PART 2

Research Processes

3

Modelling-as-Theorizing: A Systematic Methodology for Theory Development

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OVERVIEW

> Organizational researchers are primarily trained in data collection techniques and the latest analytical tools, not the nuances of theory building. Our doctoral programs tend to skip over theory building perhaps because it is not a step-by-step process that can be taught like LISREL or event-history analysis. Reading major theorists and writing literature review papers is often passed off as training in theory building, even though such assignments really don't teach one how to craft conceptual arguments. (Sutton and Staw, 1995: 380)

I second Sutton and Staw's sobering assessment regarding the paucity of theory-development training in the field of organizational studies. Furthermore, I strongly endorse Weick's (1989: 516) observation, 'Theory cannot be improved until we improve the theorizing process, and we cannot improve the theorizing process until we describe it more efficiently, [and] operate [it] more self-consciously . . .'

Reflecting the link between this edited volume and a series of workshops for doctoral students sponsored by Cranfield School of Management, what follows has a strong pedagogical purpose and flavour. Given the 'critical path' function of theorizing in the development of scholarly knowledge, our field is not well served by the myth that theory development is high art, known and knowable only to a rare, elite cadre of organizational theorists,

and beyond the grasp of less insightful scholars who, by default, are relegated to the less difficult (because it is codified) task of theory testing. I believe that theory development, like theory testing, is a competence that can and must be taught, practised and improved.

Kurt Lewin's (1945) oft-quoted endorsement of theory, 'there is nothing quite so practical as a good theory', contains two key claims: theory is *practical* – it is useful in guiding practice – and, only *good* theory is practical – bad theory is often dysfunctional, and even harmful. As reflected in my October 1989 *Academy of Management Review* essay 'What constitutes a theoretical contribution?', my abiding interest is in making the case for developing *good* theory. Furthermore, because I believe the quality of the organizational theories generally available to both scholars and managers for guiding their respective forms of practice is closely linked to the quality of the theory-development tools commonly practised, I welcome this opportunity to encourage the use of better theory-development practices.

Above all else, effective theory development practices produce theories that lend themselves to further development. I will argue in this chapter that this requirement necessarily requires scholars to make their implicit theoretical notions explicit. I will further argue that systematic theoretical conceptions are superior to unsystematic ones, and that systematic conceptions are more likely to arise from systematic conceptual processes. The core of the chapter describes a formal methodology for codifying theoretical assumptions and claims, thus making them more amenable to improvement through ongoing logical, empirical and practical assessment.

Assumptions about theory and theory development

I need to set the stage by specifying several key assumptions and assertions. First, I subscribe to the widely held notion that, at its core, theory is best conceived of as the answer to questions of *why* (Kaplan, 1964; Mohr, 1982). As Sutton and Staw observed, 'Theory is about the connections among phenomena, a story about why acts, events, structure and thoughts occur' (1995: 378). This conception of theory allows us to distinguish between scholarly *description* (one that is informed by theory but is limited to insights regarding *what* is happening) and scholarly *explanation*. Descriptions, regardless of how detailed or insightful they are, may be considered conceptual contrbutions, but without an explanation for what is observed, they do not qualify as theoretical contrbutions.

Second, I believe that the most promising arena for theory development in our field is the incremental improvement of middle-range theories (Whetten, 1989). Although most scholars dream of creating a wholly new, full-blown, broad-gauged theoretical perspective, few realize this dream. Instead, theory development mostly focuses on improving extant explanations for what is readily observable, via a process of incremental change informed by logical, empirical or practical tests. My point is that although our field is perpetually anticipating radical new conceptualizations of motivation, leadership, group

dynamics, or strategy, this form of theorizing should not be thought of as the primary (and certainly not as the exclusive) domain of the scholarly craft known as theory development.

Third, I support the position that efforts to improve theory development should be guided by the supposition that better theory is desirable because it is more useful. Given the applied nature of our field, we cannot afford the luxury of viewing the scholarly exercise of improving theory as an end in itself. Hence, I agree with Campbell (1990: 66): 'It is difficult to imagine that very useful theory could be created by someone who only knew the general laws of theory development and had never spent time in an organization, never tried or intended to collect data, and knew nothing of measurement and other methodological issues.'

Fourth, having agreed with Campbell's argument that discussions of theory development must not become preoccupied with elegant formalism at the expense of considerations of sound substance, I strongly resist the implication that knowledge of good form contributes little to one's ability to generate good theory. In fact, to suggest that there is no merit in methodological discussions of how to develop good theory makes no more sense than the reciprocal argument that empirical tests of theory should be conducted and evaluated without regard for accepted methodological conventions and standards. Although there is undoubtedly a spark of creative inspiration at the core of all noteworthy theory-development initiatives, it is not at all obvious that inspiration and insight are unique to theory building (surely they are at least as evident in creative tests of theory), nor am I aware of any evidence that the use of a structured approach to theory building extinguishes the generative flame of insight. On the contrary, it has been my experience that many seemingly interesting and creative insights never make it to the pages of our journals because they are so ill-formed that they are judged to be ill-conceived. Hence, while the medium should never be thought of as the message, our choice of medium for conceptualizing has a profound effect on the quality and type of conceptualization we are able to craft.

Fifth, the objective of theory-development training should be the articulation of theories that are closer and closer approximations of the requirements of *strong theory* (Weick, 1995). It has been widely observed that theorizing is not unique to the scholarly enterprise. Instead, it arises from a universal human need to order and explain personal experience (Dubin, 1978). Given that seemingly 'everyone has theories about everything', then science's claim of distinction must be supported by an obvious qualitative difference between *ordinary explanations* and *scholarly explanations*. This qualitative difference is often referred to as the power, or strength, of a theory. (See Campbell, 1990: 65 for an excellent working definition.)

For purposes of assessing how well our theory development efforts approximate this ideal, I suggest a simplified benchmark. In his classic treatise on scientific knowledge, Kant (1998) argued that a body of scholarship should be both *complete* and *systematic*. That is, what scholars have to say about a subject should represent a complete, or satisfactory, accounting of the matter, in the sense that it shouldn't contain obvious, gaping holes. In

addition, the body of knowledge should be organized, coherent and self-consistent.

In retrospect, my 1989 *AMR* article focused primarily on developing complete theories – those containing certain essential elements. During the past decade, my interest has expanded to include theory-development tools, or processes, that encourage the development of scholarly knowledge that is systematic, in other words, structured and orderly. The development of theories that are both complete and systematic, by means of an orderly, easy-to-use methodology is the objective of this chapter. But before wading into the details of this presentation I need to introduce an important distinction.

Contributions *of* theory versus contributions *to* theory

Treatises on theory development need to distinguish between contributions *of* theory and contributions *to* theory (Whetten, 1989). The former use theory to improve enquiry; the latter use enquiry to improve theory. For my present purposes, this distinction reminds us that how we use our theories (what we consider to be a contribution *of* theory) affects the level of attention we devote to improving our theories (the value we place on making contributions *to* theory).

In making this distinction, I have a particular concern in mind. The common practice in our field (especially 'macro' organizational studies) of using theoretical frameworks as if they are competing theoretical perspectives, or lenses (for example, how does what I see through the lens of institutional theory compare with what I see through the lens of resource control theory?) tends to shift our focus away from the permanent need to continuously improve the quality of each and every theoretical lens. The practice of using theories as perspectives tends to produce paradigmatic boundaries around our theories, which in turn fosters winner-take-all, *between-theory* scholarly debates (Pfeffer, 1993). Taken to the logical extreme, advocates of a particular theoretical perspective become so focused on advancing the merits of their point of view that their impassioned advocacy actually deflects attention away from the underlying theory-development question 'Is this the best we can do?' (Greenwald et al., 1986). Although so-called 'paradigm wars' often have theoretical merit (McKinley and Mone, 1998), we should not overlook the theory development opportunity costs associated with between-theory debates – namely, they can, and often do, direct attention away from much needed *within-theory* improvement.

Let me briefly illustrate this proposition. In 1997, Anjali Sastry published a paper in *Administrative Science Quarterly* in which she critically examined punctuated equilibrium theory, which had been introduced in our field by Mike Tushman and Elaine Romanelli during the mid-1980s (Tushman and Romanelli, 1985). What I find striking about the literature review in Sastry's paper is that it contains numerous references to applications of punctuated equilibrium as a theoretical perspective, but there is

not a single reference to systematic critiques of, or claimed improvements in, the theory.

It is particularly instructive to examine Sastry's theory development methodology. She begins by systematically identifying the theory's constitutive elements, including four core constructs and several key relationships between those constructs. After deconstructing the punctuated equilibrium theoretical lens into a set of focal elements, Sastry proceeds to systematically test the theory's core assertions using simulation data. Based on these results she proposes several non-trivial improvements in this well-worn theoretical perspective.

This exemplary piece of theory-development scholarship illustrates the necessary change in focus required of those who wish to make contributions *to* theory, from uncritically looking through a theoretical lens, to regularly and assiduously looking at the lens.

Developing complete and systematic theories

The title of Weick's (1989) classic article, 'Theory construction as disciplined imagination' sets the tone for what follows. I am sure that graduate students who have worked with me will find it ironic that I am making a case for disciplining one's imagination. Because I am by nature a divergent thinker, I easily succumb to theoretical rapture, a state of supernal intellectual bliss in which I can envision connections between anything and everything that can be imagined. However, I have experienced enough frustration trying to test, let alone express, conceptualizations that are overly complex and hopelessly convoluted, that I have grudgingly developed an appreciation for theories that are both complete *and* systematic.

It seems that young scholars are particularly susceptible to the allure of needlessly complex conceptualizations. Given the amount of information doctoral students are required to master during a highly compressed period of learning, coupled with an associated bias against uninformed (read, naïve) explanations underlying all scientific discourse, it is not surprising that aspiring scholars are inclined to construct unwieldy conceptual maps. Although the impulse to add value by adding variables may be justified on the grounds that it will produce a more complete conception, failure to discipline this impulse typically yields a hodge-podge conceptualization that is not practical for any purpose. What many of us need is a proven antidote for this learned mental affliction.

The notion that the enterprise of scholarship is devoted to instilling not just scholarly knowledge, but also scholarly 'habits of mind' (Fine, 1995), is at the heart of the 'critical thinking' movement in education circles, as reflected in the following observation.

> Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. Excellence in thought, however, must be systematically cultivated.

> Critical thinking is that mode of thinking – about any subject, content, or problem – in which the thinker improves the quality of his or her thinking by *skillfully taking charge of the structures inherent in thinking and imposing intellectual standards upon them*. (Paul and Elder, 2001: xx; emphasis added)

Several years ago, at a conference on the subject of conducting research that is both scholarly and practical, I was reminded of the practical value of disciplining our scholarly imagination by subjecting it to intellectual standards and conventions. During this meeting, two senior, highly distinguished organizational scholars, independently said something like the following: 'I am an experimental social psychologist by training. Recently, my scholarly interests have shifted from testing theories about organizing to solving problems in organizations. Therefore, I don't plan to conduct any more laboratory experiments. However, I'm glad that I've spent several years designing lab studies because the experimental design logic cultivates rigorous thinking.'

The language and logic of experimental design are one of the many intellectual standards that can be used to discipline our imagination. Because of my sociological background I am more comfortable with modelling, with a strong preference for graphical models. When students want to discuss a new research idea with me, I instinctively start drawing diagrams, figures and models.

One of the nice features of graphical models is their versatility, as tools of scholarship. For example, modeling techniques can be used to organize ethnographic field notes and to make sense out of a large body of scholarly knowledge. As these applications suggest, most formalized decision support aids and cognitive mapping tools rely on some form of graphical modeling (Huff and Jenkins, 2002). Models are equally useful as instruments of effective discourse. Audiences, consisting of students, executives or colleagues, always seem to be most attentive to the graphical elements in a written or oral presentation.

The simplest, most compelling justification for using graphical models to guide the theorizing process is that the features of the tool of choice for constituting and representing theories should exemplify the qualities of the ideal theory. Graphical modeling naturally lends itself to developing conceptualizations that are both complete and systematic. In addition, modeling is equally useful as a theory development tool for constructing emergent explanations of 'new' phenomena (Eisenhardt, 1989) and for improving long standing explanations (Bachrach, 1989).

Let me hasten to agree with Sutton and Staw (1995): a diagram, by itself, is not a theory. If we think of a theory as a story about 'why', then a model is properly viewed as a visual aid that helps storytellers highlight the main features of their explanations. In other words, when models-as-visual aids are used by scholars-as-theorists, it is easier to understand authors' arguments and to evaluate the merits of their claims. Sutton and Staw (1995: 376) said it well: 'For researchers who are not good writers, a set of diagrams can provide structure to otherwise rambling or amorphous arguments. For those researchers who are talented writers, having a concrete model may prevent obfuscation of specious or inconsistent arguments.'

MODELLING-AS-THEORIZING

What follows is a rudimentary theory-development methodology, using basic graphical modelling logic and conventions. Those who are interested in learning more about modelling as a theory-development tool are referred to Asher (1976), Dubin (1976), Jacobsen et al. (1990), Abell (1971) and Guetzkow (1962). For related examples of the use of graphical models as analytical tools in our field see Huff and Jenkins (2002), Morecraft and Sterman (1994), Cossette and Audet (1992), Porac and Thomas (1990).

The proposed modelling methodology contains four steps, corresponding to the four elements of a good theory described in my 1989 *AMR* article: What, How, Why, When/Where/Who. This step-by-step approach provides a systematic framework for codifying the constitutive elements of an extant theoretical perspective or for espousing an emergent theoretical perspective. To enhance the usability of this methodology, the description of each step contains guidelines for practice.[1]

I will not take time to review the terminology introduced in my 1989 article (What, How, Why, etc.), but my usage is similar to the following: '[A theory] is a collection of assertions, both verbal and symbolic, that identifies WHAT variables are important for what reasons, specifies HOW they are interrelated and WHY, and identifies the CONDITIONS under which they should be related or not related' (Campbell, 1990: 65; emphasis added).

Step 1: 'Whats'-as-constructs

A few years ago I taught a course with Bonner Ritchie, a legendary teacher at Brigham Young University. During one of the class periods he articulated a compelling theory of moral choice. After class a student asked him how he had come up with such a clear and clearly thoughtful understanding of a highly abstract and complex subject. Later, his intriguing reply, 'I developed this model in a motel room in Laramie, Wyoming', was expanded into the following story. 'Driving from Michigan to Utah I encountered a severe snow storm in Wyoming. Hearing that the interstate was closed in the middle of the state, I stopped in Laramie and found a Motel room. Before settling in for the night I went to a grocery store and purchased a long strip of butcher paper and some large markers. I had been thinking about moral decision making while I was driving and I wanted to use this time to clarify and organize my thoughts. Back in my room, I taped the butcher paper on the wall and began drawing circles, each one representing a key concept in my emerging framework.'

I'm confident that motel owners and campus janitors are grateful that academics now have a viable substitute for butcher paper and indelible marker pens: 'Post-it® Notes' (PIN). As illustrated by Bonner's story, the question guiding this initial phase of the model building process is, 'What are the elements of my conceptualization?' Equipped with a packet of PINs, consider the following guidelines as you begin to explore this question.

1 Treat each PIN as a circle, or box, in a graphical model. Each PIN should contain the name of a single construct, written as a noun or noun phrase.[2]

Start with your core construct – the target of your theorizing; the focal point of the puzzle or question you are trying to understand. Then, expand your focus by adding more and more related constructs, including those that might represent causes, effects and correlates. At this point I suggest you err on the side of inclusion rather than on the side of parsimony, because subsequent steps in the process will help you be more selective.

As you list your constructs, keep in mind that it is generally preferable to think in terms of *variables*, not values (variable levels). That is, in most cases, theoretical explanations that account for the full range of a construct (high to low, top to bottom, good to bad etc.) are preferable to theories of only one level, form or degree. Given the applied nature of our field, it is not surprising that most of our theories of leadership, or effectiveness, or quality, actually only cover one end of the implied continuum – good leaders, high effectiveness, good quality. This practice encourages incomplete conceptualizations and inaccurate characterizations. There are numerous examples in our literature where the explanations for the opposite ends, or values, of a commonly used construct are not simply mirror images, for example, organizational effectiveness versus ineffectiveness (Cameron, 1984) and growth versus decline (Whetten, 1980). So, unless you have a compelling reason for focusing only on part of the range of your constructs, go through your list and scratch out any qualifiers (for example, motivation, ability, performance).

2 After creating a list of constructs (a stack of PINs) assess them as a set, especially their complementarity, or compatibility. As a starting point, use the characteristics of your focal construct as a benchmark for evaluating the suitability of the other constructs (given how I'm conceptualizing X, how complementary are the other elements in my set?) We will consider two criteria for guiding this assessment: the scope and the coherence of the construct set.

(a) *The scope of the concepts*. Scope, or extension, generally refers to the breadth of the behaviour or activity covered, the class of things to which it applies, or the totality of the objects that it identifies (Osigweh, 1989: 584). For example, the meaning of a commonly used term like 'employee participation' can range from 'all efforts to broaden a worker's control and involvement in organizational affairs', to 'a subordinate's involvement in the decision-making process with guidance from superiors' (Osigweh, 1989: 583).

There is no absolute standard that we can invoke in the assessment of scope. Instead, the scope of a theoretical framework needs to be appropriate for its intended use, for example, as a general explanation, or as a guide for contextualised research. Here is the rub: There is a demonstrated preference in our field for broad theoretical perspectives (McKinley et al., 1999), but these are often difficult to translate into realistic research designs, for several reasons.

First, broad theoretical conceptions tend to rely on 'theoretical concepts' (in contrast to empirical, or observable concepts) whose 'systemic meaning' is derived solely from their part in a theoretical conception (Abell, 1971; Osigweh, 1989). Examples include synergy,

adaptability, decentralization, formalization, reputation, image, identity and stress. Given that the meaning of these constructs is derived from their specific, and often imprecise, theoretical usage, there is a high risk that the theorist espousing a theory and the empiricist testing a theory will have difficulty agreeing on the validity of a theoretical conception because they're not sure if they are talking about the same thing.

Second, broad gauged theoretical models necessarily leave out critical elements of the naturally occurring phenomenon. This results in an under-specified model, in which critical components of the logical argument are left unspecified.[3] For example, arguing that the presence or absence of a written code of conduct, or an ethical organizational climate, affects organizational performance, or that participation in decision-making leads to greater employee commitment, raises questions about the implied intermediate causal links and unspecified conditions. The obvious problem with using an incomplete theoretical explanation to guide research is that it is difficult to derive testable propositions.

Third, the data collection requirements necessary to test very broad conceptualizations are often unrealistic. One way to assess the feasibility of constructing a research design suitable for your construct set is to group your constructs according to their associated data collection requirements, for example, tally the number of different types of data (employee attitudes, company performance), the number of sources of data (employees, company records, industry statistics) and the number of data collection cycles (employee data from multiple companies, observations at three points in time).

(b) *The coherence of the constructs*. It is important to keep in mind that a model is a visual aid for telling a story, and that the story needs to be coherent. An argument is coherent to the extent that it 'hangs together'. The standard of coherence requires us to grant the criterion of *systematic* trumping rights over the criterion of *complete*. A common source of hard-to-follow, difficult-to-understand explanations is unnecessary complexity, resulting from the inclusion of bits and pieces of knowledge that are legitimately related to the subject but that are not germane to the author's particular interest in the subject (or that exceed the author's capacity to do justice to the subject).

For example, the literature on organizational identity contains references to a number of related constructs, including image, reputation, legitimacy, identification and multiple identity management strategies (Whetten and Godfrey, 1998). But just because these concepts are related to organizational identity doesn't mean they must be included in a particular theoretical treatment of identity.

As a general rule, the larger the number of constructs used to formulate an explanation, the greater the risk that the composite explanation will not make sense. But there is an even greater threat to coherence, namely, the use of concepts that differ in kind. Space allows

me only to draw attention to a single example: concepts that don't share a common level (conceptual/organizational) of analysis.

Theories of 'organizational behaviour' can focus on *contextual properties* (for example, industry performance, availability of human or financial capital), that are external to the target of investigation, *global properties* (for example, size, age, function) that are observable, and originate, at the work unit or organizational level, *shared properties* (for example, organizational climate, group norms), that are common to group members, or *individual properties* (for example, personal demographics, job performance, satisfaction level), that are unique to each person.

Although there are some excellent, recent examples of theorizing across multiple organizational levels (Aldrich, 1999; Arrow et al., 2000), as well as some important conceptual advancements in our understanding of the phenomenon of cross-level effects in organizations (Goodman, 2000; Klein and Kozlowski, 2000; Waldman and Yammarino, 1999), this continues to be treacherous conceptual terrain.

The literature on multi-level approaches to theory development presents the following conundrum. On the one hand, given that most constructs of interest to organizational scholars are embedded in a complex, multi-level set of interdependent processes, all single-level explanations of these constructs are, by definition, seriously underspecified. On the other hand, given the quantum increase in conceptual complexity associated with multi-level theorizing, it is inappropriate to include concepts from multiple organizational levels in a theoretical conception without clearly identifying the specific type of cross-level effect proposed (Waldman and Yammarino, 1999, list four different types), and the cross-level process that accounts for the effects, principally, emergence or embeddedness.

Emergence has to do with the processes by which individual properties, including attitudes and behaviours, are shaped through interaction and are manifest as higher level, collective phenomena. For example, Kozlowski and Klein (2000) identify two broad emergent processes, *compilation* (team performance) and *composition* (group climate), with three sub-types for each.[4] In contrast, *embeddedness* refers to the processes whereby lower level phenomena are brought into alignment with higher level phenomena. For example, Rousseau (1978) has argued that work-unit technology and structure exercise cross-level effects on individuals because they constrain the characteristics of jobs. In contrast, organizational size, strategy or structure are less likely to exhibit similar individual-level effects, because the causal cross-level connections are less direct, or proximal.

In general, the challenges posed by multi-level theorizing are so nettlesome that the prudent path, especially for novice scholars is to '. . . act as if the phenomena occur at only one level of theory and analysis. In this way, a theorist temporarily restricts his or her focus, putting off consideration of multilevel processes for a period' (Kozlowski and Klein, 2000: 13).

Step 2: 'Hows'-as-relationships

This is a critical step in the theory-development process, because the specification of relationships between constructs is the key difference between a theory and a list of reasons or examples. Lists of best practices for leaders, or of enabling conditions for organizational change, may be useful conceptual heuristics for teaching or consulting, but they do not qualify as explanations, and they provide inadequate direction for research. Basically, a list is an incomplete theory – it contains 'whats', but no 'hows', which means it can't inform questions of why.

It is important to keep in mind that the distinction between variance and process theories described in Mohr's (1982) highly acclaimed treatise on theory development is not the same as the distinction between the 'what' and the 'how' elements of a theory. Although the focus and form of process and variance theories are extremely different, they are constructed using similar materials and in a similar manner (that is, they both contain whats, hows etc.). Ironically, many process-oriented conceptualizations are incomplete theories because they gloss over the 'how' components. Here's how Mohr sees it. 'Process oriented ideas in organizational behavior, and in social science more broadly, tend to be of the stage naming variety. They are incomplete from the standpoint of theory in that they simply rehearse a series of steps; they lack the lines of action – either causal or probabilistic – that must be present to convey a sense of explanation' (1982: 53).

Although the basic 'how' questions must be addressed in all theoretical frameworks, the level of detail you need to provide regarding the relationships in your model will vary based on whether you intend to make a 'what' versus a 'how' theoretical contribution. For example, if your theoretical assertion is that a new moderating variable needs to be added to an existing conceptualization, then your accompanying justification will naturally be heavily content-oriented. In contrast, if the point of your theoretical argument is that the nature, or form, of a relationship has been mis-specified, or that the indirect or recursive effects of a particular construct in a complex model have been under-specified, then your focus will be centred on a detailed specification of these relationships.

An in-depth treatment of the myriad conventions used for specifying the precise nature of relationships in a model is beyond the scope of this chapter, so a couple of pointers will have to suffice. First, be aware that there is no consensus regarding the language of 'how'. For example, the cognitive mapping literature refers to 'relationships of influence' (Cossette and Lapointe, 1997), the sociology theory-development literature uses the term 'laws of interaction' (Dubin, 1978), and the systems-dynamics literature focuses on the specification of 'causal links' (Sterman, 2000). Second, keep in mind that many of the more detailed and technical discussions of relationship types or forms have a strong methodological orientation. Therefore, unless the focus of your conceptualization is on an unusual type of relationship, it is reasonable to postpone consideration of detailed relationship questions until you've completed your first pass through this theory-development cycle. Third, all organizational scholars need to come to terms with the nettlesome issue of

causality in social science research. To that end, here are some thoughts to consider.

With few exceptions (Mohr, 1982, is a good example), debates regarding the implied or explicit use of 'causal links' in our conceptualizations tend to have more symbolic than substantive merit. Because causation is inferred, not observed, scholars' expressed views about the legitimate use of causation in scholarship seldom inform the question of how the proposition that A is related to B should be tested (Dubin, 1978). For this reason, I resonate with Dubin's (1978) advice to avoid the subject of causation in our theorizing, altogether. In its place he suggests invoking specific, acausal, 'laws of interaction' – two of which are particularly appropriate for theory development in our field.

The first is called *categoric*, meaning that two constructs are associated, for example, 'When A, then B'. Think of this type of relationship as a suitable default option. That is, use it unless you have sound justification to specify a more complicated form of interaction. (You are in good company – most canonized social science is based on categoric relationship claims.) The other commonly used law of interaction is called *sequential* because it invokes a temporal dimension, for example, 'A precedes B', or 'B follows A'. If you choose to utilize the sequential law in your theorizing you should be prepared to discuss the various forms that sequential relationships might take. For example, are you invoking a natural law argument (X logically follows Y), an historical argument (X generally precedes Y) or a developmental argument (Y emerges from X)?

With this general information about relationships between constructs as a backdrop, we now turn our attention to specific suggestions for completing this step of the theorizing methodology. The goal of these guidelines is to help you avoid creating models that 'more closely resemble a complex wiring diagram than a comprehensible theory' (Sutton and Staw, 1995: 376).

1 Determine the role of your core construct in your explanation – does it play the role of an *explanatory* construct or an *explained* construct (Abell, 1971)? To help you answer this question, place your core construct in the centre of a page and then arrange the remaining constructs horizontally on the page (to the left or right of your starting point). The distinction between a 'contribution to' versus a 'contribution of' introduced earlier suggests a simple way of determining whether your constructs should be placed to the left or to the right of the core construct. Specifically, what is on the left side can be thought of as a 'contribution to' your explanation of the core construct, whereas what is on the right can be thought of as a 'contribution of' the core construct to the explanation of your outcome of choice.

   Another way of thinking about the left versus right distinction is that your left side constructs will be used to explain your core construct (why it is), whereas what is on the right side serves as a justification for the core construct (why it is worthy of study, for example, because it is a significant predictor of organizational performance). This is similar to the distinction made by Cossette and Audet (1992: 342) between 'cause–effect' and 'means–end' relationships. The former concerns the 'why' of the effect, and suggests that the discussion of a cause-as-an-explanation begins with

the word 'because'. The second type of relationship constitutes a reason for the means and suggests a justification beginning with 'in order to'. (Cossette and Audet's example: Mr Brown could delegate *because* his firm is growing, or *in order to* have more time for himself.) In the first case, the initial variable controls the final variable, much like a stimulus in classical conditioning. In the second case, it is the final variable that determines the initial variable, analogous to the role of reinforcement in operant conditioning.

In suggesting that you arrange your constructs to the left or to the right of your core construct I am not implying that your goal should be a symmetrical distribution. Indeed, there are relatively few published theoretical models and even fewer published empirical studies that use the core construct as both an explanatory and an explained variable. Therefore, a symmetrical model is best suited for a comprehensive representation of a body of knowledge, rather than as a guide for a specific research project.

2 After you have grouped your constructs to the left and to the right of your core construct, select the ones you wish to use in constructing your *core sequence*. These should be arranged from left to right, forming the horizontal axis of your model. These contructs constitute the primary elements of your theory. For example, in the illustrative model shown in Figure 3.1[5] the core, or primary sequence contains four constructs: Effort (motivation), Performance, Outcomes and Satisfaction. The intermediate constructs in this sequence (Performance and Outcomes) are referred to as *mediators*, in the sense that they mediate the relationship between the constructs on either side. According to this model, the Outcomes (rewards and discipline) given to workers are based on their Performance, not their Effort. Hence, the relationship between Effort and Outcomes is said to be mediated by Performance. (In other words, the link between motivation and outcomes goes *through* performance.) Assuming the horizontal axis in your model contains more than two constructs, make sure that the intervening linkages satisfy the definition of a mediating relationship (Baron and Kenny, 1986).

3 Now, begin fleshing out the vertical dimension of your model by arranging the remainder of your constructs above and below your horizontal axis, locating them left to right in reference to one or more of the constructs in your core sequence. Constructs that are located above and below the horizontal axis generally serve as *moderators*. A moderating construct is one that changes the relationship between two other constructs when it is present (Baron and Kenny, 1986). For example, in Figure 3.1, Ability is included as a moderating construct between Effort and Performance. This means that in order to fully understand the relationship between motivation and performance we must take into consideration a person's ability.

4 Now that you have logically arranged your constructs, in a horizontal and vertical fashion, the next step is to make explicit the theoretically relevant relationships in your conceptualization. The ability to portray specific relationships, as well as an overall pattern of relationships, is one of the strengths of graphic modelling. 'Arrows' are the convention most commonly used for this purpose. In addition, postulated feedback loops

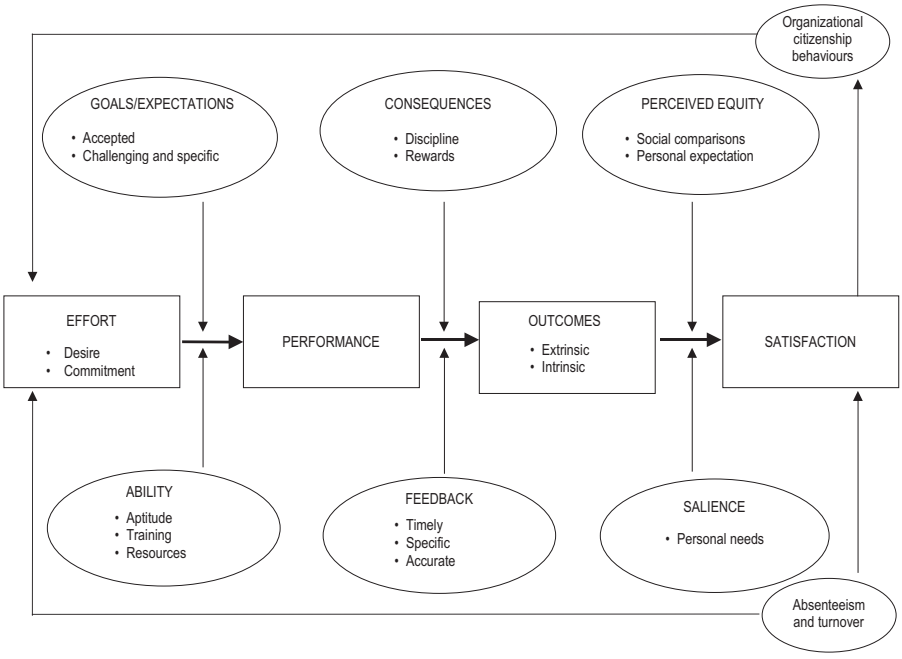

FIGURE 3.1 *A comprehensive model of individual performance and satisfaction (adapted from Whetten and Cameron, 2001)*

and/or reciprocal causality can be signified using various types of 'double arrows'. Kerlinger (1973: 34) even suggests the practice of signifying the strength of a proposed relationship using a solid line to represent a well-established, empirically verified, relationship versus a dotted line to represent a postulated relationship, requiring further examination. Finally, in some theoretical conceptions, especially those based on cybernetic logic, the 'sign' of a given relationship as well as the total number of positive and negative relationships in the model are key visual referents for important theoretical arguments.[6]

Step 3: 'Whys'-as-conceptual assumptions

Whereas the first two steps in the methodology focused on constructing a graphical representation of a theory, these final two steps require us to specify the context, or boundary conditions, of our theory. In other words, this marks a transition from focusing on the composition of a model to focusing on the context of the model. To formalize this distinction, you might find it useful to draw a box around your model and write 'conceptual assumptions' (step 3) above the model and 'contextual assumptions' (step 4) below the model.

The conceptual assumptions underlying a theory can be thought of as 'second order explanations' – the implicit whys underlying an explicit

answer to a specific why question. Conceptual assumptions come in various forms. Nagle (1961) identified a number of broad explanatory principles that are commonly invoked in science, for example, deductive, functional, probabilistic, teleological and genetic. Closer to home, Van de Ven and Poole (1995) posited four explanatory principles, referred to as 'motors of change', that undergird various scientific conceptions of change, namely evolution processes, dialectic processes, life cycle processes and teleological processes.

In our field, conceptual assumptions are often articulated using the language of foundational theories, for example, rational choice theory, need theory, personality theory, learning theory, acculturation theory, identity theory, etc. Alternatively, they might be expressed in terms of fundamental organizing modalities embedded in organizational patterns and processes, such as power and influence relations, communication links and content, leader–follower interacts, resource control needs, goal accomplishment, etc. In retrospect, when my graduate adviser asked me to articulate my theory of organizing before specifying my theory of interorganizational relations, I now recognize that he was encouraging me to align my explanations of observable phenomena with my assumptions regarding why one would expect to observe certain patterns and not others.

The evolution of organizational scholarship reflects a pattern of 'making changes at the boundaries' of our theories, in the sense of modifying accepted scholarly explanations by relaxing their assumptions. This practice is especially common at the interface between disciplinary perspectives, for example, Williamson's (1985) conception of an organization as a modified form of a market, or Simon's (1955) notion of bounded rationality, or the recent 'cognitive turn' in institutional theory (Scott, 2001).

Consider the following guidelines for guiding the process of making your conceptual assumptions explicit.

1 Think of this as a side bar conversation between you and your readers, something like, 'The sensibility of this explanation is predicated upon the following assumptions about human behaviour.' For example, a theory of ethical leadership might be based on the assumption of enlightened self-interest, a theory of decision-making would likely be predicated on some form of rational choice, and a theory of conflict resolution might assume a particular set of values regarding the utility of conflict.
2 To stimulate your thinking, consider reviewing various typologies in our field, including those classifying epistemological assumptions held by scholars (Astley and Van de Ven, 1983; Miles and Snow, 1978; Morgan, 1986) and those classifying cultural assumptions held by organizational members (Bolman and Deal, 1997; Cameron and Quinn, 1999).
3 Earlier, we introduced the criterion of coherence as a tool for evaluating the suitability of a construct set. Specifically, we argued that it was difficult to craft a coherent explanation using explanatory concepts that differ in kind, for example, individual level explanations of organizational outcomes. As you systematically flesh out the conceptual assumptions underlying your theoretical model, it is a good idea to consider how the

number and variety of your conceptual assumptions can pose a similar threat to coherence.

Let me offer an illustration from my own work. Several years ago I was asked to facilitate several focus group discussions involving faculty members from a wide range of departments on my campus. Our university was contemplating some important changes and the administration wanted to sound out faculty members' preferences. In the course of those conversations, I became intrigued by the diversity of administrative practices and structures across academic disciplines. For example, it appeared that science departments tended to be governed by strong, long-term, department heads, coupled with relatively weak faculty advisory committees. In contrast, humanities faculty seemed to prefer a more participative form of governance, including rotating department chairs and strong faculty committees.

At that time, the prevailing theoretical explanation in our literature for differences in departmental organizing preferences was contrasting levels of paradigm development across disiplines (Beyer, 1982). In pursuit of a broader understanding of what I had observed, I attempted to formulate a comprehensive explanation of faculty members' satisfaction with their department's administrative structure (Whetten and Bettenhausen, 1987).

A retrospective examination of this study illustrates why the search for a more complete explanation often results in a much less coherent explanation. I can now see how unlikely it was that an article-length, coherent explanation could be crafted using constructs drawn from a wide range of foundational theories pertaining to personal political values, institutional ideology, work design, career ladders, resource dependence and professional status. This example underscores the importance of identifying the theoretical taproots of our constructs at this stage of the model building process, especially when our intent is to use the emergent conceptualization as a guide for research.

Step 4: 'When/where/who'-as-contextual assumptions

This final step involves specifying the contextual boundaries, or conditions, that circumscribe a set of theoretical propositions (Bacharach, 1989; Dubin, 1976; Rousseau and Fried, 2001). Unfortunately, theory-development treatises in our field rarely explore the subject of contextual constraints, or conditions. This oversight reduces their 'power' as explanations. Sutton and Staw (1995: 376) put it this way: 'One indication that a strong theory has been proposed is that it is possible to discern conditions in which the major proposition or hypothesis is most and least likely to hold.' In his discussion of a 'contextualist theory of knowledge', McGuire (1983) reinforces this sentiment by arguing that empirical tests of a hypothesized theoretical relationship should not focus on whether the hypothesis is true or false, but rather on the conditions under which the hypothesis holds. Supporting this argument, negative research results can often be more informative than positive ones, if they suggest important limiting conditions that should be examined more closely. This conception of scholarship is analogous to Roethlisberger's notion

of a 'knowledge enterprise'. Recognizing the challenge organizational scholars face in our quest to comprehend what he called the 'elusive phenomena' of human behaviour, Fritz Roethlisberger (1977) proposed a highly interactive, continuous interplay between 'contexualized clinical' knowledge and 'generalized analytical' knowledge.

There is another justification for specifying the contextual limitations of our theories that is particularly salient for scholars in an 'applied discipline', like organizational studies. In the introduction, I referenced Lewin's observation that only good theories are practical. In Lewin's writing, he leaves little doubt that good theories must be sensitive to context. Reflecting a highly pragmatic view of knowledge (Dewey, 1929), Lewin's aphorism is an affirmation of the belief that the validity of an argument depends on the consequences of acting upon it. This is consistent with what another pioneer in our field, Mary Parker Follett (1924), referred to as 'the law of the situation', meaning that the value of a theoretical conception as a tool for guiding practice is subject to the circumstances of any given situation. The implication of the 'law of the situation' is that the failure to understand how contextual constraints temper general claims significantly undermines the utility, and hence, the credibility, of scholarly explanations.

The tension, inherent in an applied disipline, between the twin requirements of producing generalizable explanations and contexualized explanations can either be viewed as an insurmountable obstacle to effective theory development or as a generative prod to continuously improve our extant views. The latter perspective is illustrated by the evolution of scholarly thought on the subject of job enrichment. The initial blanket claim that job enrichment would increase the satisfaction of workers was subsequently challenged by the empirical observation that this relationship did not hold for a substantial portion of the workforce, for example, blue-collar workers who do not closely identify with their work (Hackman and Oldham, 1980). Subsequent analysis of this anomaly led to the addition of 'high growth need strength' as a key moderating construct in the job design model (if individuals have high growth need strength, then enriching their jobs will produce positive psychological outcomes). This example illustrates a common theory-improvement path: efforts to assess the adequacy of a theory uncover previously unspecified contextual constraints, which in turn lead to the addition of a new moderating variable within the theory (Baron and Kenny, 1986).

Although it is impractical to assume that scholars can a priori identify all of the potential contextual limitations pertaining to a proposed conceptualization, the literature on related subjects often provides helpful clues. For example, much of the recent discussion in our field about the need to make our theoretical contextual assumptions explicit has been stimulated by the results from cross-cultural studies. Scholarship in this area has identified important contextual limitations on the generalizability of Western theories of managing and organizing (Cheng, 1994). These include differences in cultural values (Erez and Earley, 1993), personal attribution tendencies (Choi et al., 1999), institutional environments (Child, 2000) and social networks (Heimer, 1992).

The value of models in theory assessment

One of the guiding principles of this chapter is that we should give preference to theory-development methodologies yielding theoretical conceptions that lend themselves to further development. One of the espoused benefits of a structured, systematic approach to theory articulation is that the theories represented in this manner can be readily subjected to logical, empirical and practical tests (Bacharach, 1989).

Although a detailed discussion of the connection between articulating theories and testing theories is beyond the scope of this chapter, it is important to point out some of the benefits of using formal models as a rhetorical bridge, spanning conversations about theory articulation and theory testing.

First, it makes it easier to apply logical tests to theoretical conceptions. The graphical modelling methodology proposed herein is analogous to diagramming a sentence, in that it deconstructs a rhetorical statement, thereby making it easier to apply certain rules or standards. One such standard is the logical test of necessary and sufficient conditions (Bacharach, 1989; Mohr, 1982). The relationship between X and Y is logically necessary if every time we see a Y we also see an X (without X, Y cannot be). The relationship between X and Y is logically sufficient if every time we see an X we also see a Y (X, by itself, always produces Y).

Of course, these are extreme tests, which we can seldom satisfy in social science. However, they are useful heuristics for testing the logical adequacy of our theoretical arguments. The necessity test invokes the criteria of parsimony. To conduct this logical test, begin from the left side of your model and consider whether each of the antecedent constructs is necessary for what follows. If you think of your model as a story, can you tell your story without this plot element? The sufficiency test invokes the criteria of completeness.[7] To conduct this logical test, begin with the constructs on the right side of your model and work backwards, asking yourself how confident you are that a given outcome can be adequately explained using the antecedent constructs. What you are looking for in this exercise are problematic gaps in your explanation. The sufficiency test is particularly relevant for models that use some type of global performance measure to justify the core construct. The risk associated with using a global construct like performance as the end that justifies our favourite means (core construct) is that means-end models can easily be construed as cause-effect models (Cossette and Audet, 1992: 342), in which case what was intended as a single means (to the end of performance) can be viewed as a single cause (explanation) – implying a grossly underspecified model of performance.[8]

The second benefit of using models to bridge theory articulation and theory assessment is that they make it easier to empirically test specific theoretical propositions. Several years ago, during a panel discussion on the subject of theory development, Jeff Pfeffer proposed that one of the most important actions we could take to improve the quality of our theories would be to insist that anyone proposing a new theory must also test that theory. In keeping with Pfeffer's sentiment that responsible theorizing entails theorists

taking responsibility for testing their theories, authors of theory papers need to give more than token attention to the question of how their arguments could be tested.

To that end, one of the benefits of presenting a model version of a theoretical argument is that it focuses the attention of authors and readers on the specific propositions that constitute the theory's unique claims (Asher, 1976). As we observed in the example of Sastry's test of specific propositions derived from punctuated equilibrium theory, the first step in that process was transforming a general perspective into a formal model, with an associated set of propositions.

I am often asked in workshops how many propositions are appropriate and which relationships should be formalized as propositions. Although the number of propositions will vary according to the complexity of the model, a reasonable default guideline is to formulate one proposition for each theoretically significant 'path' in your model. Using the language of our modelling exercise, this suggests that you begin writing propositions (literally, explanations) for each of your outcomes (explained constructs) on your main horizontal axis, beginning with the first explained variable on the left side of the model. Using Figure 3.1 as an example, this suggests that the first proposition would focus on an explanation for 'performance', using the elements of the model located to its left.

The third benefit of using models to guide the assessment of theory is that this practice facilitates a critical step in the ongoing process of theory development – using the results of theory-guided inquiry to improve current theory. It is common practice for scholars writing 'theory papers' to draw upon a broad base of evidence, culled from research reports, to support proposed changes in current theoretical conceptions. Given that we have few conventional standards for writing conceptual papers, the process of evaluating contributions *to* theory is inherently ambiguous.

In my 1989 *AMR* editorial essay I addressed this concern by suggesting that prospective authors focus on three rhetorical questions: (1) What's new? What specific change is being proposed and what specific deficiency in current thinking is being targeted? (2) Why so? What is the justification for the proposed change, for example, is the current theory incomplete or logically flawed? (3) So what? What difference would the proposed change make? That is, if experts on this subject agree that the proposed change is warranted, how much of a substantive difference would it make in the way they designed their next empirical study?

My current thinking on this subject has been heavily influenced by Anne Huff's workshops on writing (described in Chapter 4 of this volume). She suggests that writing for publication is like joining a conversation, in the sense that we must first understand what is currently being discussed and then identify what we might add to enrich the conversation. To make this metaphor more tangible, she proposes that writers make copies of three or four articles that represent the existing conversation they wish to join, and use them as points of reference throughout the writing process. This convention lends itself to side-by-side comparisons between 'what is' and 'what is proposed' as a significant addition or correction.

The fact that this type of comparison is very natural and straightforward if the theoretical conception under scrutiny has been formally specified as a model, constitutes one of the most compelling justifications for the theorizing-as-modelling methodology presented in this chapter. As I noted at the beginning, "Above all else, effective theory development practices produce theories that lend themselves to further development."

Conclusion

I began this chapter by making the case for devoting more collective attention to theory development in our field. A claim of distinction shared by scholars in general is that their work is theoretical, in the sense that scholarly enquiry builds or tests theory, and that theory guides scholarly enquiry. In our field this distinction is reflected in a common concern expressed by organizational scholars regarding many of the recommendations for practice made by organizational consultants or management practitioners, namely, they are not informed by the relevant theoretical perspectives and frameworks from our discipline. By extension, one can argue that the distinctive intellectual capital associated with the field of organizational scholarship is our theoretical knowledge. This supposition is reflected in the design of most doctoral education programmes: we often send our graduate students to other departments to take their research methods classes, but we insist they take their core content courses from us. It follows that, as a field, we need to place a high priority on continuously upgrading and improving our theoretical/conceptual knowledge base. This means that all extant theoretical conceptions should be subjected to constant assessment, with an eye towards continuously upgrading the power of our theoretical lenses.

To guide this process I proposed a systematic theory-development process, or methodology, that draws heavily on graphical modelling techniques. I have argued that this approach to theorizing has a number of commendable features.

First, modelling provides a structured process for making explicit the elements of a theoretical argument or perspective. Earlier, I compared the difference between making a contribution *of* theory versus making a contribution *to* theory to the actions of looking through a lens versus looking at the lens. This shift in focus is unlikely absent a detailed set of design specifications. As demonstrated in the Sastry example, until and unless a theoretical perspective is deconstructed into its constitutive elements, it is unlikely that theory application will stimulate theory development. In reference to the key constructs in Figure 3.1, I recall debates conducted in our scholarly journals during the early days of my career over questions like the following: Is the relationship between ability and motivation, as predictors of performance, additive or multiplicative? Does satisfaction explain performance, or does performance explain satisfaction? How are motivation, performance and satisfaction related? Arguably, much of the progress we've made as a field in answering these foundational questions can be attributed to the clarity in these debates regarding the constructs and relationships in question.

Second, modeling allows the theory-development process to be guided by accepted standards of scholarly knowledge, such as Kant's dual criteria of complete and systematic. One of the benefits of modeling, especially for inexperienced scholars, is that it disciplines the impulse to formulate more and more complete explanations that are less and less systematic. As usual, Weick had it right: effective theory development requires *disciplined* imagination.

Third, the language of modeling provides a standard vocabulary that can be applied to a) a wide range of subjects, spanning micro and macro concepts, b) a broad spectrum of processes and logics, including developmental sequences, logical arguments, event histories, causal relations, and c) a variety of theoretical conceptions, including variance and process theories. Thus, modelling, like network analysis and other related analytical tools, provides a robust framework that facilitates scholarly discourse across a wide variety of conceptual and empirical domains.

The fourth, and most straightforward, positive feature of modeling is that it creates models, which serve as useful guides for designing theory-based research projects. Using Figure 3.1 as an example, if someone is interested in studying the antecedents of job performance, this model identifies the set of variables that should be included in the study. It also suggests a number of specific propositions regarding the relationships among those variables that could be incorporated into the study.

Fifth, and finally, modelling democratizes the theory-development craft by making the tools for building good theory widely accessible. Given the premise that the future of our field is tied to the quality of our intellectual assets, it is imperative that all scholars who are inclined to improve our theoretical knowledge are able to do so, easily and effectively.

Study questions

Following are several theory-development exercises, based on the methodology described in the chapter. What insights do you gain into the theory-development process from each exercise? What opportunities for developing theory emerge from each exercise?

1 *Codifying gestalts*: Following the Sastry example cited in the chapter, use this modeling methodology to codify a broad theoretical perspective in our field, specifying its constructs, relationships, propositions, and so on.
2 *Explicating assumptions*: Select a well-known theoretical framework in your specific area of study and make a list of its key propositions. Next, draw a box around these propositions and then make a list of the conceptual and/or contextual conditions that are assumed but not stated by the authors. Then, brainstorm a list of conditions that might alter or even falsify these propositions.
3 *Community theory-building*: Identify a construct that has not attracted

much attention in our field, for example compassion or identity. Place it on a large Post-it® Note (PIN) in the centre of a bulletin board in your department commons area and invite colleagues (faculty and students) over a period of time to add other constructs (PINs), arrange the existing constructs, specify limiting conceptual and/or contextual conditions for the emerging conception, etc. (Try using different colors of PINs for different elements of the model.) When the nascent model is starting to take shape, schedule a brown bag discussion and engage in a group sense-making exercise.

4 *Doctoral course exercise*: Identify the key propositions (implied or explicitly stated) in the literature assigned for each major course topic, for example, leadership, motivation, power etc. Using these propositions, 'reverse engineer' a model, that is, try to construct a sensible model that contains all of the key propositions, specified as relationships among constructs.

5 *Doctoral preliminary exam question*: Select a well-established theoretical perspective on a given topic. Present it as a model and then propose improvements, in the following manner. First, create a figure featuring a side-by-by comparison between the current and the proposed models. Second, use this figure as a reference in explaining and justifying your proposal. Be sure to address the following questions: (1) What's new? What specific change is being proposed and what specific deficiency in current thinking is being targeted? (2) Why so? What is the justification for the proposed change, for example, is the current theory incomplete or logically flawed? (3) So what? What difference would the proposed change make? That is, if experts on this subject agree that the proposed change is warranted, how much of a substantive difference would it make in the way they designed their next empirical study?

Recommended further reading

Bacharach, S.B. (1989) 'Organizational Theories: Some Criteria for Evaluation', *Academy of Management Review*, 14 (4), pp. 496–515.

Campbell, J.P. (1990) 'The Role of Theory in Industrial and Organizational Psychology', in M.D. Dunnette and L.M. Hough (eds), *Handbook of Industrial and Organizational Psychology*. Palo Alto: Consulting Psychologists Press, pp. 39–73.

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Notes

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1 If you are planning to use this methodology as a decision support aid for formulating a specific research project, I encourage you to write down a carefully crafted research question or problem statement before proceeding. The presence of an orienting problem statement or research question provides an extra measure of discipline that is often necessary to insure that what we articulate as a theoretical conception can actually be assessed. Keep in mind the following 'prime directive' from the systems dynamics literature: 'The most important step in modeling is problem articulation . . . beware the analyst who proposes to model an entire business or social system rather than a problem' (Sterman, 2000: 89).
2 In my 1989 article I briefly discussed the difference between constructs and variables and the corollary difference between propositions and hypotheses. See Kaplan (1964) and Abell (1971) for a broader discussion of these terms.
3 Campbell (1990) refers to this as the problem of the loose derivation chain, and Guttman (1971) calls it the problem of the incomplete mapping sentence.
4 To illustrate the importance of specifying one's theory of emergence Kozlowski and Klein, (2000) argue that the use of group means as measures of group characteristics is appropriate for compositional concepts, but not for compilational concepts.
5 This model was developed for the purpose of summarizing a body of knowledge. Hence, it has some characteristics that are at variance with the format recommended for theory-development models. I've elected to use it because most readers will be familiar with these constructs, and because the history of how the current conceptualization of this subject matter emerged is particularly illustrative.
6 For an easy-to-understand discussion of 'link polarity' (the assigning of positive and negative signs to links) and 'loop polarity' (the determination of whether a feedback loop is *reinforcing* or *balancing*), see Sterman (2000). Also, for a discussion of assessing the relative significance, or importance, of the variables in a model, by examining the frequency of links between variables, assessing the 'intensity of the influence' of one variable on another, etc., see Cossette and Lapointe (1997).
7 The common test of the completeness of our predictive models is explained variance – the implication being that unless all of the reliable variance is explained we are doing bad science. However, because it is generally difficult to isolate the sources of error in our predictive studies, explained variance is an unreliable test of the sufficiency of a theoretical explanation (Campbell, 1990). It is, therefore, advisable to couple this empirical test with a complementary conceptual assessment, comparing the completeness of our model with the relevant scholarly literature. If nothing else, this gives us an opportunity to inform readers that we understand what we are leaving out and why we made these choices.
8 The type of models I'm referring to have the core construct in the middle of the horizontal axis, with performance as the single construct to the right, and numerous constructs to the left. In other words, the model contains both an explanation of, and a justification for, our core construct. The only way to totally blunt the criticism that this represents an under-specified explanation of performance is to

eliminate the one-on-one relationship between our core construct and the performance outcome construct in our model (redrawing the model showing all the explanatory variables directly related to performance, including our core construct). However, that defeats the purpose of using the model to tell a story about how the study of X is justified because it is a legitimate path to Y. This conundrum highlights the need to carefully label and describe 'justification relationships'. For example, if our core construct is organizational culture, its relationship to performance might be characterized as, 'the contribution of organizational culture and its antecedents to our understanding of organizational performance', or, if necessary, 'an organizational culture explanation of organizational performance'.

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