence in support of one theory implies the rejection or negation of a rival alternative theory. In other words, we should carefully examine the consequences of our claims whose negation may be implied by the alternative theory or argument. This results in a disjunctive conditional proposition that rules out a plausible alternative theory.

**Building Theoretical Arguments**

Kaplan (1964: 302) pointed out that, ‘A hypothesis may be as much confirmed by fitting it into a theory as by fitting it to the facts. For it then enjoys the support provided by the evidence for all the other hypothesis of that theory’ in comparison with other theories. The method of argument provides a rhetorical strategy for justifying the conceptual basis of a theory.

Arguments are produced for many purposes. In this section I focus on scientific and professional discourse where an argument is presented in formal defense of a claim (a theory, proposition, or hypothesis). As used here, argument does not refer to its commonplace meaning of people having unpleasant and pointless disputes or verbal fistfights. Instead, an *argument*
refers to an explanation with reasons and evidence for a theory. Argument in this sense is an essential mode of inquiry because it is a way of explaining why our proposed theory is better than others. Not all theories are equal. Some theories can be supported with better reasons and evidence, and with fewer qualifications and possible rebuttals than others. Without the discipline of critical reasoning that arguments entail, it is often difficult to convince yourself and others of the pros and cons of our theories in comparison with others.

An argument is also a central means of communicating a proposed theory and attempting to convince others that it is correct. The relative contribution or advance to knowledge of a new theory is rarely self-evident, and not accomplished by asserting strongly-held beliefs or ideologies. If it is to be considered credible, sound arguments are needed for a proposed theory in comparison with others so that listeners can assess those arguments and judge which is the stronger or more plausible theory. Thus, once we have conceived of and constructed a theory, a further step of developing an argument is needed to explain and defend it.

A good argument doesn’t merely repeat conclusions. Instead it offers reasons and evidence so that other people can make up their own minds for themselves. . . . That is how you will convince others: by offering the reasons and evidence that convinced you. It is not a mistake to have strong views [i.e., beliefs]. The mistake is to have nothing else. (Weston, 2000: xii)

While crafting an argument provides many opportunities for learning, revising, and improving our theory, the argument itself does not reflect this journey of learning and conceptual development. Giere (1984: 10) notes that the process of convincing others of what one has created or discovered is very different from the process of discovery itself. Scientific reasoning, as found in professional scientific journals, does not include the many activities and independent thought trials that may go into creating or discovering a theory (as discussed in the first section of this chapter). Instead, it typically includes only the argument of reasons, evidence, qualifications, and reservations for the proposed theory or claim. The British logician, Stephen Toulmin (2003) points out that an argument is a retrospective justification of a theory.

An argument makes good on our claim that the conclusions arrived at are acceptable conclusions. . . . Logic is concerned with the soundness of the claims we make--with the solidity of the grounds we produce to support them, the firmness of the backing we provide for them--or, to change the metaphor, with the sort of case we present in defense of our claim. (Toulmin, 2003: 6-7)

As noted before, it has been customary since Aristotle to analyze the logical structure of arguments by setting them out as a syllogism, consisting of three propositions: minor premise, major premise, and conclusion. Although analytically simple and elegant, Toulmin (2003: 87) argues that a syllogism is not sufficiently elaborate or candid for presenting a practical substantial argument that has the objective of persuading an audience rather than analyzing formal logic. Toulmin adopted a audience-based courtroom metaphor of argument where jurisprudence governs how claims-at-law are put forward, disputed, and determined.

Toulmin’s courtroom model differs from formal logic in that it assumes (1) that all assertions and assumptions are contestable by ‘opposing counsel,’ and (2) that all final ‘verdicts’ about the persuasiveness of the opposing arguments will be rendered by a neutral third party, a judge or jury. Keeping in mind the ‘opposing counsel’ forces us to anticipate counter-arguments and to question our assumptions; keeping in mind the judge and jury reminds us to answer opposing
arguments fully, without rancor, and to present positive reasons for supporting our case as well as negative reasons for disbelieving the opposing case. Above all else, Toulmin’s model reminds us not to construct an argument that appeals only to those who already agree with us. (Ramage & Bean, 1995: 102)

This courtroom model of argumentation applies equally well to scientific discourse, where the judge and jury are the members of a professional or scientific community, and the ‘opposing counsel’ tends to be those individuals who subscribe to the theories or models being negated or replaced in the argument. More specifically, in the case of the journal review process, the jury consists of two or three anonymous reviewers of each paper while the judge is the journal editor. In the case of competitive research grants, the jury consists of the review panel and the judge is the program funding officer. While reviewers also perform the opposing counsel role, it is ever-present in the many other papers and proposals competing for the same limited journal space and research funding. Although politics and chance influence this process, most scientists believe that arguments trump politics and chance in governing this highly competitive market for ideas.

Logic and jurisprudence help to keep in the center of the picture the critical function of reason. The rules of logic are not laws, but standards of achievement which a person in arguing can come up to or fall short of, and by which achievement can be judged. A sound argument, a well-grounded or firmly-backed claim, is one which will stand up to criticism. (Toulmin, 2003: 8)

The Toulmin structure of argument consists of the following elements: background, claim, grounds, warrants, backing, qualifications, and possible rebuttals. Toulmin’s method of argument has become perhaps the most widely diffused and adopted form of argumentation in western society. It is the leading form of argumentation taught in English-speaking schools (Ramage & Bean, 1995) and used by debate clubs throughout secondary and higher education (Freeley, 1996). Instruction in Toulmin’s structure of argument is available in many excellent textbooks (Freeley, 1996; Ramage & Bean, 1995; Weston, 2000; as well as three editions of ‘The Uses of Argument’ from 1958–2003 by Toulmin himself). Several educators have created publicly accessible web sites for introducing and practicing Toulmin’s method of argument.5 Some of these textbooks and web sites use slightly different terminology for various elements of an argument, as outlined below. However, these are differences of style rather than substance.

- **background**: problem, question, context of the claim
- **claim**: conclusion, answer, or hypothesis
- **reasons**: major premise, warrants, or logic underlying the claim
- **evidence**: minor premise, grounds, or data backing the reasons
- **qualifiers**: boundary conditions and assumptions when claim holds
- **reservations**: limitations or grounds for rebuttal of a claim

We now discuss how these elements of the Toulmin system might be used to craft an argument in support of a theory that we have created. Figure 4.4 illustrates how these elements

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5 See, for example: http://writing.colostate.edu/ Google.com identifies many additional web sites with the keyword ‘Toulmin structure of argument.’
are related. Readers are referred to other textbooks and websites just mentioned for more extensive treatments and applications of the Toulmin method of argumentation.

<Figure 4.4>

Background

An argument assumes a specific context or background. To start with we need to present the problem or question being investigated in a particular context. This background statement is needed for several reasons.

First, as discussed in Chapter 3, understanding the nature and context of the research problem and question is needed to motivate an argument. Explanations of the problem or question--why it is important in the context in which it resides, how it has been addressed in the past, and what is incomplete or unsatisfactory with past treatments--open the mind of a listener and set the stage for claiming a new theory to answer the question.

Second, this background statement is also needed to determine whether the case merits argumentation. Establishing the case is mandatory for pursuing it in legal proceedings. At issue is whether our theorizing has progressed to the point of having a theory or proposal that is ready for justification. Too often we rush prematurely to make an argument for a case that has not yet been adequately conceived or constructed. The quotation in the chapter introduction by Hanson (1959: 35) merits restatement: ‘For our own sakes, we must attend as much to how scientific hypotheses are caught, as to how they are cooked.’ Several iterations of the activities discussed in the first and second sections of this chapter are typically needed to ‘catch’ (conceive and create) a theory. As most fishermen and women have experienced, you lose the fish if you try to bring it in before setting the hook. Premature theory justification often destroys or evaporates theory creation.

An argument begins by specifying the problem and question to be addressed and the possible solutions that merit consideration. To determine if we have a justifiable case that warrants consideration, Toulmin suggests that it is common to (1) set out the alternative solutions requiring consideration to a question or problem, (2) identify a particular solution that is unequivocally indicated by reasons and evidence, and (3) rule out some initial possibilities in light of the evidence (Toulmin, 2003: 21).

Third, it is important to consider the assumption base of the intended audience in addressing these issues. Like a plaintiff in a courtroom, the more we know the assumptions of the judge, jury, and defendants, the better we can tailor and direct the argument. Some members of the audience may not be aware of the problem or why it is important. For those who are aware of the issue, they may not share similar assumptions about the problem and ways to address it. An effective starting point in any communication is to appeal to shared assumptions, values, or standards that the audience grants. If the audience accepts our assumptions, then we have a starting place from which to build an effective argument. If our audience doesn’t accept our starting assumptions, then other formulations of the problem, case, or beliefs are needed until we find common ground with our audience (Ramage & Bean, 1995: 100).

The Claim

6 There is no better way to learn the mindset of a reviewer than to be one. Reviewers of scientific journal articles and research grants are pro bono volunteers. Most journal editors and program organizers have an ongoing search for volunteers. If their reviews are penetrating and constructive, these volunteers are often invited onto the editorial board or research panel.

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The claim is the theory, proposition, or hypothesis that we propose as an answer to the question or problem being investigated. A claim is the central conclusion that we are trying to establish by our argument. To be effective, claims should be specific, discriminating, and simple assertions.

For example, a claim that ‘group brainstorming techniques increase group decision-making effectiveness’ is too general, while ‘the nominal group brainstorming technique increases the number of ideas generated by a group on a problem-solving task’ is more specific. However, neither of these propositions are discriminating for they leave the alternatives and key conditions unspecified. A more discriminating proposition would be that ‘nominal and delphi group brainstorming techniques generate more ideas than conventional discussion groups composed of seven members when working on a problem solving task for one hour.’ Crucial to a discriminating proposition is inclusion of the alternatives that are being negated in comparison with the ones being affirmed.

These examples represent relatively simple propositions because each is stated in a single sentence that is relatively easy to understand (for those who know about brainstorming groups). Indications of propositions that are too complex are those that entail a highly complex sentence with many adjectives, qualifications, and prepositions. A claim may also be too complex if it needs to be re-read several times to be understood. As Weston (2000: 60) advises, first state your claim or proposition simply, and elaborate it later when discussing other elements of the argument.

Arguments should be restricted to focusing on a single claim. This is an important implication of hierarchical and concatenated theories discussed in the last section. Hierarchical theories facilitate clarity of exposition and energy in crafting a single argument that focuses on the central theoretical proposition from which one can descend the ladder of abstraction to logically derive and explain many diverse concrete hypotheses. In contrast, concatenated theories seldom take advantage of the parsimony provided by the ladder of abstraction, either by descending the ladder to logically derive hypotheses from propositions, or by climbing the ladder to infer how various hypotheses conceptually aggregate to reflect a theoretical proposition.

Concatenated theories, consisting of many logically different hypotheses are difficult to justify. Not only do they require crafting multiple arguments, one for each hypothesis, but also reconciling inconsistencies between arguments. This creates an unmanageable complex problem for the proponent and the audience. Given the same space and time limitations, a proponent is more likely to craft a single strong elaborate argument for a proposition than many equally strong ‘mini’-arguments for each hypothesis. An audience is more likely to follow the line of reasoning and be convinced by a single coherent argument than by a series of shorter, different, and often inconsistent arguments.

**Reasons and Evidence**

Reasons are statements explaining the logic underlying the claim for why the claim is correct or true, and evidence is the grounds--data, facts, statistics, testimony, or examples--backing the reasons. In terms of a syllogism, reasons are the major premises for a claim, and evidence includes the minor premises grounding the reasons for the claim. In most arguments, several reasons are presented for the claim and a variety of evidence to support each reason. For example, we might state that ‘there are three reasons for my claim, and a variety of studies in the literature support each reason.’ Then presumably we would go on to discuss each reason and the literature supporting each reason for the claim.
Given that there are typically many reasons and extensive evidence for a claim, the question is which reasons and what evidence should be presented in an argument? Space and time limitations force us to present only the most important reasons and evidence. As discussed in the prior section, the reasons and evidence presented for a claim should be logically valid. In other words, we select the reasons that represent the major premises and the evidence reflecting the minor premises that provide the strongest and most direct chain of reasoning to logically derive the claim. If an argument cannot be presented in a logically valid way, then it may be pointless to pursue it further.

For example, to substantiate the logical validity of the claim that ‘the nominal group technique generates more motivated and satisfied participants to a task than does the Delphi technique,’ one could reason that ‘face-to-face group meetings facilitate greater social-psychological interactions, norms, and sentiments among members than do electronic discussion groups where members do not meet face-to-face (the major premise).’ As evidence one might present two minor premises: (1) Nominal groups meet face-to-face in a structured meeting format while Delphi group members do not meet face-to-face and only submit their ideas to a question via electronic media. (2) Studies (for example by Van de Ven & Delbecq, 1974) have found that the structured format of nominal groups (silent writing of ideas on paper, round-robin recording of ideas, discussion, and independent voting) inhibits the negative effects of conventional discussion groups (e.g., falling into a rut, evaluating rather than generating ideas, and voting in conformance with members of higher status), but facilitates positive affects of belonging to the group and satisfaction with group decisions. The chain of reasoning from these major and minor premises leads to the logical inference of the claim.

Qualifications and Assumptions

Once we have considered the reasons and evidence for the claim, then we are in the position to qualify the claim by specifying the boundary conditions within which the claim applies, and outside of which the claim is not assumed to hold or be true. Boundaries and assumptions are critical because they set the limitations for applying a proposed theory or claim. Dubin (1976) emphasized that all theories are contingency theories because each is based on a host of bounding assumptions. They include the values and interests of researchers and users of a study, as well as analytical limits on the time, space, and magnitude of relationships specified in the claim.

Values are the implicit assumptions by which a theory or claim is bounded. Bacharach (1989: 498) cites Max Weber for pointing out that ‘the value-laden nature of assumptions can never be eliminated. Yet, if a theory is to be properly used or tested, the theorist’s implicit assumptions which form the boundaries of the theory must be understood.’ Fortunately, there is growing acceptance of Weber’s conclusion. Reflecting on a decade of theorizing, Weick (1999) observes a growing reflexivity in recent management literature.

More straightforward boundary conditions of a theory are analytical assumptions of time, space, and magnitude of relationships. Spatial boundaries are conditions restricting the use of a theory to specific units of analysis (e.g., specific types of organizations, locations, or contexts).

Chapter 8 expands on this discussion by pointing out that an intended audience may wish not only a logical explanation for a claim, but also strategic and deep explanations that respond to their own pragmatic interests in understanding the meanings and uses of an argument.
Temporal contingencies specify the dates and durations of time over which the proposition or theory applies (Bacharach, 1989).

Finally, Toulmin (2003) points out that we may need to qualify the degree of certainty or confidence in the evidence and reasons used in support of the claim. Qualifiers (e.g., ‘very likely,’ ‘probably,’ or ‘better than an alternative’) state the extent to which our reasons and evidence fit the case under consideration, and whether special facts may make the case an exception to the rule or whether our claim is subject to certain qualifications.

**Reservations and Limitations**

No argument for a claim or theory is perfect. Every argument has some limitations or objections that can represent the grounds for rebutting or refuting the claim. As Figure 4.4 indicates, validity, truth, and persuasiveness represent three common grounds for refuting an argument. These evaluation criteria can help us detect and to replace or repair flaws in our arguments. ‘As advocates, we should prepare our refutation with the same care that we prepare other elements of our argument. Effective refutation is rarely the result of improvisation, but comes from careful analysis and preparation’ (Freeley, 1996: 283).

As discussed in the second section of this chapter, the logical *validity* of an argument is the degree to which the claim is a logical conclusion in the chain of reasoning from the major premises (the reasons) and minor premises (the evidence). Paraphrasing Freeley (1996: 170-171), a number of questions are useful for assessing logical reasoning:

- Are the reasons solid? Have good reasons been given to establish the foundation of the claim? Have better reasons been used in the literature?
- Are the reasons and evidence sufficient to justify the claim? Are additional evidence and reasons needed to back the claim?
- Have sufficient reasons and evidence been provided to anticipate rebuttals or reservations of the argument?

A second common ground for refuting an argument is the extent to which the evidence that is used to support the reasons are considered *truthful* (i.e., survive empirical testing). Freeley (1996: 127-148) discusses a variety of tests of credible evidence that emerge from a long history of argumentation. Stated as questions, they provide a useful checklist for evaluating the evidence used in any argument:

- Is the evidence relevant, critical, and sufficient?
- Is the evidence clear, consistent within itself and with other known evidence?
- Is the evidence verifiable?
- Is the source of the evidence competent, unprejudiced, and reliable?
- Is the evidence statistically sound, cumulative, and current?

Finally, the logical elements of an argument discussed in this section will be expanded in Chapter 8 to include the *persuasiveness* of an argument. Justifying a theory represents an art in building a convincing argument. What makes an argument convincing and, therefore, utilized is a rhetorical question (Van de Ven & Schomaker, 2003). Rhetoric is the use of persuasion to influence the thought and conduct of one’s listeners. To Aristotle, the art of persuasion comprises three elements: (1) *logos*--the message, especially its internal consistency as discussed
in this section (i.e., the clarity of the argument, the logic of its reasons, and the effectiveness of its supporting evidence); (2) pathos--the power to stir the emotions, beliefs, values, knowledge, and imagination of the audience so as to elicit not only sympathy, but empathy as well; and (3) ethos--the credibility, legitimacy, and authority that a speaker both brings into and develops over the course of the argument or message (Barnes, 1995). As discussed in Chapter 8, logos, pathos, and ethos together shape the persuasiveness of any communication. The persuasiveness of a theory is in the ‘eyes’ of the listener (not just the speaker), and requires appreciating the context and assumptions of the audience or listeners.

We are reminded again of the importance of framing a study with a reflexive attitude about whose perspectives and interests are to be served by the claim. Knowing the values and interests of stakeholders in the intended audience of a study is crucial for formulating the research problem, the question, selecting an interesting conjecture, and presenting a convincing argument for the theory. A convincing theory is not only a function of presenting a valid argument, but also of the degree to which the speaker is viewed as a credible witness and is able to stir the human emotions of listeners.

Can a Theory be General, Accurate, and Simple?

Three criteria are commonly used to evaluate a theory: it should be general, accurate, and simple. Thorngate (1976) postulated that it is impossible for a theory of social behavior to be simultaneously general, accurate, and simple. Like Weick (1999), I question if this postulate is correct, and discuss some possible ways for developing general, accurate, and simple theories using some of the logical principles of theory building discussed in this chapter.

Weick (1999: 800) selects the following quotation from Thorngate to summarize his postulate.

The impostulate of theoretical simplicity dictates that we shall never see a general, simple, accurate theory of social behavior. In order to increase both generality and accuracy, the complexity of our theories must necessarily be increased. Complex theories of social behavior will be viable only to the extent that the complexities of social behavior are organized. However, there is reason to believe that much social behavior is not organized beyond a ‘local,’ or situation-specific level. Even if it is organized beyond this level, there is faint reason to believe that the organization is simple. Complex theories of social behavior may be easily constructed in an attempt to describe the organization, but the ethics and pragmatics of research set severe limits on the complexity of theories that can be subjected to empirical test. Herein lies the ultimate irony of our discipline [social psychology]: Precise and complex theories may hold the promise for being general and accurate, but in the end they are untestable as those which are simple and vague. (Thorngate, 1976: 134-135)

Many organizational scholars have expressed agreement with Thorngate’s postulate that any social theory entails inevitable tradeoffs between being general, simple, and accurate (Langley, 1999; Pentland, 1999; Van de Ven & Poole, 2005; Weick, 1999; among others). For example, Weick (1979: 36) illustrates Thorngate’s postulate using the metaphor of a clockface with general at 12:00, accurate at 4:00, and simple at 8:00, as illustrated in Figure 4.5. Weick (1999: 801) states that the point of this representation is to see the tradeoffs among the three criteria. ‘An explanation that satisfies any two characteristics is least able to satisfy the third characteristic.’
Is Thorngate’s postulate correct, or does Weick’s clockface metaphor lock us into thinking of tradeoffs rather than complements among general, simple, and accurate theories? ‘A way of seeing is a way of not seeing’ (Poggi, 1965). For example, another spin on Weick’s clock metaphor is that a theory will appear general, simple, and accurate twice a day—‘it’s just a matter of when you look. Continuing this playfulness, the clockface might represent different times around the world. Then we might conclude that a given theory can simultaneously be general in Europe and New Zealand, accurate in India and California, and simple in Asia and Brazil—‘it’s a matter of where you look. Pressing this far-fetched metaphor a bit further leads to a reasonable conclusion that the generality, simplicity, and accuracy of a theory may be a function of time, proximate viewpoint, and cultural context. Slight variations of metaphors can lead us to think very differently about things.

By relaxing his clockface metaphor and applying a few of the basic principles of logical reasoning as discussed in this chapter, Weick (1999) changed his position. He observed the following contradiction in Thorngate’s postulate.

If, as Thorngate asserts, it is true that it is impossible for an explanation of social behavior to be simultaneously general, accurate and simple, then that assertion is false. It is false because the assertion itself IS general (it applies to all explanations), IS simple (it is summarized in one accessible sentence), and IS accurate (it is a valid prediction). Thus, Thorngate’s general, accurate, simple explanation for the impossibility of a theory itself shows that such a theory is possible. Humans who are able to wind themselves into and out of tangles such as this need all the help they can get when they develop theory. (Weick, 1999: 802)

To explore how and why we might work ourselves out of this tangle, let us examine three propositions in Thorngate’s statement of his postulate (quoted above).

The first proposition in Thorngate’s postulate is that, ‘In order to increase both generality and accuracy, the complexity of our theories must necessarily be increased.’ Although this may often happen, it need not if we travel the ladder of abstraction correctly. Thorngate’s proposition may be a result of incorrectly climbing the ladder of abstraction by widening the extension and increasing the connotation of concepts, resulting in concepts that are stretched to become vague pseudogeneralizations that are not necessarily more complex; instead they become meaningless. If logical steps in climbing the ladder of abstraction are applied correctly, then increasing the generality of a theory should maintain its accuracy by decreasing its complexity. As Osigweh (1989: 584) points out, climbing the ladder of abstraction involves extending the breadth of a concept (generality) while reducing its properties or connotation (thereby increasing its simplicity).

The second proposition in Thorngate’s quotation is that ‘complex theories of social behavior will be viable only to the extent to which the complexities of social behavior are organized. However, there is reason to believe that much social behavior is not organized beyond a ‘local’ or ‘situation-specific level.’ In this statement Thorngate appears to reflect the principle of local determination. Kaplan (1964: 300) observes that

It is often felt that only the discovery of a micro-theory affords real scientific understanding of any type of phenomenon because only it gives us insight into the inner mechanism of the phenomenon. Underlying this position is what might be
called the principle of local determination: the radius of the explanatory shell can be made indefinitely small. Local determination is determinism conjoined to a denial of action-at-a-distance in space or time: whatever happens anywhere is capable of being explained by reference to what is to be found there and there. (Kaplan, 1964: 300)

Simple theories are economical. ‘But contracting the explanatory shell is by no means always a move in the direction of economy’ (Kaplan, 1964: 300). For example, it is not obvious that a cognitive psychological explanation of human behavior is more simple, general, or accurate than an institutional sociological explanation. Local determination appears to reflect the disciplinary disposition of the researcher. While a researcher’s inclinations cannot be ignored in theory development, neither should the nature of the research question or problem being addressed. Selecting the radius of a theory’s explanatory shell (i.e., its generality, accuracy, and simplicity) is a choice that should match the perspective and scope of the problem domain as perceived by key stakeholders of the study.

A third proposition in Thorgate’s postulate quoted above is that ‘Complex theories of social behavior may be easily constructed in an attempt to describe the organization, but the ethics and pragmatics of research set severe limits on the complexity of theories that can be subjected to empirical test.’ Clearly, the greater the complexity of a theory, the more difficult it is to test. But Thorngate’s statement addresses the complexity problem only from the researcher’s viewpoint. He does not mention the consequences of complexity for the audience or consumers of theories. For them, the limiting factor of complex theories is not their testability; it is the amount of complex information people can simultaneously process at a time.

From an engaged scholarship perspective, the complexity (as well as the generality and accuracy) of theories is more in the eyes of the audience than it is in the testing capacities of the researcher. Theories that exceed Miller’s (1956) ‘magical number’ (of seven plus or minus two) exceed the information processing capabilities of most readers. Beyond this number of 7 +/- 2 factors, hypotheses, or findings in a study, members of an audience become numb and lose their capabilities to discern what is general, simple, or accurate in a theory of social behavior. Theories that exceed Miller’s magical number may be a product of not clearly formulating the research problem as well as not traveling the ladder of abstraction in crafting an understandable hierarchical theory out of a concatenated ‘laundry list’ of possible explanatory factors.

This interpretation of Thorngate’s postulate links the generality, accuracy, and simplicity of a theory with climbing the ladder of abstraction and considerations of the intended audience. Like any claim, there are boundaries to these links. An important qualification is Merton’s (1968) proposal to develop theories of the middle range. Merton describes a middle-range theory as being less abstract than grand social theories (such as proposed by Parsons or Engles) that are often too remote from social phenomena to accurately account for what is observed in specific empirical contexts. On the other hand, middle-range theories are a level more abstract than observed particulars for identifying the classes or archetypes of problems of which particular cases are a part. Middle-range theories are close enough to observable activities within contexts to permit empirical testing and generalization to propositions (Merton, 1968: 39).

Theories tend to be constructed and justified to fit the existing body of knowledge. Hence we should expect, as Merton (1968) describes, that while middle-range theories are not logically derived from general abstract theories, once developed and tested, they may provide important empirical evidence for one or more general theories. This is because grand abstract theories tend
to be sufficiently loose-knit, internally diversified, and mutually overlapping to subsume a number of middle-range theories. More accurate and specific empirical evidence and more contextual theorizing of middle-range theories contribute to improving and grounding general theories. In return, this increases the generality or radius of the explanatory shell of the middle-range theory subsumed by a general theory. In this way, middle-range theories can contribute to bridging and contributing to scientific knowledge.

Conclusion

Writers often express different views about theory building. They range from those emphasizing theory creation and arguing that trivial theories are produced by hemmed in methodological strictures that favor validation rather than imagination (Mintzberg, 2005; Weick, 1989), to those emphasizing the need for clear definitions, internal logical consistency, and verifiability (Bacharach, 1989; Peli & Masuch, 1997; Wacker, 2004). In part these writers are right in describing one theory building activity and wrong in ignoring other activities involved in theory building. Many of these differences dissolve when it is recognized that theory building is not a single activity. Instead it involves at least three activities—creating, constructing, and justifying a theory.

This chapter examined these three theory building activities and discussed how they entail different patterns of reasoning: abduction is used for conceiving a theory, logical deduction for constructing a theory, and inductive reasoning and argumentation for evaluating and justifying a theory. I conclude that much can be learned about theory building by understanding and developing skills in these patterns of reasoning.

Conceiving a Theory by Abduction

The first step in theory building involves an abductive reasoning process of conceiving the germ of an idea that may become a theory. This idea may be a ‘half-baked’ conjecture that was created in response to an anomaly that violates our understanding of the world. Abduction is a creative form of reasoning that is triggered by encountering anomalies and ends by selecting a plausible or coherent solution that might resolve the anomaly.

A useful model for understanding the dynamics of abductive reasoning in theory creation is an evolutionary model of variation, selection, and retention of thought experiments, as proposed by Campbell (1988) and Weick (1989). Variation is the number of different conjectures that are developed to make sense of an anomaly observed in a problematic situation. Selection involves the application of different criteria for choosing among these conjectures. Retention is the elaboration and justification of theories for the chosen conjecture.

Representing abductive reasoning as an evolutionary process, Weick (1989) introduced several useful propositions for increasing the number of independent thought trials in generating and selecting conjectures for addressing anomalies. In particular, this chapter discussed three of these propositions. First, the number and diversity of thought trials in generating conjectures increases the likelihood of producing better theory. Second, the diversity of criteria applied to a conjecture increases the likelihood that those conjectures that are selected will result in good theory. Third, since it is not possible to determine or test the validity of a conjecture at the time of its conception, then plausibility is a substitute criterion for validity in selecting conjectures.

Engaged scholarship represents a strategy for implementing these propositions. Engaging and obtaining the diverse perspectives of other people increases the independence of thought.
trials for developing conjectures, and for applying diverse criteria in choosing among the conjectures. Moreover, the more we engage and the better we know the perspectives and assumptions of key stakeholders, the better we can select and frame conjectures that are plausible to the intended audience of a study.

Constructing a Theory with Logical Deductive Reasoning.

Once a plausible conjecture has emerged through a process of abduction, then the mode of reasoning switches to deduction to elaborate the conjecture and construct it into a complete theory. A theory was defined as an explanation of relationships among constructs within a set of boundary conditions. I reviewed some of the basic principles of logical deductive reasoning, for they provide the toolkit for theory construction. Constructing a theory involves articulating and elaborating a conjecture into theoretical and observable terms, developing propositions and hypotheses that relate these terms, and specifying the conditions when they apply. I emphasized that sound logical reasoning remains as important as ever to elaborate the semantic meaning of theories and identify the boundaries of concepts and their relationships. I reviewed the distinction logicians make between the logical ‘validity’ and empirical ‘truth’ of an argument. This distinction is important because if a theory is not logically valid, then it is pointless to investigate its empirical truth by designing and implementing either variance or process research models, as discussed in the next three chapters.

Justifying a Theory with Inductive Reasoning and Rhetorical Arguments

I discussed how theories can be justified in two ways: by testing their empirical fit with the world using inductive reasoning, and by presenting rhetorical arguments of the logical validity, credibility, and persuasiveness of a theory. Both of these approaches are necessary to justify the empirical and conceptual bases of a theory. Hence, they compliment, and do not substitute for, each other.

By inductive reasoning, a theory can only be disproven and never proven. If that is the case, I discussed how we might gain confidence in the plausibility of a theory? The proposed answer is to (1) develop many diverse tests of the hypothesis, and (2) rule out plausible alternative hypotheses.

- The greater the number and variety of tests that do not reject a hypothesis, the more credible it is. The credibility of a theory is a function of its probability of rejection.
- Another way to increase the credibility of a theory is to rule out plausible alternative hypotheses. At a minimum, to be credible a new theory should provide a better explanation for a phenomenon than the status quo explanation.

These two strategies strengthen the inductive conclusion that the hypothesis is more probable in comparison with alternatives, although by deduction it can never be proven to be true. Stinchcombe (1968) suggested that this basic inductive process of science should lead scholars to design crucial experiments where evidence in support of one theory implies the rejection or negation of a rival alternative theory.

An argument provides a rhetorical strategy for explaining and justifying a theory. Not all theories are equal; some can be supported with better reasons and evidence, and with fewer qualifications and possible rebuttals than others. Without the discipline of critical reasoning that arguments entail, it is often difficult to convince yourself and others of the pros and cons of a theory in comparison with others.
I proposed and discussed the Toulmin (2003) structure of argumentation for explaining and justifying a theory. The Toulmin method arranges the elements of an argument into statements of: (1) the background context, problem, and question being examined; (2) the claim, or the central proposition, hypothesis, or theory being advanced; (3) the major reasons or explanations supporting the claim; (4) evidence backing the reasons; (5) qualifications of the boundary conditions and assumptions for the claim; and (6) reservations, including limitations or grounds for rebuttal of the claim. Critical in developing these elements of an argument are the assumptions and perspectives of the audience being addressed. It reminds us again of the importance of being engaged and in framing a study with a reflexive appreciation of whose perspectives and interests are being served in an argument.

The chapter concluded with a discussion of three criteria commonly used to evaluate a theory: generality, accuracy, and simplicity. Thorngate (1976) postulated that it is impossible for a theory of social behavior to be simultaneously general, accurate, and simple. Like Weick (1999) I questioned if this postulate is correct, and explored possible ways for developing general, accurate, and simple theories by climbing the ladder of abstraction and incorporating the perspectives of the intended audience. An important qualification to this discussion is Merton’s (1968) proposal to develop theories of the middle range; theories that lie in between and can bridge concrete hypotheses among observable variables or events and grand universal propositions among abstract concepts.
References


Figure 4-1 Theory Building in Engaged Scholarship Model

Theory Building
Create, elaborate & justify a theory by abduction, deduction & induction
Engage knowledge experts in relevant disciplines & functions
Criterion - Validity

Problem Formulation
Situate, ground, diagnose & infer the problem up close and from afar
Engage those who experience & know the problem
Criterion - Relevance

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Figure 4-2. Illustration of a Theory

Source: Adapted from Bacharach (1989)
Figure 4-3. Hierarchical & Concatenated Theories
Figure 4-4. Toulmin Structure of Argument

Background
- the problem, question, context of the claim

Claim
- Proposition
- Hypothesis

Reasons
- Major premise
- Logic underlying claim
- Grounds

Evidence
- Minor premise
- Data backing reason
- Warrants

Qualifiers
- When claim holds
- Assumptions
- Boundary conditions
- Contingencies

Reservations
Limitations - Grounds for Rebuttal
- Logical refutations: validity
- Empirical refutations: truth
- Cogency of argument: persuasiveness

Figure 4-5. Weick’s Clockface of Thorngate’s Criteria of a Theory Being General, Simple, and Accurate

Weick, K.E. 1979. Social Psychology of Organizing, Second Edition, Figure 2.1, p. 36.