

COMPARATIVE ORGANIZATIONAL ANALYSIS ACROSS MULTIPLE LEVELS:

A SET-THEORETIC APPROACH

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As social structures, organizations are inherently multilevel, and levels issues pervade organizational analysis. The comparative study of organizations therefore implies comparisons both across units and levels of analysis. Yet, the field of comparative study has mostly developed independently from theories focusing on understanding organizational phenomena at multiple levels (e.g. Rousseau, 1985). To some extent, this separation reflects methodological differences; many comparative studies have followed a case-study approach, while studies focusing on multiple level theories have largely followed a variable-based approach. However, the separation comes with considerable costs. In particular, the lack of a clear framework for understanding cross-level configurations presents a challenge for a comparative approach that aims to understand differences in observations of a given phenomenon across two or more levels.

In this chapter, we aim to offer such a framework for multilevel comparisons by drawing on the Comparative Method and Qualitative Comparative Analysis (QCA) as developed by Ragin (1987; 2000; 2008). Our goal is to offer a fresh approach to multiple level research by setting out a methodological agenda that allows the construction of truly comparative multiple level theories of organization; that is, of theories that conceptualize cases as configurations across levels. In doing so, we depart from a number of common assumptions about multilevel research, such as the notion that all levels have to be perfectly nested within higher levels and that it is useful to isolate level-effects by “controlling” for them before one is able to understand how cross-level effects emerge. Instead, we argue that the comparative study of organizations would benefit from a move to a configurational understanding of multilevel effects and a focus on multiple, conjunctural causality in order to account for the embedded nature of level effects. Specifically, we argue that conceptualizing levels as sets and using set-theoretic methods such

as QCA to examine how effects combine across levels allows for a more sophisticated comparative analysis. As such, QCA provides a superior approach to conducting configurational analysis and can place comparative organizational research on a stronger footing for dealing with multilevel effects.

To make our case, we first review differences in multiple level theories and the comparative study of organizational phenomena. After considering the nature of each approach, we turn to how we may move forward by bringing both approaches together in a comparative multilevel approach. To accomplish this, we argue that set-theoretic methods such as QCA allow us a better understanding of the mechanisms that connect such cross-level phenomena. We conclude by discussing the prospects for cross-level comparisons in comparative organizational analysis and suggest several ways in which the comparative approach to organizations can move forward to have a greater impact on organization studies.

MULTILEVEL VERSUS COMPARATIVE RESEARCH ON ORGANIZATIONS

The contrast of multilevel and comparative research may seem counterintuitive at first. After all, one might argue that comparative research on organizations by necessity spans several levels of analysis (Rokkan, 1966). Yet, multilevel and comparative research on organizations present rather distinct traditions in organization studies, each with its own epistemological assumptions and associated methods. Accordingly, an approach that aims to incorporate both multilevel and comparative ideas needs to start with taking inventory of these prior literatures in order to situate itself. In the following, we thus turn to the literatures on multilevel and comparative research as different traditions with surprisingly little overlap.

The Multilevel Study of Organizations

Whenever we define a level of analysis, we suggest that within this level the units of analysis are sufficiently homogeneous to justify treating them as of the same kind (Klein et al., 1994). For instance, considering organizations within an industry to be at the same level of analysis suggests that these organizations share certain features that, within limits, make them particular to that level and distinguishable from entities and processes at different levels, such as markets or individuals. Of course, this does not mean that entities at the same level are fully identical. Organizations can be large versus small or centralized versus decentralized, but such within-group heterogeneity usually does not justify classifying them as belonging to different levels of analysis, that is, to different levels of generalization or abstraction.

To understand multilevel theorizing, Rousseau (1985) set out an influential typology of multiple level organizational theoretical projects. Specifically, Rousseau defined three types of multiple level theories: composition, cross-level and multilevel. Composition theories are essentially conceptual theories of aggregation from one level to the next and ask how, or if, concepts located at level 1 relate to the same concept at level 2 and level 3. Such theories are frequently related to the “should I aggregate at all” problem. A typical example of this kind of research is work on team leadership style and commitment, which aims to understand and conceptualize commitment at the group level as emerging from shared norms and perceptions at the individual level.

In contrast, cross-level theories aim to test whether a variable at level 3 or 2 affects behavior at the lower level 1. For instance, such research has examined whether firm performance can be influenced by constraints arising at different levels of analysis (e.g.

Stimpert & Duhaime, 1997). Perhaps the most obvious example of this is that business unit effects tend to be embedded in corporate level effects that can both sustain and constrain business level effects (Dess et al., 1995).

Finally, multilevel theories are those that aim to explain whether a theoretical relationship of $A \rightarrow B$ holds at multiple levels of the organization. The classic example here is whether threat-rigidity effects can be observed for individuals, groups, and for entire organizations (e.g. Staw, Sandelands, & Dutton, 1981). More recently, Chen, Bliese, and Mathieu (2005) have extended this idea by offering a conceptual framework of cross-level generalization, suggesting that multilevel theories range from metaphorical and analogical reasoning across levels to true-multilevel theories that imply identical variable relationships across levels.

Much of the research that explicitly examines such aggregation, cross-level, and multilevel effects has been based on methodological individualism – namely psychology, economics, and rational choice sociology – because this approach fits well with the assumptions of most multilevel methods about the independent and additive nature of variables.¹ As a consequence, the development of multiple level theory to date has to a large extent been a refinement of methods for more accurately disentangling the independent effects of variables across levels. This has not only enhanced analysis techniques for existing models but has also facilitated a theoretical focus on emergence; that is, a focus on how phenomena are created by the

¹ This is not to say that multilevel research has been exclusively conducted based on methodological individualism; as noted earlier, most research on organizations is at least implicitly multilevel given the multilevel nature of its phenomenon. However, while these studies implicitly invoke cross-level mechanisms, those that explicitly do so have been largely based on methodological individualism.

interactions of lower-level entities, resulting in higher-level, collective outcomes (Kozlowski and Klein, 2000). This approach is most useful if one wants to examine relationships between different levels across presumably homogenous samples of organizations such that the effect of a single variable can be usefully separated out in such a manner. However, as Kozlowski and Klein (2000) point out, multilevel phenomena are both bottom-up and top-down, and multilevel methods need to account for both emergence and embedding effects.

The search for independent, additive effects of variables comes with an implicit conceptual assumption about the nested nature of levels; namely, if the independent effects of variables are to be separated, the researcher must also separate the effects of levels. This is not to say that levels are the methodological or theoretical equal of variables, but only that without clean separation of the effects of levels it is not possible to separate equally clean independent effects of the variables under study. Consequently, levels are conceived as nested in some way – rather than wholly interdependent – so that the independent effects of variables at each level can be separated before turning to examining cross-level interactions. As we will discuss later, this assumption appears problematic from a comparative point of view that emphasizes complex, conjunctural causal relations. To shift our focus, we will suggest that causes and levels need not be assumed to be independent, but rather may be fully interactive and reciprocally embedded. However, different methods are needed to study levels in a more contextualized, non-emergent, and interdependent way.

The Comparative Study of Organizations

While most multilevel theory of organizations has emerged from a micro-perspective on organizational behavior (e.g. Kozlowski and Klein, 2000), the comparative analysis of organizations has its roots in the field of sociology and, to a lesser extent, business administration and management. For our current purposes, it is useful to distinguish between two types of comparative approaches to organizations. The first one relates to the small-N, case-oriented analysis based on in-depth knowledge of specific organizations and contexts, with a particular focus on international comparisons. For instance, in *Work and Authority in Industry*, Bendix (1956) uses four cases and two sets of comparisons—England vs. Czarist Russia and the US vs. East Germany—to examine the relationship between authority relations, institutional settings, and ideological interpretations, and the comparisons are not only synchronic across nations but also diachronic across periods. Similarly, Dore's (1973) important work *British Factory—Japanese Factory* compared four factories—two in England and two in Japan—to understand and explain key differences between British and Japanese firms. Similarly, Burawoy (1985) studied factory regimes in the United States and Hungary to compare production politics in mature capitalism and “actually existing” state socialism, while Sabel (1982) compared the emergence of the mass production system in Great Britain and the United States of the 18th and 19th century. More recently, Guillén (1994; 2001) has employed international comparisons of three to four countries to argue from a comparative perspective regarding issues such as the development of managerial ideologies and the convergence of patterns of organizing due to globalization.

The logic of this comparative approach is perhaps best exemplified by Eisenhardt's (1989) exploration of how case studies can be used to build theory. As a research strategy, the case study frequently examines multilevel phenomena. For instance, Crozier (1964) drew connections between the nature of the bureaucratic control system and the larger cultural environment. His study attends to the larger culture surrounding a French administrative agency and uses comparative methods in contrasting the French case with Russian and American bureaucratic systems. In this regard, it resembles the attempts of comparative sociologists to understand large-scale, multilevel processes such as the emergence of authoritarianism (Moore 1966) and the causes of major social revolutions (Skocpol, 1979).

However, the case study approach in comparative research has also been criticized by sociologists aiming to develop general principles for the comparative method. In this regard, Smelser argued that "the general aim of comparative analysis—as of scientific analysis in general—is to generate logically rigorous causal explanations or regularities and variations in empirical phenomena"(1976: 174) and suggested that such regularities and variations can best be captured using statistical analysis of variables rather than case studies, which he argued are very limited and "among the most fragile of the comparative methods"(199) due to their lack of variation in possible causes and effects. Taking a slightly different approach, Walton (1973) argued for standardized case comparisons, which uses standardized data collection procedures and archival data to examine multiple cases while assuring comparability across them. However, while the case study allows for the detailed, ideographic analysis of specific conditions, it was less appropriate for the nomothetic approaches to comparative analysis that subsequently came to dominate organizational sociology.

The second comparative approach to organizations relates to the comparative paradigm that emerged in sociology more broadly in the 1960s and includes the work of scholars such as Blau (1965), Etzioni (1961), Heydebrand (1973), and Perrow (1967). Methodologically, the sociology of organizations shifted from the case study method to the comparative approach, usually involving statistical analyses of organization and the analysis of organizations per se rather than the analysis of the people in these organizations (Azumi & Hull, 1982). Here, the notion of comparative analysis is used to refer to “quantitative comparisons that make it possible to determine relationships between attributes of organizations, for example, what other differences are generally associated with variations in an organization’s size, or the degree of its bureaucratization, or its functions” (Blau, 1965: 323). The goal of this research program was thus at least two-fold, including a mapping of the varieties of organizations as well as the detection of law-like generalizations of relationships between organizational characteristics across a wide variety of institutional contexts (Lammers, 1978).

The initial comparative studies in this research stream were primarily concerned with understanding variation in the internal structures of organizations, and “comparative” in this sense refers to comparing different organizations, but usually within the same society. Examples here include Heydebrand’s (1973) *Comparative Organizations*, which focused on understanding the predictors of structural features of organizations, such as size, dependence, and technology. The logical extension of these studies was to move from intra-societal to cross-societal studies of organization, thus moving the approach to the international field that is nowadays more commonly associated with the term comparative analysis. The bold hypothesis of the Aston program was that relationships regarding the structural characteristics of work organizations

would be stable across societies, leading to the “culture-free” hypothesis (e.g. Hickson et al., 1974). This second type of comparative analysis is much closer to classic variance-based multilevel research program because it focused on co-variation across a set of variables. However, it has also been challenged for not developing a systematic approach to comparing similarities and differences across contexts (e.g. Ragin, 1982) and in addition faces issues relating to the comparability of units and measures across contexts (e.g. Armer, 1973; Smelser, 1976).

Both comparative approaches to organization studies have overlapped little with traditional multiple level research, albeit for different reasons. Regarding the first, case-oriented approach, case studies are based on configurational assumptions. Accordingly, unique, independent effects and methodological individualism in general contrast with the assumptions of interactivity and holism at the epistemological and ontological base of comparative research. As a result, comparative case study researchers have so far shown little interest in the types of theoretical projects defined by Rousseau (1985). Conversely, their concern for holistic analysis has largely isolated comparative case-based researchers from the multiple level research arena because the latter has been defined in a way relevant mostly to variable-based, not case-based research. Yet, the case-based, holistic approach used by comparative research also faces its own liabilities in examining multiple level phenomena. Specifically, most comparative studies lack a clear theory of how multiple levels affect causal arguments. Furthermore, the majority of comparative studies do not select their cases specifically with levels of analysis in mind, resulting in research designs that do not include enough levels to be theoretically satisfying.

For the second, variable-based approach, the methodological overlap with classic multilevel research is much more obvious since both approaches share largely the same epistemological assumptions. Yet, while this approach—at least in principle—should be able to incorporate levels-issues, its focus on variable-based analysis has meant that it remains without a rigorous method for configurational comparing, a key notion of truly comparative analysis.

All these issues have limited the feasibility of both case-based and variable based approaches to result in comparative multilevel research. In the following, we aim to offer a different approach that explicitly incorporates causal mechanisms located at different levels while providing a systematic approach for comparing organizations that acknowledges the complexity of comparisons across multiple levels of analysis.

RETHINKING COMPARATIVE MULTILEVEL RESEARCH

The major obstacle in using variable-based methods when doing comparative research across organizations is that variable-based methods are designed to be comparative across *levels*, not organizations. To clarify this point, we briefly discuss the two major variables-based approaches to multilevel research. These two approaches may be classified as *variance decomposition* methods (e.g. the classic components-of-variance research such as that of McGahan & Porter, 1997) and *variance disaggregation* methods (that is, methods aiming to disaggregate the variance of a dependent variable explained by independent variables, including Hierarchical Linear Modeling [HLM]).

Let us begin by considering variance decomposition methods. In the study of organizational performance, an important debate relates to understanding the relative

importance of industry, corporate, and firm effects (e.g. Rumelt, 1991). Clearly, firm performance is likely to be importantly determined by what is happening at the level of the firm or “business unit” itself, yet higher level effects stemming from a firm belonging to a larger corporation, and even higher level effects stemming from that corporation operating within a specific industry environment (which is largely identical for all other firms in that industry) are also likely to matter.

The usual way that researchers have studied the “effect” of the industry level is by employing a series of variables measured at that level. This might be as simple as measuring membership of the firm in the industry using the industry’s standard industrial classification (SIC) code, or employing a number of industry dimensions such as industry turbulence or uncertainty. Furthermore, there are usually several variables measured at the corporate and firm levels, such as market share or market segment. The researcher’s task then becomes examining the explanatory power of each variable to understand what “level” (i.e. business unit, corporation, or industry) has the most influence. This approach effectively controls for the role of adjacent levels while allowing the researcher to focus on the variation explained by factors at a specific level. However, such an approach also neglects the issue of how levels *combine* to create outcomes; that is, how effects at one level necessarily depend on effects at other levels in order to produce outcomes. For instance, firm performance within an industry may crucially depend on resources made available by the corporate parent in a particular industry, yet the same resources might have no effect or a negative effect in a different industry (Greckhamer et al., 2008). The problems of variance decomposition methods in accounting for interactions or covariance effects between organizations and industries are considerable; essentially, these methods face

difficulties including a corporate—industry interaction term separate from the business effect in an ANOVA analysis (cf. Bowman & Helfat, 2001). However, such interactions are likely to be relevant and their omission is likely to result in an incomplete modeling of the overall effects. In sum, variance decomposition methods are a useful tool, but they face considerable challenges in their own right when examining cross-level interactions.

Alternatively, researchers may employ variance disaggregation approaches that include most multilevel analysis techniques such as HLM (e.g. Raudenbush & Bryk, 2002). These techniques similarly allow the researcher to understand the relative impact of levels in considerable detail by estimating intercepts and slopes across several analysis levels. However, while such methods have become increasingly powerful and easy to use in recent years, they are most useful for estimating cross-level interaction models. In such cross-level models, the researcher is interested in determining whether the *within* group relationship between the individual level predictor and outcome varies as a function of the *between* group predictors (e.g. Hofmann & Gavin, 1998). Such interactions can take essentially two forms. In the *meditational* form, group level variables affect individual behavior only indirectly through mediating mechanisms. Examples here include studies of organizational climate, where objective contextual factors such as the level of centralization influence individual outcomes only through the mediating variable of perceived autonomy. In the *moderational* form, the group level variable actually moderates the relationship between two individual-level measures, such as when the average salary of a school district might moderate the relationship between job satisfaction and turnover intentions (Hofmann & Griffin, 1992).

While such multilevel modeling approaches are considerably superior to the variance decomposition approaches discussed earlier and have begun to replace these decomposition approaches (e.g. Hough, 2006; Short et al., 2006), they still face statistical challenges when modeling cross-level interactions. For instance, HLM models do assume multivariate normality, but this assumption can be problematic in the presence of interactions (Hoffman, 1997). Furthermore, simulation studies suggest statistical power issues, and to have adequate power to detect cross-level interactions, a sample of 30 groups with 30 individuals may be necessary. Finally, while multilevel models such as HLM are in many ways highly effective, their focus on *correlational* relationships still presents a challenge for comparative analysis since it disaggregates cases into variables and aims to model the relationship between these variables using a net-effects approach rather than one that sees causal effects as truly contextual and conjunctural (Ragin, 2008).

There is, however, an alternative way to treat levels that views levels as interactive rather than independent constructs, and furthermore does so under the assumption of maximal heterogeneity in a population under study. This approach is set-theoretic in nature and based on Qualitative Comparative Analysis (QCA). In this approach, the effects of levels are presumed to vary based on the full complexity of interaction with other levels and features of a specific organization. Here, levels are best conceived as reciprocally embedded with organizations such that the effect of the level could be potentially unique within a single organization based on the dimensions of that embeddedness.

Let us consider an example to demonstrate the potential and possibilities of a comparative approach to studying multilevel effects using the illustrative example of the study Greckhamer

et al. (2008), who employ QCA in understanding the determinants of firm performance. For our purposes here, we focus on two levels that were considered in the study: the corporate level (defined by three factors of resource availability, capital intensity, and diversification) and the industry level (defined by four dimensions of munificence, dynamism, competitiveness, and sector).

In a variable-oriented approach, the goal would be to examine the independent effect of all seven factors at two different levels. In a case-based, comparative approach based on the assumption of heterogeneity and maximal diversity within the population, the researcher may believe that any of these dimensions on each level may have an entirely unique effect depending on all the other level dimensions. For example, the researcher might assume that the effect of industry sector could be qualitatively different for a corporation with high diversification and *high* capital intensity as opposed to a corporation with high diversification and *low* capital intensity—industry sector (industry level) and capital intensity (corporate level) thus may interact and may lead to quite different results depending on the assumed values. From this perspective, a level becomes another feature of an organization interacting with all other features, not a unit of analysis in its own (independent) right across organizations.

It might appear that a fully-interacted variable model could replicate this analysis, but it would be both methodologically prohibitive. The number of possible combinations of interactions is defined by 2^k combinations (e.g., 128 with seven dimensions for our example) that are not interpretable in a variable-based regression model. More importantly, however, is the theoretical assumption that enters when the researcher considers a seven-way interaction—it is the *de facto* acknowledgment of significant heterogeneity in the population and the recognition

that the independent effect of a particular level is of little empirical interest and meaning given this complexity of effects.

While the study by Greckhamer, et al. (2008) is an interesting example based on the firm as the unit of analysis, it generalizes to other populations. For instance, group performance may depend simultaneously on group composition (a group-level factor), firm climate (an organization-level factor), and individual leadership qualities (an individual-level factor), yet individual leadership may crucially depend on overall firm climate. In other words, multilevel effects are configurations across levels, making the attempt to “control” for other levels questionable.

Overcoming the Limitations of Variable-oriented Approaches

How, then, might we be able to engage in multilevel analysis of organizations that allows for a robust comparison of similarities and differences both within and across populations of organizations? Our starting point for reconsidering multilevel comparisons of organizational phenomena is the recognition that the comparative approach is by its very nature configurational (Ragin, 1987, 2000; Fiss, 2008). Conceptually, this approach differs from a variable-based understanding of levels of analysis by being based on the notion of the set. We start with a specialized, but configurationally appropriate definition of a level. In this definition, a level of analysis is an *aspect of set membership*. As such, a level of analysis is not a variable – that is, it is not a characteristic of location of some case of analysis or a feature of a case that needs to be controlled for in a specialized way. Instead, a level is a characteristic of abstraction in which a case (such as an organization) has a degree of membership. This qualitatively different, set-

membership based approach solves several problems and offers new opportunities that are especially relevant to multilevel comparative research. Specifically, by conceptualizing levels as aspects of set membership, our approach for analyzing levels effects is much less constrained by methodological assumptions that restrict current statistical models. The result is flexibility in the analysis that still allows the researcher to understand the aggregation and embeddedness relationships that levels research is concerned with.

To illustrate our arguments, Table 1 provides an overview of the main differences between multiple level theories and the comparative, set-theoretic approach to organizations. The table contrasts research goals, methodology, conceptions and operationalization of levels, as well as methodological challenges of both approaches.

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While the following discussion will elaborate a number of issues listed here, we want to draw attention to the key issue of how levels are conceptualized in both approaches. Specifically, we want to suggest that the configurational approach of set membership provides the opportunity for a process of successive theoretical refinement of levels being considered in a comparative approach. Levels issues are first and foremost a theoretical issue; how levels should be defined is primarily a theoretical concern (Klein et al., 1994). Levels are theoretical constructs for the simple fact that they don't empirically exist – they are projections of the researcher or other observer. Not even the projections of organizational members through labels and organizational charts are definitive about a set of levels; there may be levels that would usually not be

acknowledged as relevant by members of the organization but that are key levels for the researcher (e.g., friendship networks). Similarly, the researcher may ignore the labels that are in common use regarding levels. The level may be a symbol of little interest to the study at hand, or more likely, the hierarchical nature of many organizations is explicitly de-emphasized by the organizational members (think “flat organization”).

A fundamental issue of all comparative analysis is the step of “casing” (Ragin, 1994) – the dynamic setting of boundaries of a populations based on sufficient homogeneity to justify comparisons between them. In the case of multilevel research, the problem of “casing” the population becomes qualitatively more difficult. The most obvious way this happens is that the dimensions of similarity between cases are expanded by the number of levels—the meaning of “corporate,” “department,” or “team” has to be sufficiently similar in content and form across organizations to allow meaningful comparisons, an issue that is enhanced when the research is comparative across national and cultural contexts. In comparative, multilevel research, comparability thus has to be assured regarding both context and level.

Yet, too often levels of analysis are accepted and taken for granted rather than examined, questioned, and perhaps adjusted in response to the research question. For instance, a researcher might find after a series of interviews that the notion of “department” really only holds in some organizations and has no meaningful pendant in the rest of the organizations of the population of interest. In a variable-based approach, this situation is more problematic since the levels and data here are mutually constituted and levels are largely treated like any other characteristic intrinsic to the members of the population. Consequently, there is little opportunity within a single theoretical model and analysis to refine and adjust levels issues, only to replace or drop the

problematic levels. With new data collected on levels, or existing levels data dropped from the equation, the entire model is changed in all of its estimates of relations to retained variables.

The rigidity of specifying levels takes on special importance in variable-based approaches because the multilevel statistical tools used for partitioning of variance across levels tend to be sensitive to changes in levels. Particularly within the variance-decomposition approaches, levels take the form of a supra-variable that affects the estimates for every other variable in the model (e.g. Rumelt, 1991; McGahan and Porter, 1997). Other variables can be removed without necessarily affecting the convergence and partitioning of variance across levels, but the number of levels always affects the estimates because they are estimates only relative to each other, not solely to an underlying assumption of an objective distribution of the variable. Consequently, there exists not only sensitivity to changes in levels, but the number of levels affects the models as well. A three level model is likely to converge, but a seven level model is usually not likely to do so unless there is a very large population that is well-distributed across those levels.

In contrast, treating levels as dimensions of a property space in which cases have varying degrees of membership allows for a refinement of adding or subtracting levels from the analysis that is no different than removing or adding any other dimension of interest. The removal of a level will affect the total theorized variation including an entire group of interaction terms by removing possible interactions with that level. As such, dropping a level does affect the property space within which the configurational analysis is conducted. However, dropping the level is much less problematic in a set-theoretic, configurational analysis because it is a theoretical frame projected onto the population by the theorist to capture variation assumed to be important. Accordingly, the researcher can easily change the dimensions of analysis because those

dimensions do not define the scope of the population under study but rather locate it within a multi-dimensional theoretical space for analysis. This ability to adjust the analysis makes the case-oriented approach suggested here different from the typical variable-oriented approach and allows for an intensive, detailed analysis that can be adjusted during the course of the research project (Stouffer, 1941).

This notion of configurations as theoretical frames of interpretation to examine populations under study can also be used recursively to adjust the populations under study itself. In this regard, the comparative approach can also use multilevel analysis as a way to be more explicit in the “casing” (Ragin, 1994) of its cases – that is, setting the boundaries dynamically through the analysis process of the case to be compared. Although most case analyses share this dynamic interplay between phenomenon and theory, the reduction or expansion of the analytical focus is particularly appropriately handled by a configurational approach when focusing on levels because it does not presume what is or is not a level worthy of analysis. For variable-centered approaches, the issue of what is a level is usually settled during the collection of the data – it is not level of analysis so much as level of data collection that determines the levels involved. While theoretically there is no reason why a variable-oriented researcher might not collect data according to any given theoretically meaningful conception of levels, in practice such research tends to take *de facto* groupings as “levels.” The configurational approach, however, sensitizes the researcher to the fact that one need not presume that a level is defined by measurement of the data because levels are part of a whole and as such are not defined by the data or measurement because their effect is not presumed to be limited to a level – it is interactive with other levels.

Inclusiveness and relationship between superordinate and subordinate levels

A separate analytic issue when doing multilevel comparative analysis of organizations is the question of how to handle variation in set membership in lower levels relative to set membership in higher levels. As shown in Table 1, in variable-based approaches, higher level phenomena are defined by lower level phenomena, or to put it another way, lower-level entities create higher-level entities through processes of emergence and aggregation while higher-level entities affect lower-level processes through moderation and mediation. Regardless of whether the processes are bottom-up or top-down, lower levels are completely nested within higher levels. For example, a collection of individuals may form a group, a collection of groups may form a department, a collection of departments may form an organization, and so forth. This situation is depicted in Figure 1a, which shows a set of levels, each of which is contained within a higher level. In the iterative statistical approaches, complete nesting is assumed, so each individual is in a group, each group in a department, each department within an organization, and so forth. Cases in the population that are not fully nested across all levels of analysis are quite problematic here and would usually have to be discarded because they do not contribute variance across all levels and thus do not fulfill the requirements of the typical statistical techniques used to apportion variance .

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While statistical models may require complete nesting, the assumption that lower levels wholly comprise higher levels is problematic both conceptually and empirically when studying

multiple levels of organizations. The reason for this is that boundaries are frequently quite permeable, particularly at lower levels. Studying organizations as a full case can be very deceptive on this point since organizations form a special class of social structures that are usually assumed to have particularly well-defined boundaries, making them especially convenient and manageable as units of analysis and thus suitable for comparative analysis (cf. Heydebrandt, 1973). It is frequently obvious whether an individual is a member of a firm, for example, and one may determine this by looking at personnel files or where that person usually reports for work. Yet, even though organizations are fairly useful entities in this regard, they are in fact more problematic in their boundaries than is commonly acknowledged (e.g. Ashkenas et al, 1995). For instance, an individual may not be a member of every entity across all levels of analysis for at least two reasons.

The first reason is that frequently not all lower level groupings have full membership in higher level groupings. This situation is depicted in Figure 1b, which shows a number of only partially overlapping sets. If we assume a simple case of four levels in an organization – individual, group, function, and organization – then in any given firm there may frequently be a considerable number of individuals that do not belong to any group, such as certain staff members or some executives that essentially work alone. There may also be groups that do not participate in any function, such as a task force working on a goal outside of any particular function. Similarly, a work group could comprise the entire function; this might be the case if the function is quite small, as is often the case with the legal staff for an organization.

The situation becomes even more complicated if the entities examined are inherently less clearly bounded, such as a social network that cut across the organization, or when groups are

only informally defined and shift frequently. At this time, the usual methods employed to understand the contribution of each level to the outcome in question are often no longer adequate since they do depend on each case having full membership in each level of analysis. Note that with the emergence of team-based and other, temporary forms of organizing, this problem is going to become ever more prevalent as we shift away from traditional forms of organizing.

The second issue regarding level membership is that lower-level entities such as groups or networks may in fact cross higher-level boundaries, or even those of the organization itself. For instance, some work groups may extend beyond the organizational boundaries and these “unwrapped groups” (Lacey and Gruenfeld, 2000) are subject to different influences than those groups fully wrapped within the organization. Examples of such groups include consultants or “in-house” members of service providers that are legally and socially not treated as members of the organization and because of their specialized expertise do not fit well within any function in the firm. However, they are nevertheless frequently members of work groups and play an important role in their success while simultaneously being members of yet a different organization. Likewise, teams that draw on members from a variety of levels within the organization may be rather difficult to categorize. With the increasing role of networks for organizations, seems evident that there is considerable complexity in defining organizations in terms of clear set-subset relationships where the highest level set fully contains all lower-level sets.

For a variable-based approach, the kind of situation depicted in Figure 1b is quite problematic because the lack of information at some levels makes it difficult to estimate independent effects of each level simultaneously. A configurational approach, in contrast, has

no such limitation because configurations of set membership – not levels – are the unit of analysis. Set membership, even within a group of sets with a hierarchical relationship, have no necessary relationship between them. In this sense, sets are not the “building blocks” of larger levels—there is no necessary aggregation relationship between sets and levels. There is also no necessity of membership in all sets of each level. For instance, an individual might have full membership in the organization, partial membership in the workgroup, and essentially no membership in any intermediate aggregations without creating methodological problems; the configurational approach using sets and set membership would automatically have configurations in the analysis that represent all possible combinations of set membership including membership scores of zero.

A final reason why a set-membership approach to levels will frequently be advantageous is that the existence of various levels will likely vary across firms. Not all firms, for instance, may have a functional level as part of their organizational structure. Should such cases be dropped from the analysis? The answer is likely no, yet such cases are not easily accommodated within the classic variance partitioning framework. As noted above, scale issues are furthermore likely to complicate the situation, as a smaller organization may have too few functions to split them into work groups. In a variable oriented approach, this heterogeneity prevents analysis. However, for a configurational, comparative approach such variation across organizations is again an easy matter because it would be captured and analyzed as part of variation that is potentially of considerable theoretical significance.

All of these examples show that current comparative multilevel analysis of organizations is limited by methodological barriers. However, once we understand levels as aspects of sets,

we can avoid problems stemming from the need to have a clear one-to-one correspondence of cases across all levels of analysis. At the same time, treating levels as aspects of sets also raises the bar for the analysis of interactions between levels, calling for a method that allows for levels to be fully interactive with each other. We now turn to the question of how this can be accomplished.

Fully Interactive Modeling

One of the key advantages that comparative, configurational approaches hold over variable-based approaches is the inherent creation of fully interactive models where all dimensions interact with all other dimensions – an impossibility in variable based approaches (Ragin, 1987, 2000). The gains for causal analysis are considerable, since most social phenomena are caused through multiple, conjunctural causes rather than independent main effects of a single variable (Ragin, 1987). If multiple, conjunctural causality is the rule, then it would behoove our methods to accommodate it. While the advantages of a fully interacted model of causality have been discussed in other contexts (e.g. Ragin, 2000; Greckhamer et al., 2008), there are particular advantages for an analysis of multiple levels across organizations that bear mentioning here.

First, a configurational methodology such as QCA can be used to examine the n-dimensional property space of organizational attributes across levels. In this regard, the analysis is essentially descriptive and the goal is to allow a classification of organizations along a set of dimensions that are defined by either theoretical relevance or empirical instances. However, configurational analysis has an advantage over variable-centered approaches in its ability to study the range of empirically observable variation relative to the range of all possible theoretical

variation (Ragin, 2000). That is to say, the analysis can examine the patterns of the configurations that are possible to conceive theoretically but have no organizations that fit that configuration. For the multilevel comparative study, the important effect of limited variation is in the very distribution and effects of levels as units rather than solely individual sets. Levels in organizations are unlikely to be distributed evenly and consistently, but instead are more likely to be “lumpy.” Simply detailing empirically the actual use of levels provides theoretical insight into the structuring of organizations that studying the effects of levels does not. An example here is again the work by Greckhamer et al. (2008), who find very limited diversity in how cases cluster across the dimensions of industry, corporate, and business attributes but greater diversity in manufacturing and lesser diversity in the mining sectors. Another example would be studying the phenomenon of “flat” organizations. What flat means depends greatly on what one means by levels and how those levels are defined and the effects of those levels. An examination of both the existent and non-existent configurations would provide a more effective and clear understanding of these organizational changes than a simple, and potentially misleading, counting of the formal layers of hierarchy within the organization. In sum, QCA thus allows the researcher to map the diversity of a property space, thus allowing insight in its structure and a comparative understanding of organizational diversity.

Second, QCA can be used to conduct context-sensitive analyses. The presence of complex causal relations that cross levels points to the importance of understanding multilevel phenomena. Usually, these phenomena are embedded in each other and therefore can only be truly understood in relation to each other. The point here is that it is not enough to merely *control* for the effect of a different level in estimating a causal relationship. Accordingly,

understanding levels as sets contrasts with variable-based, net-effects thinking, which aims to understand the unique contribution of each level while holding the effect of other levels constant (Ragin, 2008; Ragin and Fiss, 2008). Consider, for instance, prior work that aims to understand the relationship between human resource practices, employee outcomes, and firm financial performance (e.g. Huselid, 1995). It would seem likely that the effectiveness of various human resource practices is going to be highly context and industry dependent, making universal models of how practices affect organization-level outcomes weak in explanatory power. Instead, a helpful analysis would causally explain the diverse conditions under which these links actually do hold (Ostroff & Bowen, 2000). The interactions become even more extensive when the focus is on interactions between levels such that each additional level increases the number of interactions possible. It would thus appear that the complexity of variability inherent to multilevel models of any sort requires the complexity-capturing possibilities of the comparative method and configurational analysis.

CONCLUDING THOUGHTS AND A LOOK AHEAD

Almost 40 years ago, John Porter remarked that “it is surprising, for all that has been said about the value of comparison, that a rigorous comparative methodology has not emerged. The reason for this lack may be the great difficulties that a rigorous comparative methodology would impose” (1970: 144). The purpose of this paper has been to examine the possibilities provided by set-theoretic methods when an additional layer of complexity is added to cross-organizational comparative research: multiple levels. Our argument here has been that set-theoretic methods are both a solution and an opportunity. They are a solution to the qualitatively more difficult issues

faced by variable-based methods when confronted by multilevel analysis. This is not surprising given that standard linear methods have difficulties to handle greater levels of complexity; a three way interaction is nearly impossible to interpret, much less higher order relationships. The addition of multilevel theories in a comparative setting turns even fairly simple comparisons between organizations into highly complex analyses that involve three way interaction of organization by level by other characteristics. This is of course a completely plausible and worthwhile increase in theoretical complexity, but it is frequently too much for standard variable-based methodologies. While we have seen considerable advances in developing multilevel models (e.g. Kozlowski and Klein, 2000), these models nevertheless tend to make a considerable amount of simplifying assumptions that sufficiently reduce this complexity to estimate the models. Instead, it would seem that a different approach is needed that allows to adequately model this complexity stemming from interactions within and across multiple levels of analysis.

As we have argued here, set-theoretic methods bring particular and useful possibilities to the multilevel comparative studies. Set-theoretic methods such as QCA are quite capable of handling the increased complexity of multilevel analysis by incorporating it as a series of set memberships within the standard configurational approach. Yet, they also go beyond this by allowing us to ask different questions, such as: what is the empirical pattern of levels observable across organizations in relation to all the possible combinations we can envision? How do multiple levels interacting with each other have causal relationships among each other, resulting in differing outcomes? How can we understand what combinations of organizational attributes across levels lead to an outcome in different environments? These questions are easier to address

in the set-theoretic models because these models were designed specifically for the analysis of maximal complexity.

By offering a way of handling complexity, comparative approaches based on set-theoretic methods such as QCA formalize the comparative analysis that was inherent in the classic comparative case study approach of Bendix, Dore, and other sociologists. By drawing on Mill's (1967) logic of the methods of difference and the method of agreement, QCA provides a rigorous approach for making comparisons and testing theories across organizations. In addition, QCA pays special attention to causality, and in particular to the notions of necessary and sufficient conditions to bring about an outcome of interest while focusing on complex, conjunctural causal processes. We believe that these features will make set-theoretic an increasingly attractive alternative to standard statistical methods, particularly in a rapidly changing, non-linear world. Because they lack a comparative focus—that is, a focus on understanding similarities and differences and mapping them in a multi-dimensional property space—linear methods will remain a problematic choice when it comes to the task of comparing across levels, particularly as our organizational world continues to grow in size, levels, and complexity. In this regard, comparative research is perhaps best characterized as offering middle-range theories of causal mechanisms. By focusing on configurations, it moves us down from grand theories with high generalizability of effects but up from idiosyncratic case study accounts with low generalizability.

This is not to say that set-theoretic methods are a panacea for the comparative researcher. As every method, they come with their own unique challenges. For instance, set-theoretic methods such as QCA were initially conceived as an intermediate path between two well-

developed worlds, those of qualitative and quantitative research (Ragin, 2000; 2008). As such, comparative methods aim to fill the gap between the worlds of in-depth case analysis that focuses on one or a few cases, and extensive, variable-based analyses of large-n populations. In particular, QCA was developed as a tool for the systematic analysis of small-n populations too large for case studies and too small for linear statistics. For some arenas of study such as cross-national comparative work, QCA was the only applicable method because the entire set of comparable nations was rarely more than a few dozen. In other contexts, however, QCA has only recently made inroads between two well-developed analytic approaches central to entire fields of organizational study (e.g. Greckhamer et al., 2008; Fiss, 2007). However, it is important to note that, as the method continues to evolve, greater standardization of its application will be needed. In particular, as QCA moves from small-N to large-N applications, the question of how to select appropriate models that balance the need for parsimony with the need for accurate representation will have to be more fully resolved. In addition, we believe it would be useful to develop standard methods for conducting robustness checks regarding the calibration of a case's membership in a set and for selecting causal conditions, an issue that is of particular relevance because of the fully interactive nature of set-theoretic models where an additional causal condition exponentially increases the number of possible configurations and thus interactions.

Finally, there is a growing need to compare not only across populations and levels but also across time, and thus a need for QCA to be able to dynamically model causal processes that mature and evolve. It would seem to us that this could be accomplished either by modeling membership in a temporal dimension or by dynamically linking a series of causal models, much

like network analyses have recently proceeded. However, the details of such an approach will require a considerable amount of additional work and are beyond the scope of this chapter.

As set-theoretic methods evolve and QCA is applied more widely, we believe that we will continue to see researchers taking advantage of this method's ability to handle complexity that exists in all populations both large and small. Over the last several decades that are the lifespan of concerted efforts for developing organizational theory, the one constantly increasing aspect of research has been the increasing complexity of analyzing organizations as social systems. In many ways, this complexity can no longer be reduced by decomposition of component parts. Instead, what we are increasingly witnessing is a complexity that emerges from the interaction of systemic effects and the embeddedness of organizations in multiple layers of relationships. QCA seeks to capture this complexity of the configurations of organizational characteristics defined by all theoretically relevant dimensions. It is a method that has the granularity to present and reduce where possible the many layered, multi-dimensional landscape of organizations, and it offers a middle path between the intensive but limited reach of the case method and the extensive but cursory coverage of variable-based approaches.

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TABLE 1

COMPARISON OF ANALYTIC APPROACHES TO MULTILEVEL ANALYSIS

	Variable-based	Comparative
Research Goals	<ul style="list-style-type: none"> • Cross-level causal relationships • Multiple level theory validation • Conceptual development at higher levels of composition 	<ul style="list-style-type: none"> • Identifying relevant levels for understanding phenomena • Understanding causal processes across levels • Analyzing empirical case patterns of membership in sets of levels
Methodology	Linear and interactive	Configurational and comparative
Conception of level	Attribute of a construct, either theoretically informed or manifested	Theoretically-informed aspect of set memberships for analysis
Operational definition of level	Measurement of case characteristics	Selection of dimensions of configurations for study
Relationship between levels	<ul style="list-style-type: none"> • Upper level contains lower levels—i.e. lower levels are nested within upper levels • Moderation, mediation, and aggregation relationships between levels • Reciprocal, inclusive, one-to-many map between lower level units and higher level units • Must be separated methodologically 	<ul style="list-style-type: none"> • Upper levels can exist independently—no nesting assumed but possible • Interactive, conjunctural causal relationships within and across levels • Levels loosely linked as can be partial or missing set membership of cases • May be separated but need not be
Methodological challenges	Decomposition of variance Aggregation	Selection of cases Selection of levels
Analysis of levels independently	Focus	Yes, but limited
Vertical analysis of configuration	Yes, but limited (cross-level)	Focus

FIGURE 1

LEVELS IN MULTI-LEVEL ANALYSIS OF VARIANCE AND LEVELS AS SET MEMBERSHIP

Figure 1a
Analysis of variance

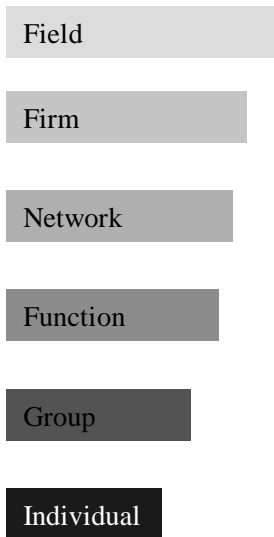
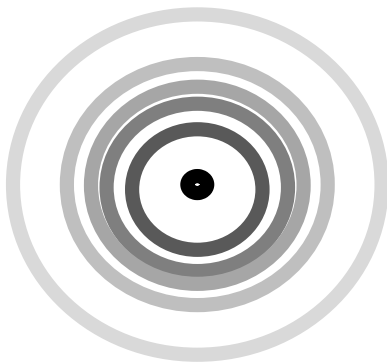


Figure 1b
Set membership

