* CHAPTER NINE *

Concepts in Theories: Two-Level Theories

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> Every one may observe how common it is for names to be made use of, instead of the ideas themselves . . . especially if the ideas be very complex, and made up of a great collection of simple ones. This makes the consideration of *words* and *propositions* so necessary a part of the Treatise of Knowledge, that it is very hard to speak intelligibly of the one, without explaining the other.
> *John Locke*

CONCEPTS PLAY TWO IMPORTANT ROLES in the research enterprise, as constituent parts of theories and as an essential part of case selection. The last few chapters have examined some core aspects of concepts and case selection. It seems appropriate to end this volume with how concepts play a role in theories.

As this volume has stressed throughout, secondary-level dimensions play a key causal part in the larger theoretical, explanatory enterprise. If one takes the standard regression-type model it consists of basic-level concepts. Once we put multilevel concepts into these variables we produce multilevel theories. As a result, we will refer to two-level theories. We call them two- and not three-level *theories* because the third level of concepts deals with measurement and data. This level rarely comes into play in the description of causal mechanisms and explanations at the basic level. In contrast, secondary-level dimensions frequently appear as part of the theoretical framework. For example, the analysis of the liberal peace in chapter 5 shows that two-level theories appear in statistical settings as well. Embedded in the dyadic concepts of democracy and trade dependence are causal hypotheses. The dyadic concepts are then correlated with the

basic-level outcome variable of militarized dispute. We suggest that in fact many quantitative as well as qualitative models have two-level theories because of the causal hypotheses embedded in concepts.

Putting multilevel concepts into hypotheses and propositions generates a complex theoretical edifice. Not only do we need to decide how to construct concepts, but now we need to decide how the basic-level concepts are "put together" and structured to form some kind of hypothesis or theory. Of course, by now this is a fairly familiar problem. It is one that the researcher has faced in "aggregating" from the indicator level to the secondary level, and from the secondary level to the basic. Not surprisingly, we will continue to use the same structural principles *between* basic-level concepts, the logical AND and OR.

Just as we can use AND and OR to structure concepts we can use them to model the relationship between independent and dependent variable. As we shall see, many influential scholars have used this methodology for their theories. They have claimed that some factor **X** is a necessary condition for the outcome **Y** (we continue to use boldface fonts for basic-level variables). For example, in Skocpol's theory of social revolution, a continuing example in this book, state crisis is a necessary condition for social revolution. The logical forms used to construct multilevel concepts also apply to the construction of theories using basic-level concepts.

As examples of concepts in theories we will be revisiting some familiar friends, concepts such as social revolution, welfare state, democracy, and others. These concepts appear as key independent and dependent variables in major social theories. While previous chapters have analyzed these concepts in isolation, it is useful to see how these core concepts of politics science and sociology appear when surrounded by other multilevel concepts.

Throughout this volume I have stressed the importance of ontology, substitutability, and causality in building concepts. I have stressed the ontological view most in this volume since it is not generally recognized as an approach to concepts. However, two-level theories can involve causal relationships between levels. We have already seen (chapter 2) that factor analytic approaches see indicators as effects of basic-level causes. Here we explore the converse pattern, how basic-level factors are effects of secondary-level causes. Using Skocpol once again, we show how basic-level factors like state breakdown are produced by some secondary-level causes like international pressure.

In this kind of two-level model we still have basic and secondary levels, but now the causal arrow goes from the secondary level to the basic level. One can think of this relationship between levels in terms of causal mechanisms. The secondary level provides various causal mechanisms for the production of basic-level phenomena.

One *noncausal* relationship between secondary and basic levels takes the form of substitutability. Typically, this refers to different means to attain a given end (e.g., foreign policy substitutability; Most and Starr 1984). Our principle example of this will be Ostrom's theory of common pool resource institutions (1991). For example, an important basic-level factor is the ability to monitor compliance with institution rules. However, depending on the characteristics of the society and the resource itself there are various *means* of achieving successful monitoring. These means do not stand in a causal relationship to monitoring, they are different ways to do it. While the Skocpol model involves equifinality, it is a causal equifinality; in the substitutability model, it is a noncausal equifinality.

The power of the three-level concept framework comes out in how famous scholars have implicitly used this structure. In particular, we shall continue our empirical examination of Skocpol's theory of social revolution because it is a famous study that has been at the center of much methodological debate. We suggest that our analysis provides for the first time a succinct and accurate portrayal of the *structure* of Skocpol's theory. We believe that her work has been influential not only because of her substantive arguments, but also because she constructed a two-level theory.

Using Skocpol as a concrete example also permits us to illustrate the usefulness of fuzzy sets as a methodological tool for dealing with two-level theories. If one's conceptual theory along with the propositions combining concepts all use the logic of AND and OR then fuzzy logic provides a natural and coherent way to operationalize the overall theory. Fuzzy logic is built on the foundation of the logic of AND and OR, as such it translates directly two-level theories into appropriate methods. It is a relatively straightforward matter using fuzzy sets to move from the indicator level to the secondary level to relationships between basic-level variables. In contrast, it is not clear at all how this would work using standard statistical methods (though see Braumoeller 2003). So while we focus on evaluating Skocpol's theory of social revolution the basic methodological tools apply to three-level concepts as well.

We conclude that fuzzy-set methods are very helpful for testing two-level theories because they allow the analyst to think about complex causal patterns in terms of necessary and sufficient conditions. Yet these methods will have problems evaluating two-level theories if one is not clear about the structure of these theories from the onset. For example, a fuzzy-set test that focuses on variables of the secondary level will not generate meaningful results unless the relationship between these variables and basic-level causes are systematically considered. Hence, analysts must consider the overall structure of a two-level theory *before* evaluating it using fuzzy-set techniques.

The Structure of Two-Level Theories

In this section, we describe the common structure of two-level theories, drawing on the concepts of basic level and secondary level. We also review the different logical structures that can exist at the two levels, and the different kinds of relationships that can exist between the secondary and the basic levels.

Basic Level

In a two-level theory, the basic level contains the main causal variables and outcome variable of the theory as a whole. Variables at the basic-level form the building blocks of two-level theories, but there are different logical relationships with which these variables can be put together to form theories. We find that much qualitative and comparative work uses two logical structures at the basic level: (1) a set of causal factors that are individually necessary and jointly sufficient for an outcome; and (2) a set of causal factors that are individually sufficient but not necessary for an outcome. We refer to the first structure as a "conjuncture of necessary causes" to highlight the fact that a combination of necessary conditions are sufficient to produce an outcome. We refer to the second structure using the term "equifinality," which means that there are various conditions that are sufficient to produce the same outcome and hence *multiple paths* to the same end (Ragin 1987). For example, a classic example of equifinality is Barrington Moore's (1966) argument that there are three independent routes to the modern world.

The underlying logical structure of a conjuncture of necessary causes can be specified simply as

$$\mathbf{Y} = \mathbf{X} * \mathbf{Z}. \tag{9.1}$$

In this equation, we have two necessary conditions (**X** and **Z**) that are jointly sufficient for **Y**. We can refer to this basic structure as characterized by AND.

The second logical structure is equifinality. In contrast to equation (9.1), there are no necessary conditions in this structure. Instead, there are multiple paths by which Y can occur:

$$\mathbf{Y} = \mathbf{X} + \mathbf{Z}. \tag{9.2}$$

Equation (9.2) provides this structure where the plus sign designates the logical OR, such that **X** *or* **Z** is sufficient for **Y**. Hence, equifinality is a logical structure characterized by OR.

These two types are not the only options for representing causal structures at the basic level. For example, one could have a basic-level theory that simply focused on individually necessary causes. Likewise, one could easily formulate more complex hybrid structures such as

$$\mathbf{Y} = \mathbf{U} * \mathbf{X} + \mathbf{U} * \mathbf{Z}. \tag{9.3}$$

In equation (9.3), we have both a necessary condition (i.e., **U**) and equifinality [i.e., (**U** AND **X**) OR (**U** AND **Z**)]. For the purposes of this chapter, we will focus our discussion of the basic level on the two canonical causal structures of equifinality and a conjuncture of necessary causes.

Secondary Level

Variables at the secondary level are less central to the core argument and refer to concepts that are less easily remembered and processed. Nevertheless, these variables play a key theoretical role. For example, in theories about democracy, factors such as free elections, civil liberties, and broad suffrage often play a major role, even though they are still secondary compared to the basic-level concept of democracy itself.

As discussed in detail in chapter 2, three relationships can exist between the secondary level and the basic level: causal, ontological, and substitutability. It bears emphasis that none of these relationships is simply one in which the secondary-level variables serve as indicators or measures of the basic-level variables. The role of the secondary-level variables is *not* to operationalize the basic-level variables. Rather, in a two-level theory, the secondary-level variables *always have a causal relationship to the main outcome variable*. Two-level theories are complex precisely because the nature through which secondary-level variables affect the main outcome variable varies depending on how these variables relate to the causal variables at the basic level.

First, there may be a *causal relationship* between secondary-level variables and basic-level variables; in this case, secondary-level variables represent "causes of causes." With a causal relationship between levels, the secondary-level variables affect the main outcome variable by helping to bring into being more temporally proximate causal variables at the basic level. Hence, when a causal relationship exists between levels, one can usefully speak about more remote causes (i.e., secondary-level causes) and more proximate causes (i.e., basic-level causes).

Second, an *ontological relationship* can exist between levels. In this case, the secondary-level variables represent the defining features that constitute the basic-level variables; the secondary-level variables literally *are* the elements that compose the basic-level variables.[1] For example, free elections, civil liberties, and broad suffrage are the ontological secondary-level variables that constitute the basic-level

[1] Hall (2003) defines ontology as fundamental assumptions about the nature of causal relationships in the world. By contrast, our understanding of ontology focuses on the way in which secondary-level factors constitute basic-level variables. This constitutive relationship can be modeled with different theoretical or mathematical structures (e.g., equifinality, a conjuncture of necessary conditions), but in each case the assumption is that the secondary-level variables do not cause basic-level causal variables; rather, they describe the ontology or essential make-up of the basic-level causes. Our view of ontology is like Hall's in that we stress that the secondary-level constitutive factors have causal relationships with basic-level outcome variables. A description of the causal mechanisms will almost always invoke secondary-level variables. Our understanding of an ontological relationship is similar to what Wendt (1999) calls constitutive explanation, though we prefer to reserve the label "explanation" for causal relationships. We agree with Wendt that the secondary-level constitutive elements are parts of causal explanations.

variable of democracy. We use the word "ontological" to describe this relationship because it stresses that the issue concerns the essential character, structure, and underlying parts of the phenomenon to which the basic-level concept refers. The secondary-level variables play a key causal role in explaining why the basic-level causal variables have the effects they do. For example, the institutional theory of the democratic peace invokes elections as a key part of the explanation for why democracies do not fight wars with each other. In this theory, the ontological secondary-level variable of elections (which in part defines the basic-level concept of democracy) has a causal impact on the main outcome variable of war.

The logical structure of an ontological relationship can take different forms. Traditionally, most scholars have defined concepts in terms of necessary and sufficient conditions. For example, the classical approach to concepts built around a taxonomical hierarchy, as exemplified by Sartori (1970), treats defining attributes (secondary-level variables) as necessary and sufficient for membership in a concept. With the classical approach, the analyst uses AND to connect the secondary-level variables with the basic-level variable.

To connect the secondary-level variables with the basic-level variable in the family resemblance structure, the analyst uses OR. However, because the family resemblance structure may require that more than one secondary-level variable must be present for membership in the basic level, the strict application of OR will not always be adequate (i.e., the presence of a single secondary-level variable may *not* be sufficient for membership in the basic-level category). Instead, the structure can be better modeled by another version of OR that implements the rule that m of n characteristics must be present. Thus, when considering the ontological family resemblance structure, we propose to implement OR as follows:

$$\mathbf{X} = \min(\text{sum}(\text{X}_1, \text{X}_2, \ldots), 1). \tag{9.4}$$

Equation (9.4) is a fuzzy-set logic implementation of the family resemblance m-of-n rule.[2] When using this implementation, the values of the secondary-level variables are calibrated to reflect the number of attributes that must be present for a case to be a member of the

[2]In fuzzy-set logic there are various ways to implement OR; see Smithson 1987 for a discussion.

basic level. For example, if at least two of four possible attributes must be present to be a member, then the values of the secondary level variables should be set to a maximum of .50 (e.g., if the variable is coded dichotomously, its possible values are .00 and .50). Hence, if two secondary-level variables are present, the case would be a member of the family (i.e., the sum of .50 and .50 is 1.00). If only one secondary-level variable is present, the case would be excluded from full membership. We use the expression $\min(\text{sum } X_i, 1)$ to characterize this procedure for implementing OR.

Finally, we consider a *substitutable relationship* between the secondary and basic levels. In this case, the secondary-level variables are neither causes nor constitutive features of the basic-level causal variables. Rather, each secondary-level variable is a substitutable means to a given basic-level variable. At the basic level is a concept such as "labor incorporation" (Collier and Collier 1991). Substitutability at the secondary level is an analysis of the different ways that labor can be or has been incorporated in different countries. In some countries this incorporation occurred via political parties, while in others it has been done by the state. Cioffi-Revilla (1998) stresses that substitutability is related to redundancy in systems (e.g., Bendor 1985; Landau 1969). Systems are more stable if necessary components have backups and alternative sources. An example is U.S. nuclear deterrence via the triad of air-, land-, and submarine-based weapons. If any one or two legs of the system were to be taken out by attack, there is enough redundancy in the system to give the United States a second strike capability (Cioffi-Revilla 1998).

Two-level theories are thus distinctive and powerful precisely because secondary-level variables are systematically related to basic-level factors. The addition of the secondary-level variables not only adds complexity to the argument developed at the basic level, but also helps analysts empirically substantiate the argument at the basic level. To concretely test the claims at the basic level, analysts must draw on the information at the secondary level, which allows them to move down levels of analysis and examine factors that further elaborate the causal relationship. For example, the examination of an ontological relationship between levels allows the analyst to explore the specific defining properties of the basic-level concepts that actually affect the outcome of interest. In the case of an ontological relationship, the specific properties identified in the secondary level are "mechanisms" that explain why the basic-level variables have the effects they do.

Substitutability is usually pursued when the analyst needs to explore the different ways in which the basic-level process can be fulfilled. Here the basic level taps a factor which is common across cases (e.g., labor incorporation), while the secondary level permits differentiation among cases in the ways in which this can occur (e.g., state or party incorporation of labor). Finally, a causal relationship enables the researcher to deepen the analysis by adding an account of the more temporally removed processes that bring into being the proximate basic-level causes themselves. This approach is highly effective when the basic-level causes are very closely related to the main outcome of interest.

In this discussion, we have emphasized different ways in which secondary-level variables can relate to *causal* variables at the basic level. However, two-level theories that propose an ontological relationship may consider the linkage between secondary-level variables and the main *outcome* variable at the basic level. In doing so, the theory draws on the secondary level to explicate and conceptualize the basic-level outcome variable. When analysts define their outcome variable in terms of secondary-level variables, they are offering an ontological and conceptual account of how secondary-level variables relate to the basic-level outcome variable.

Not only do two-level theories provide a framework for future theorizing, we suggest that they are very useful in understanding existing theories. Many social theorists have implicitly thought in two-level terms. Much of the confusion around some theories, e.g., Skocpol (1979), arises from a failure to appropriately conceptualize levels and relationships between levels. In the next section, we provide some examples of what two-level theories look like in practice.

Substantive Examples of Two-Level Theories

In this section, we offer several different examples of two-level theories. Since the concept of a two-level theory is not prominent in the literature (though see Cioffi-Revilla 1998; Cioffi-Revilla and Starr 2003), we must interpret the degree to which the studies in question are two-level theories. In addition, we must uncover the specific two-level theoretical structures of the studies, since they are not explicitly developed. We have tried to focus on clear examples of two-level theories that exhibit some of the different possible theoretical structures. At the

same time, we wish to be clear that what follows are our *stylized reconstructions* of authors' works—reconstructions that inevitably simplify sophisticated arguments.

Skocpol's Theory of Social Revolution

We begin with Skocpol's *States and Social Revolutions*, which seeks to explain the onset of social revolution in France, Russia, and China through a comparison with several other cases that did not experience social revolution. Despite all the attention surrounding this work, most analysts have failed to recognize its two-level structure. In figure 9.1, we summarize that structure.

Basic level. At the basic level, *States and Social Revolutions* has the structure of a conjuncture of two necessary causes that are jointly sufficient for the outcome of social revolution. Skocpol summarizes these two basic-level causes as follows:

> I have argued that (1) state organizations susceptible to administrative and military collapse when subjected to intensified pressures from more developed countries from abroad, and (2) agrarian sociopolitical structures that facilitated widespread peasant revolts against landlords were, taken together, the sufficient distinctive causes of social-revolutionary situations commencing in France, 1789, Russia, 1917, and China, 1911. (1979, 154)

These two causes refer to conditions for state breakdown and conditions for peasant revolt, and they can be summarized simply as "state breakdown" and "peasant revolt." Because these variables are at the basic level, most (good) summaries of Skocpol's work have referred to them.

Skocpol is explicit that these two causes are jointly—not individually—sufficient for social revolutions. This is clear from her assertion that the two factors "were, taken together, the sufficient distinctive causes" and from her explicit remarks that state breakdowns would not have led to social revolutions without peasant revolts (1979, 112). Elsewhere she attempts to empirically demonstrate that neither condition is by itself enough to produce social revolutions by examining cases of non–social revolution in which only one of the two conditions was present.

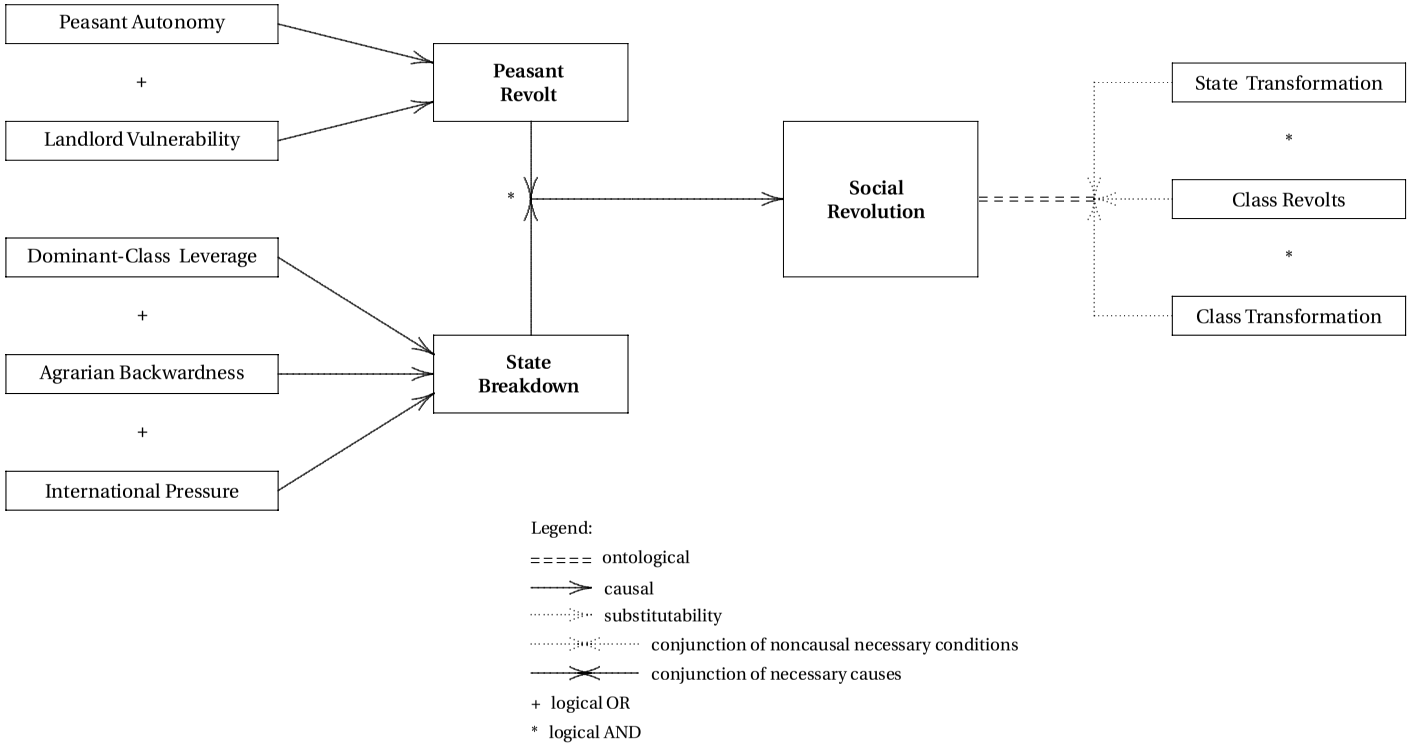

FIGURE 9.1
Two-level theories: *States and Social Revolutions*

It is harder to find explicit passages in *States and Social Revolutions* where Skocpol states that her key variables are *necessary* for social revolution. But there are passages that strongly hint at the necessary condition character of her two core variables. For example:

> Nevertheless, peasant revolts have been the crucial insurrectionary ingredient in virtually all actual (i.e., successful) social revolutions to date … Without peasant revolts urban radicalism in predominantly agrarian countries has not in the end been able to accomplish social-revolutionary transformations . . . they [English and German revolutions of 1848] failed as social revolutions in part for want of peasant insurrections against landed upper classes. (1979, 113)

In addition, Skocpol has been widely interpreted as identifying necessary causes (e.g., Kiser and Levi 1996, 189–90; Dion 2003) and her work is used by Ragin as a central example of necessary conditions: "Consider the argument that both 'state breakdown' and 'popular insurrection' are necessary conditions for 'social revolution' " (2000, 219).

The basic-level argument of *States and Social Revolutions* therefore has the formal structure of equation (9.1), which we call a conjuncture of necessary causes. Here we succinctly—and perhaps for the first time in print—state Skocpol's basic theory of social revolutions:

> State breakdown and peasant revolt are individually necessary and jointly sufficient for social revolution.

This proposition is bound by certain scope conditions, such as the presence of an agrarian-bureaucratic state that lacks a significant colonial history. Within the scope identified by Skocpol, however, state breakdown and peasant revolt represent a combination of individually necessary and jointly sufficient variables.

Secondary level. At the secondary level, Skocpol focuses on the different processes that can produce state breakdown and peasant revolt. In this sense, there is a *causal relationship* between secondary-level variables and basic-level causes. The logical structure of this causal relationship is one of equifinality—that is, the secondary-level variables are sufficient but not necessary for either state breakdown or peasant revolt. Formally, to characterize Skocpol's argument in this way, we use OR at the secondary level of the theory. Hence, whereas Skocpol's

theory is built around a causal conjuncture of necessary conditions at the basic level, it is characterized by equifinality at the secondary level.

With respect to explaining the basic-level cause of state breakdown, Skocpol focuses her analysis on three secondary-level causes: (1) *international pressure*, which causes crises for regime actors; (2) *dominant-class leverage* within the state, which prevents government leaders from implementing modernizing reforms; and (3) *agrarian backwardness*, which hinders national responses to political crises. With respect to peasant revolt, Skocpol focuses on two secondary-level variables: (1) *peasant autonomy and solidarity*, which facilitate spontaneous collective action by peasants; and (2) *landlord vulnerability*, which allows for class transformation in the countryside.

Skocpol's theory not only relates secondary-level variables to the causal variables of the basic level, but also directly relates secondary-level variables to the outcome variable of social revolution itself. Here, however, the relationship is ontological; we have a theoretical structure of what social revolution *is*—i.e., the defining features of the concept.

In classical fashion, Skocpol defines social revolution using a necessary and sufficient condition structure: "Social revolutions are rapid, basic transformations of a society's state and class structures; and they are accompanied and in part carried through by class-based revolts from below" (1979, 4–5). This definition holds that social revolutions are the combination of three components: (1) class-based revolts from below, (2) rapid and basic transformation of state structures, and (3) rapid and basic transformation of class structures.[3] Skocpol is explicit that if any one of these three attributes is missing, the case in question cannot be considered a social revolution. In this sense, each of the three attributes is *necessary* for social revolution. Skocpol also strongly implies that the simultaneous presence of the three components is *sufficient* for an event to be classified as a social revolution: any case that contains her three components is definitely a social revolution.

Given that Skocpol uses a necessary and sufficient approach to defining the outcome variable, it is appropriate to use AND in specifying the relationship between Skocpol's three definitional components and social revolution. When the two-level structure of the outcome

[3]The first component is actually somewhat problematic, given that it may be causally related to the other two, thereby raising questions of endogeneity.

variable is added to the two-level structure of the causal variables, the full argument depicted in figure 9.1 emerges.

We suggest that much of the debate around Skocpol can be traced to confusion about what variables belong to which levels and the structural relationships between levels. Not surprisingly, as we shall see below, this has important ramifications for theory testing.

Other Two-Level Theories

Skocpol is not alone in her use of a two-level theory; in fact, prominent analysts present theories that have the same basic structure of Skocpol's two-level theory (e.g., the exercises to this book provide many examples; see Exercises and Web Site at the end of this volume). However, other analysts have formulated two-level theories that vary from Skocpol's in at least two ways. First, whereas Skocpol primarily explores a causal relationship between levels, other scholars examine substitutability or ontological relationships. Second, whereas Skocpol's theory identifies a set of necessary conditions that are jointly sufficient at the basic level, other scholars examine equifinality at the basic level (i.e., individually sufficient causes).

Common pool resource institutions: Ostrom. An excellent example of a two-level theory that uses a *substitutable* relationship between the secondary and basic level is the work of Ostrom (1991). Ostrom identifies eight conditions[4] that are necessary for her key outcome of "institutional functioning." Of these eight conditions, monitoring and sanctions stand out. In fact, in her APSA presidential address, she selects them for special attention: "Most robust and long-lasting common-pool regimes involve clear mechanisms for monitoring rule conformance and graduated sanctions for enforcing compliance" (Ostrom 1998, 8). Thus, her argument emphasizes necessary conditions that form a conjuncture that is sufficient. In figure 9.2, we have represented this basic-level theory by focusing on how "monitoring" and "sanctions" are individually necessary and jointly sufficient for the outcome of institutional functioning (see Goertz 2003 for an elaboration of this model).

[4]These are (1) monitoring, (2) graduated sanctions, (3) clear boundaries and memberships, (4) congruent rules, (5) conflict resolution mechanisms, (6) recognized rights to organize, (7) nested units, and (8) collective-choice arenas (Ostrom 1991, 180).

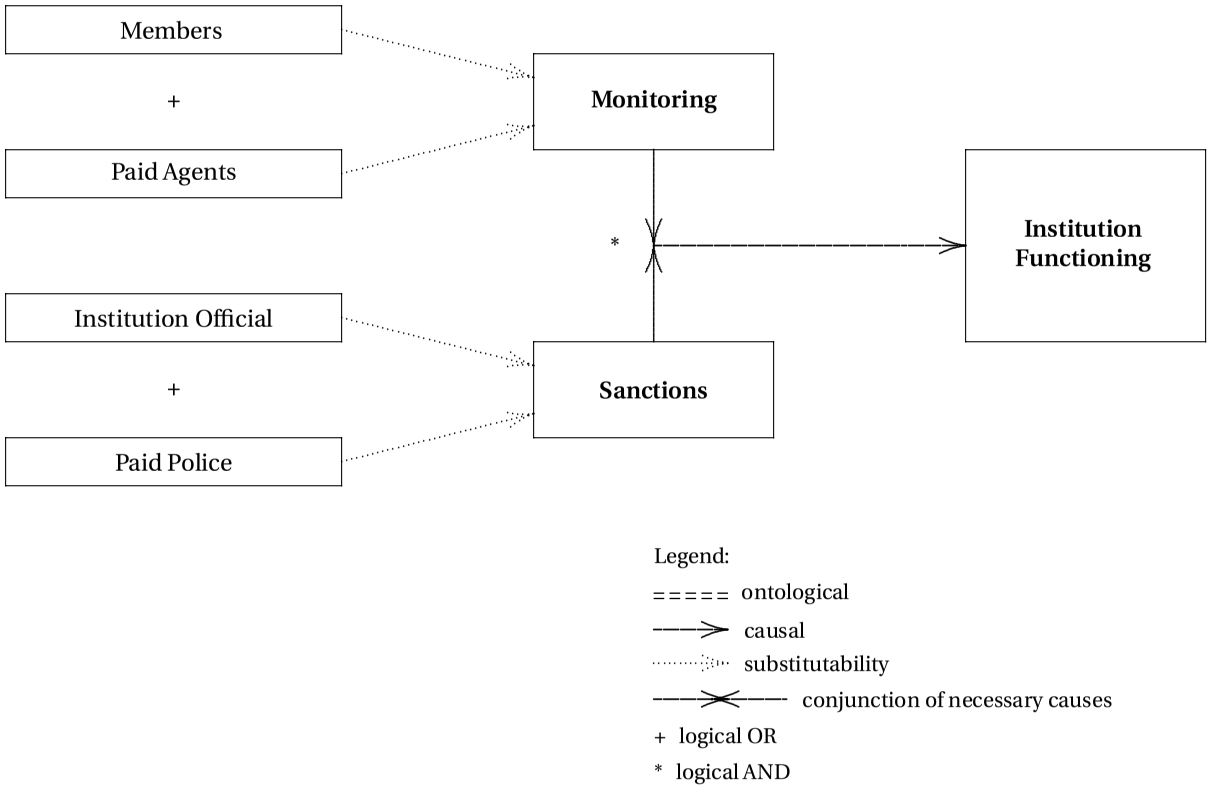

FIGURE 9.2
A two-level model of common pool resource institutions

At the secondary level, Ostrom identifies variables that are specific means of sanctioning and monitoring, thereby employing a substitutable relationship between levels. She describes two ways that monitoring can be accomplished, monitoring by an institutional member or monitoring by a paid agent. Clearly, these two types neither cause nor define the basic-level variable of monitoring. Analogously, the basic-level cause of sanctions can be arrived at in one of two ways, sanctions by institutional officials or sanctions by paid police. Again, the relationship here is one equifinality: institutional-official sanctions or paid-police sanctions are alternative paths to sanctions in general.

Here we see a typical example of how the basic level focuses on a factor, e.g., monitoring, common to all successful common pool resource institutions. The secondary level is then an analysis of how different societies with different resource technologies go about implementing a monitoring system. At the basic level the key fact is that someone monitors; the secondary level shows the substitutable ways in which this can occur in different cases. In other words, we have a situation of equifinality in which the secondary-level variables are sufficient for the basic-level variable, as represented by the OR in figure 9.2.

Cioffi-Revilla (1998) and Cioffi-Revilla and Starr (2003) provide a mathematical and probabilistic analysis of a model with the same structure as Ostrom's. Most and Starr introduced the influential notion of foreign policy substitutability [Most and Starr 1984; see also the special issue of the *Journal of Conflict Resolution* 2002 39(1)]. They are also well known for the idea that opportunity and willingness are individually necessary and jointly sufficient for foreign policy action. If one puts opportunity and willingness at the basic level and foreign policy substitutability at the secondary level, one arrives at the model in figure 9.2. Cioffi-Revilla and Starr (2003) formally model this in ways that make clear the tight link with our analysis of two-level models and they do so in a completely probabilistic fashion.

Beyond the Cioffi-Revilla and Starr example, we believe that two-level theories which propose substitutable relationships are reasonably common, particularly in the comparative-historical literature. The exercises that accompany this volume provide numerous other examples; see Exercises and Web Site.

Early modern democracy: Downing. Downing's (1992) *Military Revolution and Political Change* offers a two-level theory of the origins of

liberal democracy in early modern Europe (see figure 9.3). At the basic level, Downing identifies two main causes that are individually necessary and jointly sufficient for liberal democracy: (1) medieval constitutionalism—i.e., an institutional heritage that included representative assemblies and other constitutional features; and (2) the absence of military revolution—i.e., little or no domestic mobilization of resources for war-fighting purposes during the sixteenth and seventeenth centuries. In his words: "To put the argument in its barest form, medieval European states had numerous institutions, procedures, and arrangements that, if combined with light amounts of domestic mobilization of human and economic resources for war, provided the basis for democracy in ensuing centuries" (1992, 9).

In the two-level theory, the medieval constitutionalism variable is constituted by four secondary-level variables that literally are "medieval constitutionalism." Thus, according to Downing, medieval constitutionalism is "parliaments controlling taxation and matters of war and peace; local centers of power limiting the strength of the crown; the development of independent judiciaries and the rule of law; and certain basic freedoms and rights enjoyed by large numbers of the population" (1992, 10). As figure 9.3 shows, Downing uses the classical necessary and sufficient approach to concept membership when modeling medieval constitutionalism (as indicated by the AND in the figure). These ontological secondary-level variables enter into the causal analysis because they affect the possibility of democracy. For example, if a country lacks one or more of the defining attributes of medieval constitutionalism (e.g., independent judiciaries), then that country will also lack an essential prerequisite (i.e., necessary condition) for democracy. Hence, ontological secondary-level variables are causally related to the basic level outcome variable.

For the basic-level cause of "absence of military revolution," the relationship with the secondary level is one of equifinality. Four secondary-level variables are alternative causes of the absence of a military revolution. Thus, when faced with heavy warfare, a country can avoid a substantial mobilization of national resources for the military if one or more of the following causes are present: (a) a geography that provides a natural barrier to invading armies, (b) commercial wealth that allows the country to protect itself while mobilizing only a proportion of resources toward war, (c) foreign resource mobilization that takes place when war is conducted primarily outside a country's territory, and (d) alliances that reduce the extent of domestic resources that

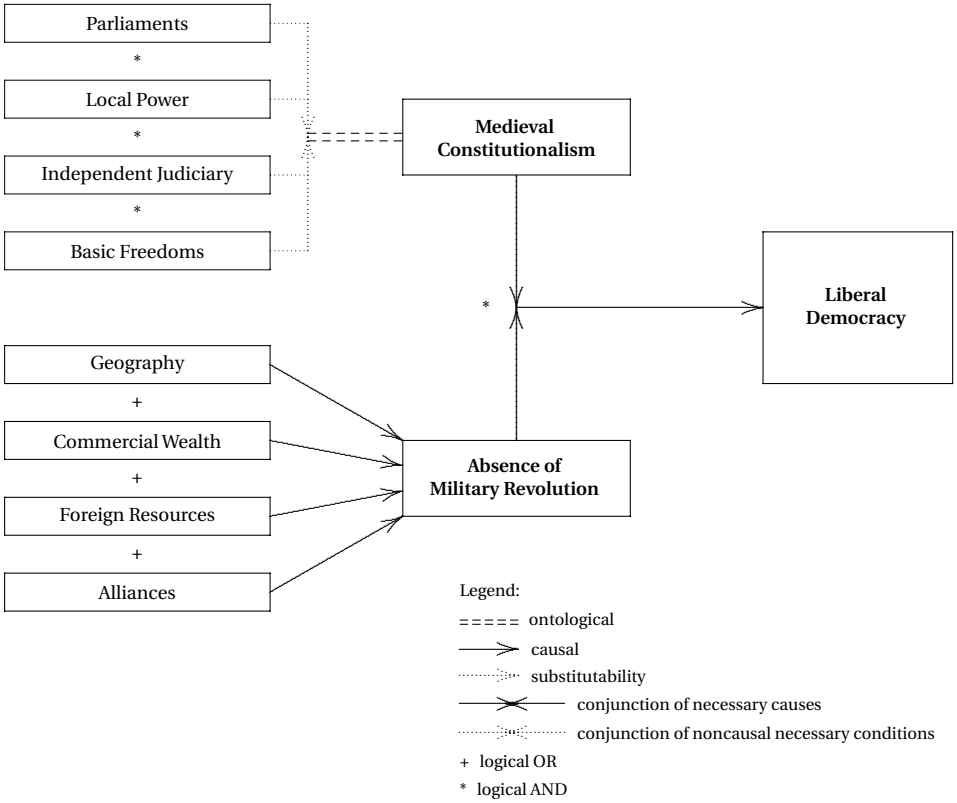

FIGURE 9.3
A two-level model of the early modern roots of liberal democracy

must be mobilized (1992, 78–79, 240). A key aspect of Downing's argument involves exploring the different ways that specific countries avoided a military revolution and stayed on a path leading to democracy.

Welfare state: Hicks, Misra, and Ng. Ragin's (1987; 2000) discussions of qualitative comparative analysis (QCA) and fuzzy-set (fs) analysis are centrally concerned with the following logical structure: substitutability at the basic level and necessary conditions at the secondary level. By contrast, the examples discussed so far tend to have the converse structure: a conjuncture of necessary conditions at the basic level and mostly equifinality at the secondary level. We do not believe that the logical model on which we have focused is more important

than the typical fsQCA one, but rather that it needs to be recognized as powerful and common in its own right. In this section, however, we consider the logical structure familiar from fsQCA analyses.

We examine the two-level theory developed in Hicks, Misra, and Nah Ng's (1995) QCA analysis (see figure 9.4). The outcome variable of this study is the creation of welfare states during the crucial period of social provision expansion in the 1920s. This outcome is conceptualized using the family resemblance approach to concepts. Thus, a country is coded as a "welfare state" if it adopts at least three of four classic welfare programs: (1) old age pensions, (2) health insurance, (3) workman's compensation, and (4) unemployment compensation. Here we have an equifinality relationship between secondary-level variables and the outcome variable: no single condition is necessary; there are multiple paths to the welfare state.

At the basic level, the structure of the causal theory is also one of equifinality. The main secondary-level variables are: working-class mobilization, patriarchal state, unitary democracy, catholic government, and liberal government. The QCA results yield a relatively parsimonious model that is consistent with previous theory yet enriches it in other ways. In the final model, there are respectively "three routes to the early consolidation of the welfare state ... (1) a 'Bismarckian' route, (2) a unitary-democratic 'Lib-Lab' [i.e., Liberal-Labor] route, and (3) a Catholic paternalistic unitary-democratic route" (1995, 344). The routes are represented by the following variable summaries: (1) WORK $*$ PATRIARCHY $*$ catholic $*$ unitary-democracy, (2) WORK $*$ UNITARY-DEMOCRACY $*$ catholic, and (3) WORK $*$ PATRIARCHY $*$ CATHOLIC $*$ UNITARY-DEMOCRACY $*$ liberal. In presenting these equations, we follow the standard QCA practice of designating variables that are present with capital letters and those that are absent with lower-case letters.

This QCA analysis thus arrives at substantively important findings. Working-class mobilization is a necessary but not sufficient condition for all causal paths to a welfare state. In the Bismarckian path, working-class mobilization combines with a patriarchal authoritarian regime to produce a welfare state. In the other two routes, welfare states emerge in democracies facing working-class mobilization, either under the support of Liberals or under the support of Catholics in a context of patriarchy. Though scholars have discussed the important role of Liberals in creating welfare states, Hicks and his collaborators suggest that the Catholic path to welfare consolidation was also critical.

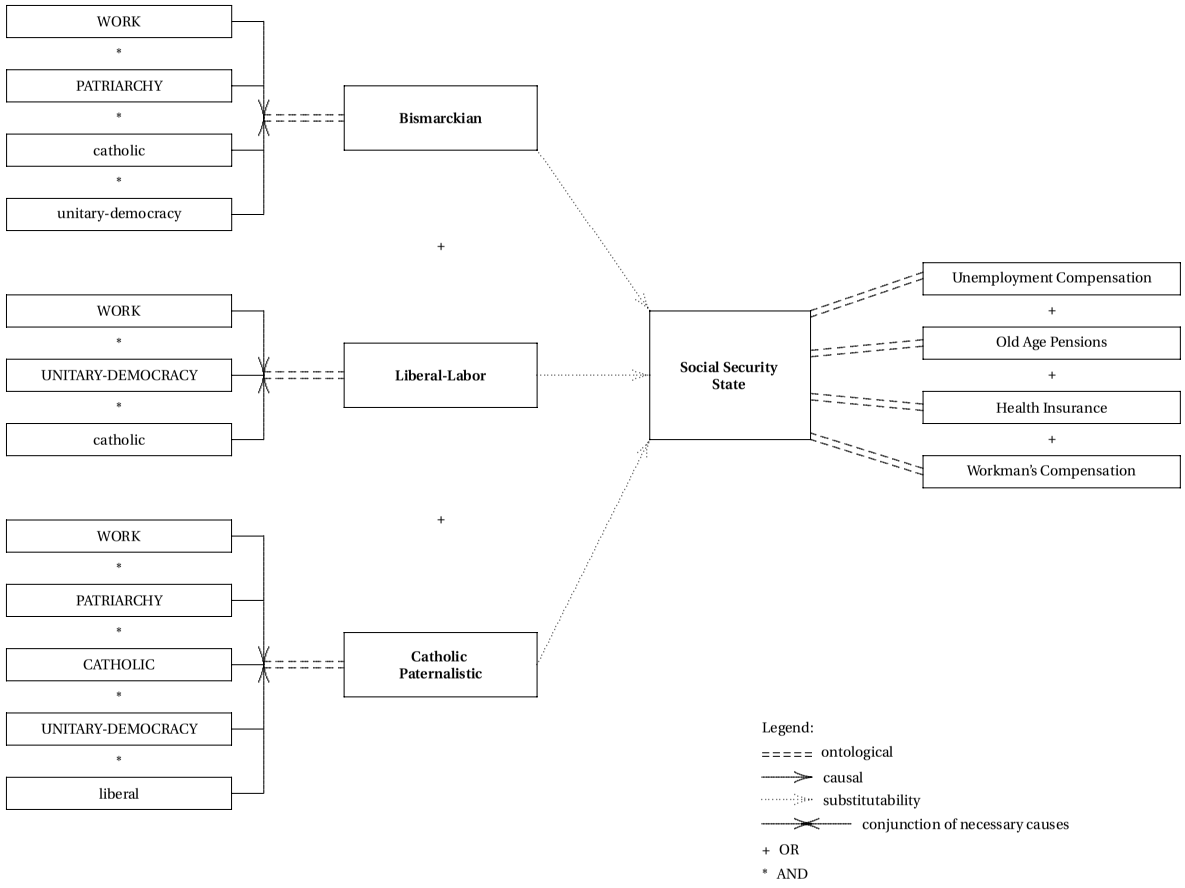

FIGURE 9.4
A two-level model of the development of the social security state

The Fuzzy-Set Methodology of Two-Level Theories

Given the complex relationships modeled in two-level theories, how can scholars test the propositions of these theories? In this section, we argue that fuzzy-set analysis is an extremely useful methodology for carrying out this task. The advantages of fuzzy-set analysis for testing two-level theories include enabling researchers to logically analyze necessary and sufficient causation and allowing these researchers to code qualitative variables in light of their specialized knowledge of particular cases.

The application of fuzzy-set analysis can be complicated, even for relatively straightforward causal propositions. When we move to two-level theories, the issues are especially challenging. Thus, rather than offer superficial tests of multiple two-level theories, we choose instead to provide a sustained consideration of one specific two-level theory: Skocpol's *States and Social Revolutions*. We focus on Skocpol's book because it is a well-known study that usefully highlights many of the challenges that arise in using fuzzy-set analysis to test two-level theories. Our goal is ultimately less to offer a definitive test of Skocpol's argument and more to examine the general methodological issues that it raises.

Before beginning, it is worth underlining again that many critics of Skocpol have not adequately understood key elements of her two-level theory. In some cases, the problem has been confusion about levels. For example, in a widely cited critique, Geddes (1990; also Geddes 2003) treats Skocpol's secondary-level variables as if they directly affect the outcome of social revolution itself. For example, she correlates international pressure (a secondary-level variable) directly with the outcome of social revolution. Yet, as we have stressed, one cannot understand the effects of Skocpol's secondary-level variables on social revolution without understanding the equifinality relationship between levels. A weak correlation between international pressure and social revolution is hardly evidence against Skocpol: international pressure does not matter for social revolution as long as there is another secondary-level variable (i.e., dominant class leverage or agrarian backwardness) to take its place. In a subsequent analysis, Geddes (2003, 114–16) treats international pressure as a necessary cause of social revolution. Again, however, our reading is that international pressure is one of several sufficient causes of the basic-level variable of state breakdown.

We also observe that many of Skocpol's critics have not correctly represented the causal structure of her theory at the basic level itself. Most commonly, analysts proceed as if Skocpol's theory were modeling correlational causes in which variables are related to one another in a linear pattern (see Goertz 2005 for a contrast of necessary condition models with linear ones). For example, Geddes (1990) frames her discussion of Skocpol in the context of selection bias as conventionally understood in statistical research. Yet, as Dion (2003) has pointed out, these issues of selection bias cannot be meaningfully extended to studies focused on necessary causes. In short, from the previous methodological literature discussing Skocpol's book, we can initially underline two important lessons: (1) confusing basic-level and secondary-level variables grossly distorts any subsequent test of a two-level theory and (2) confusing correlational relationships for those of necessary or sufficient causes grossly distorts any subsequent test of a two-level theory.

Coding the Variables

We begin our evaluation of Skocpol's work by considering how fuzzy sets might be used to code her outcome variable and causal variables at both the basic level and the secondary level.

Outcome variable. Earlier we discussed Skocpol's three-component definition of social revolution, noting that she treats each component as necessary and the combination of the three as sufficient for membership in the category social revolution. Although Skocpol often sees variables as either present or absent, her analysis makes it clear that many cases are neither fully "in" nor fully "out" of a given dimension. On this basis, it is possible to use fuzzy sets to code cases across the three secondary-level variables (see table 9.1).[5] To do this, we adopt a simple five-value coding scheme: .00, .25, .50, .75, 1.00. A more sophisticated approach to coding variables is not easily pursued given the inevitable qualitative distinctions developed in *States and Social Revolutions*.

At least two strategies can be used for aggregating the fuzzy-set scores from the secondary level into overall fuzzy-set scores of social

[5]We have gathered the key passages and evidence for these scores into an index that is available upon request.

TABLE 9.1
Fuzzy-Set Test of Skocpol's Theory: Outcome Variable

	Secondary Level			*Basic Level*	
Country	*Class Revolts*	*State Transform.*	*Class Transform.*	*Social Revolution Minimum*	*Social Revolution Min(sum X_i,1)*
France 1787–1800	1.00	1.00	1.00	1.00	1.00
Russia 1917–1921	1.00	1.00	1.00	1.00	1.00
China 1911–1949	1.00	1.00	1.00	1.00	1.00
England 1640–1689	.00	1.00	.25	.00	.42
Russia 1905–1907	1.00	.00	.00	.00	.33
Germany 1848–1850	.50	.00	.00	.00	.17
Prussia 1807–1814	.00	.25	.50	.00	.25
Japan 1868–1873	.00	1.00	.25	.00	.42

revolution. One possibility is to use the classical approach based on AND as we did above—i.e., social revolution is a product of class-based revolts *and* state transformations *and* class transformations. In fuzzy-set analysis, AND is calculated by taking the *minimum* membership score of each case in the sets that are intersected. Given that all the cases besides France, Russia 1917, and China have a score of .00 for at least one secondary-level component, these cases also receive a score of .00 for social revolution. By contrast, since France, Russia 1917, and China have a score of 1.00 for all secondary-level variables, they also receive a score of 1.00 for social revolution. This procedure of using the minimum leads to a dichotomous coding of social revolution (see table 9.1).

Second, an alternative aggregation procedure involves using the min(sum X_i,1), which as we noted above is appropriate for concepts built around the family resemblance structure. In the case of Skocpol, we implement this procedure by dividing all values for secondary-level

variables by 3 and then summing the three variables together to generate a total score for social revolution. For example, the score for Japan is calculated as follows: 0/3 + 1/3 + .25/3 = .42. Clearly, as table 9.1 shows, the use of the min(sum X_i,1) generates different values than the use of the minimum. In fact, no case has a score of 0.00 when the min(sum X_i,1) is used, since at least one secondary-level variable is partially present for every case.

Using the min(sum X_i,1) as an approach to creating scores for social revolution has two supporting arguments. First, although Skocpol generally characterizes social revolution in a manner consistent with the minimum, her argument also suggests that she uses a family resemblance framework for her three defining attributes. In particular, Skocpol explicitly notes that she selected only "negative" cases that were fairly close to becoming social revolutions, not cases that were maximally distant from the category social revolution. Thus, for example, her nonrevolution cases do not include any instances of political stability and few situations where change did not occur at all. Instead, they all resemble social revolutions to some degree, and they all can be meaningfully seen as overlapping with the category social revolution at least to some extent.

The second reason is that Skocpol's dichotomous coding can also be derived from the family resemblance structure that uses the min(sum X_i,1). Thus, table 9.1 shows that no case other than France, Russia 1917, and China receives a fuzzy-set score above .50. Hence, if these fuzzy-set scores were recoded dichotomously, one would still conclude that only these three countries experienced social revolutions.

Secondary-level causal variables. With regard to the causal variables, we begin with the secondary level, because these variables are causally prior to those at the basic level. Skocpol makes numerous observations about the degree to which each secondary-level cause is present. These observations provide a basis for coding the variables as fuzzy sets, a task which is carried out in table 9.2.[6]

Basic-level causes. In a two-level theory, the values for basic-level causes are derived directly from the values of the secondary-level

[6]The scores in this table reflect an ordinal coding of the cases that was independently carried out for a different purpose (Mahoney 1999).

TABLE 9.2
Fuzzy-Set Test of Skocpol's Theory: Secondary Level

	State Breakdown			*Peasant Revolt*	
Country	*Internal Pressure*	*Class Leverage*	*Agrarian Backward*	*Peasant Autonomy*	*Landlord Vulnerable*
France 1787–1800	.50	.75	1.00	.75	1.00
Russia 1917–1921	1.00	.25	.50	1.00	1.00
China 1911–1949	.75	.75	1.00	.00	.75
England 1640–1689	.50	1.00	.25	.00	.00
Russia 1905–1907	.50	.25	.50	1.00	1.00
Germany 1848–1850	.25	.25	.25	.50	.00
Prussia 1807–1814	.75	.25	.25	.50	.00
Japan 1868–1873	.75	.00	.50	.00	.00

causes. Hence, the methodological task of scoring basic-level causes is straightforward once the secondary-level variables are coded and the structural relationship is identified. In Skocpol's theory, each secondary-level causal variable is individually sufficient for a particular basic-level cause. Thus, we can use OR to determine values for basic-level causes. In fuzzy-set analysis, the use of OR requires taking the *maximum* score of the secondary-level variables. For example, France's scores for the secondary-level variables that cause state breakdown are .50, 1.00, and .75, and thus the case receives a score of 1.00 for state breakdown, since this is the highest score among the intersecting sets. We use this same procedure to arrive at all the scores for state breakdown and peasant revolt in table 9.3.

TABLE 9.3
Fuzzy-Set Test of Skocpol's Theory: Basic Level

Country	*State Breakdown*	*Peasant Revolt*	*State Breakdown∗ Peasant Revolt*	*Social Revolution Minimum*	*Social Revolution Min(sum X_i,1)*
France 1787–1800	1.00	1.00	1.00	1.00	1.00
Russia 1917–1921	1.00	1.00	1.00	1.00	1.00
China 1911–1949	1.00	.75	.75	1.00	1.00
England 1640–1689	1.00	.00	.00	.00	.42
Russia 1905–1907	.50	1.00	.50	.00	.33
Germany 1848–1850	.25	.50	.25	.00	.17
Prussia 1807–1814	.75	.50	.50	.00	.25
Japan 1868–1873	.75	.00	.00	.00	.42

Testing Two-Level Theory with Fuzzy-Set Analysis

This section reanalyses of Skocpol's theory using fuzzy-set methods. Though we are focusing here only on Skocpol's argument, many other two-level arguments with alternative causal structures can also be evaluated with fuzzy-set methods.

Testing joint sufficiency. We begin by testing Skocpol's argument that state breakdown and peasant revolt are jointly sufficient for social revolution. The column for "state breakdown∗peasant revolt" in table 9.3 gives the fuzzy-set values for this causal combination. The table also includes columns with the two different scorings for the outcome variable depending on whether the minimum or the min(sum X_i,1) is used. We first offer our best attempt to be faithful to the structure

of Skocpol's argument, which entails using the minimum for the outcome.[7] Likewise, since we cannot assume that Skocpol thinks of her variables in terms of continuous fuzzy-set scores, we begin by looking at results for dichotomous codes. This can easily be done in table 9.3 by converting all values of .50 or less to .00, and all values of greater than .50 to 1.00.

In dichotomous terms, Skocpol's theory does quite well with respect to the proposition that state breakdown and peasant revolt are jointly sufficient for social revolution. It predicts accurately all the positive cases of social revolution: France, Russia 1917, and China. That is, all three of these cases have a dichotomous 1.00 in the column for "state breakdown∗peasant revolt" and a dichotomous 1.00 for social revolution. For the negative cases, the theory also correctly predicts a .00 (absence of social revolution) for England, Russia 1905, Germany, Prussia, and Japan. These results give us some confidence that our codes of the data are a reasonable approximation of Skocpol's work and that we have correctly represented the structure of her theory.

When dichotomous codes are used, counting hits and misses is fairly straightforward. Once we move to fuzzy-set scores, however, it becomes more difficult to evaluate success and failure. The use of continuous fuzzy-set scores increases the probability that small coding errors will lead one or more cases to violate sufficiency or necessity. Since we have a complex model and only approximate codings for the secondary-level variables, it is quite likely that our test will produce one or more false negatives. Hence, we will consider a case to be consistent with causal sufficiency (or necessity) if its fuzzy-set value on the cause (or outcome) exceeds its score on the outcome (or cause) by no more than one fuzzy membership unit, which in our coding scheme means a difference of no more than .25 (Ragin 2000). For example, we consider the value for Germany of .25 for the joint combination of state breakdown and peasant revolt to be close enough to the outcome value of .00 to be considered a success.

When the minimum is used to construct the outcome variable, the predictions of Skocpol's theory (as reconstructed by us) suggest that we should see higher levels of social revolution in two cases, Russia 1905 and Prussia (i.e., both cases have a fuzzy-set value of .50 for the causal

[7] Strictly speaking, for the dichotomous test, either the minimum or the min(sum X_i, 1) could be used for the outcome variable, since, as pointed out above, both procedures lead to a dichotomous coding in which only France, Russia 1917, and China are social revolutions.

combination but a value of .00 for social revolution). With Russia, Skocpol argues that the Revolution of 1905 was nearly a full-blown social revolution, and only the abrupt end of international pressures allowed the country to temporarily avoid this fate (1979, 95). Given that this country did experience a social revolution about a decade later, the low value on the outcome for Russia 1905 can perhaps be understood as an early measurement of a variable whose value was soon to increase. As for Prussia, its low value on the outcome reflects the fact that class-based revolts were not an important component of the reforms of 1807–14, leading the case to be coded as zero for social revolution. Again, though, this low value was a temporary situation. By the time of the German reform movement in 1848, the value for the class revolts dimension of social revolution was .50. Hence, Prussia is not successful in the test because Junker landlords were able to keep class-based revolts in check to a surprising degree, though they were not able to sustain this control and the country would soon more closely approximate a social revolution.

While not a miss by our standards, the China case merits discussion. The predicted value is .75 or lower while the outcome is 1.00. A value less than 1.00 is predicted on the outcome because China receives only .75 on the basic-level cause of peasant revolt. Other analysts have previously raised concerns about Skocpol's treatment of peasant revolt in China, suggesting that it is not fully consistent with her theory (e.g., Taylor 1989; Selbin 1993). For her part, Skocpol argues that the Chinese Communist Party created a high level of peasant autonomy and solidarity once the revolution was under way. If these organizational activities are taken into consideration, the Chinese case might be seen as having a 1.00 for the peasant revolt variable.

Looking at the min(sum X_i,1) for social revolution provides an instructive contrast to Skocpol's use of the minimum. The practical effect of using the min(sum X_i,1) is to increase the value of the cases that have a zero with the minimum. Hence, the min(sum X_i,1) makes it easier to find causal sufficiency, since the value of the outcome variable may be increased (but never decreased) compared to the minimum. For example, both Russia 1905 and Prussia are within the neighborhood of causal sufficiency when the min(sum X_i,1) is used for the outcome variable. Russia 1905 has a value of .50 for the combination of state breakdown and peasant revolt, which is only slightly above its score of .33 for the outcome using the min(sum X_i,1). Hence, if

the min(sum X_i,1) is used for the outcome variable, an even stronger case can be made that state breakdown and peasant revolt are jointly sufficient.

Testing causal necessity. The previous discussion offered a test of Skocpol's theory about joint sufficiency for the basic-level variables. Here we explore the other central claim of her main theory: state breakdown and peasant revolt are individually necessary for social revolution.

For the state breakdown variable, the data support the argument about causal necessity. All eight cases have scores on the state breakdown variable that are greater than or equal to their scores on the outcome within one fuzzy-set unit (i.e., within .25). We find this for both versions of the social revolution variable. This support for causal necessity is not unrelated to the way in which the basic-level causes were constructed from the secondary level. In particular, the maximum was the mode of creating the basic level, which gives the highest possible value for the basic-level variables. This mode of moving across levels makes it easier to support claims of causal necessity, since it produces higher values on the basic-level causes.

The necessity of peasant revolts depends heavily on how the outcome variable is coded. When the minimum is used, necessity is achieved for the non–social revolution cases because they all have a value of zero on the outcome. Hence it is easy to have a larger or equal value on the peasant revolt causal variable!

Once we move to the min(sum X_i,1) for the outcome variable, however, Japan and England are no longer consistent with the argument about causal necessity. This lack of empirical support is driven by the complete absence of peasant revolts combined with a reasonably high fuzzy-set score for social revolution (i.e., .42). We would suggest that Skocpol's selection procedure might have led her to this kind of contradictory case. Skocpol may have selected England and Japan precisely because peasant revolts were totally absent even though the cases resembled social revolutions in certain important respects. This kind of selection procedure in which a case is chosen because it has a very low value on a causal variable but a reasonably high value on the outcome variable is almost certain to violate causal necessity. Again, though, we emphasize that Skocpol most likely prefers to think about the outcome variable in terms of the minimum, not the

min(sum X_i,1), and her cases are consistent when that approach is used.

Our analysis provides substantial support for Skocpol's theory, though it also raises some lingering questions about specific cases. Above all, the example shows how challenging it is to confirm a two-level theory that proposes, at the basic level, a set of variables that are individually necessary and jointly sufficient. This is true because an aggregation procedure for moving from secondary-level variables to basic-level causes that makes it more likely to find necessity for individual variables simultaneously makes it more difficult to find sufficiency for a combination of these variables. For example, the maximum will produce high values for the basic-level causes, which in turn will make it easier to find causal necessity when these variables are tested with fuzzy-set methods. At the same time, however, the use of the maximum for constructing basic-level causes will make it more challenging to support claims that these variables are jointly sufficient, since this mode will inflate the value of the causal combination. Concerning the outcome variable, the minimum makes it easier to find causal necessity and more difficult to find causal sufficiency when compared to the min(sum X_i,1).

Our empirical analysis of Skocpol's theory suggests that it is not clear how one might go about testing her explanation with statistical methods (e.g., Geddes 2003). It is a complex, multilevel model constructed using necessary and sufficient conditions, along with equifinality at the secondary level. As Pierson says in the context of the welfare state literature: "Different welfare state configurations are the products of complex conjunctural causation, with multiple factors working together over extended periods of time to generate dramatically different outcomes. There is no theoretical justification for arguing that a 10 percent shift in the value on one variable or another will have a simple direct effect on outcomes" (2000, 809–10). Braumoeller (2003) is a rare example of an attempt to model theories formulated in terms of AND and OR in a way that is faithful to the theory and estimatible using statistical techniques. As our various examples have illustrated, qualitative, comparative theories often are complex and multilevel. Much more needs to be done to understand what are the appropriate empirical (statistical, fuzzy set, or whatever) methods for evaluating such theories.

Two-Level Theories and the Interpretation of fsQCA

The Skocpol example illustrates how important the mode of aggregating secondary-level variables to the basic level can be for testing theoretical claims. The results of the fuzzy-set test depended in part on her use of the maximum for creating the basic-level causes. In this section, we briefly discuss alternative options for aggregating to the basic level. In addition, we assess the benefits of reinterpreting fsQCA results presented at a single level in terms of two levels.

QCA and fuzzy-set analyses generate single-level models where there are multiple paths to the outcome variable. However, conceptualizing these models in terms of two levels can make the interpretation of the results more coherent both formally and theoretically.

A not uncommon situation is when the final results of the fsQCA analysis look like:

$$Y = (A * B * C) + (A * B * D). \tag{9.5}$$

Often it makes much theoretical and empirical sense to think of C and D as substitutes for each other. Accordingly, one arrives at a two-level model such as

$$Y = A * B * \mathbf{E}, \tag{9.6}$$

$$\mathbf{E} = C + D. \tag{9.7}$$

To reconceptualize QCA results in this fashion, the analyst must identify the concept **E** for which C and D can substitute. Typically, this will involve moving up the ladder of abstraction to a more general concept. For example, Amenta and Poulsen (1996) show that there are two necessary conditions for New Deal policies such as OAA pensions, voting rights, and absence of patronage politics. To achieve sufficiency, some mechanism for positively pushing reform through government must be present. This can happen in substitutable ways, e.g., "administrative powers" or "democratic or third parties" (see also Amenta et al. 1992). These substitutable means are like variables C and D, while the general idea of a mechanism for achieving reform is like variable **E**.

The key point is that often we can reinterpret QCA or fuzzy-set analyses in terms of two-level theories, particularly using the substitutability

relationship. This is another reason why two-level theories provide a rich set of methodological tools: they can help make sense of the results of single-level models by reinterpreting them as two-level models.

In this chapter, we have given some examples of prominent works that implicitly use two-level models. While we do not pretend to know all works that use two-level models (at least to a significant degree), other works that use this framework include Blake and Adolino (2001), Ertman (1997), Goertz (2003), Jacoby (2000), Kingdon (1984), Linz and Stepan (1996), Marks (1986), Weede (1976), and Wickham-Crowley (1991), see the exercises (described in the appendix to this volume) for more examples. In particular, we have found the literature on states, public policy, and social movements/revolution to be rich in applications of two-level ideas. One of the goals of this chapter is to make explicit explanatory theories that a number of researchers have intuitively found useful. Instead of reinventing two-level models each time, we hope that an explicit awareness of their structure and properties will help increase the theoretical and methodological rigor of future work.

Conclusion

J. S. Mill was absolutely correct to start his discussion of scientific inference and logic with an analysis of names, definitions, and concepts. Over the decades courses on research design and methodology have lost that focus. The various chapters of this volume have stressed the central importance of concepts in theories, case selection, and causal explanation. Much remains to be done to flesh out the characteristics of three-level concepts and how they fit into theories. For example, I have only outlined the prototypical necessary and sufficient condition and family resemblance structures. Clearly, hybrid structures could be built and other modeling techniques chosen (instead of fuzzy logic and set theory). I hope the analysis of concepts such as democracy, welfare state, interstate crisis, corporatism, and social revolution helps students and scholars alike recognize various concept structures in the work they read and helps them produce better and more valid concepts. Without valid concepts, our theories have little value.