

THE STRUCTURE AND FUNCTION OF COLLECTIVE CONSTRUCTS: IMPLICATIONS FOR MULTILEVEL RESEARCH AND THEORY DEVELOPMENT

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We address gaps in the multilevel organizational theory development literature by critically examining the structure and function of collective constructs. Structure emerges from interaction and can, over time, come to influence systems of interaction. Functions represent the causal outputs of constructs and provide a mechanism for integrating constructs across levels. We then discuss implications arising from this perspective and present a set of guidelines for multilevel research and theory development.

During the past ten years I have been pointing out the inadequacies which seem to me to arise from talk about "societal" entities, such as groups and institutions, as though they possessed human qualities, causal potency, or characteristics for objective, scientific study. These earlier efforts were not a questioning of whether collective entities exist, but only a plea that we discriminate carefully in the manner in which such concepts are used, that we inquire whether, on certain occasions, a different conception might not reveal truths which are fundamental (Allport, 1933: vii).

Floyd Allport's observation, written over 65 years ago, is still relevant for modern-day organizational scientists, because it highlights a number of issues about collective phenomena that have not been addressed fully. These issues involve such questions as the following: Is it justifiable to refer to collectives as if they possess characteristics that are inherently human? Do groups and other collective entities possess such things as "abilities," "personalities," or "memories" (LePine, Hollenbeck, Ilgen, & Hedlund, 1997; Tziner & Eden, 1985; Walsh & Ungson, 1991)? Are organizations able to learn, apart from the learning of individual organizational members (Argyris & Schön, 1978; Senge, 1990)? By ascribing individual attributes to collective entities, are we committing fallacies of reification and personification and, hence, proliferat-

ing terms that have little, if any, scientific value? Or is the use of these constructs (e.g., team ability) scientifically legitimate? If so, what is the fundamental nature of these constructs, and what implications does this have for multilevel theory development?

Addressing questions such as these has become increasingly important because of the recognition that integrating variables across multiple levels of analysis may provide a more veridical account of organizational phenomena (House, Rousseau, & Thomas-Hunt, 1995; Klein, Dansereau, & Hall, 1994; Roberts, Hulin, & Rousseau, 1978). Up to this point, however, researchers have tended to focus primarily on the measurement and analytic strategies used to investigate multilevel questions (e.g., Bryk & Raudenbush, 1992; Dansereau, Alutto, & Yammarino, 1984; Hofmann, 1997; James, 1982; James, Demaree, & Wolf, 1984, 1993; Kenny & La Voie, 1985; Kozlowski & Hattrup, 1992; Mossholder & Bedeian, 1983; Ostroff, 1993).

A smaller number of scholars have examined conceptual issues as they pertain to generating and testing multilevel theories. Roberts et al. (1978) were among the first to forward an explicitly multilevel conception of the organizational sciences by providing an interdisciplinary framework for studying phenomena at multiple levels and discussing the problems that may arise when aggregating and disaggregating data. Building upon this work, Rousseau (1985) developed a typology of mixed-level models. In

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this typology, composition models involved articulating the nature of a variable at multiple levels of analysis; cross-level models entailed describing relationships among independent and dependent variables at different levels of analysis; and multilevel models involved explicating the relationships among independent and dependent variables, generalizing across two or more levels.

More recently, Chan (1998) expanded Rouseau's discussion of composition models by developing a framework for specifying the functional relationships among variables. This framework included a conceptual rationale for relationships across levels, a mechanism for combining lower-level measures into collective constructs, and the type of empirical support that would be needed to justify aggregating from lower to collective levels.

Focusing on a different set of issues, Klein et al. (1994) outlined some of the theory development, data collection, and data analysis issues that arise when working within a levels framework. Notably, they highlighted the primacy of theory (as opposed to analytic concerns) in developing multilevel theory and, in so doing, described several different assumptions that underlie specification of levels within the organizational sciences. In addition, they discussed a number of important measurement and statistical analysis issues that are relevant when dealing with multilevel phenomena.

Finally, House et al. (1995) forwarded an ambitious framework for integrating micro- and macro-organizational behavior research under the "mesoparadigm" rubric. They suggested that both micro and macro variables are needed in order to understand organizational phenomena. The mesoparadigm resides at the intersection of these levels, focusing on the process by which micro and macro variables interact and affect one another. They further suggested that

social interaction is fundamental to organization-related processes . . . what is needed is a way of coupling theories and research at different levels into a meaningful whole. We need mechanisms that help us conceptualize the complex relations between units at different levels of analysis . . . in organizational settings (House et al., 1995: 86).

Although these works have significantly advanced our conceptions of multilevel theory development and measurement, and have had a pronounced influence on this article, they have

been relatively silent in two important areas: (1) the structure of constructs at collective levels of analysis and its implications for measurement and theory development and (2) a generalized model for integrating constructs across levels of analysis. With respect to the structure of constructs at collective levels of analysis, it appears that we still know very little about the foundation upon which multilevel theories are based—namely, the nature of collective constructs. Prior to pursuing a program of multilevel research and theory, one must clearly understand the nature of constructs at levels of analysis higher than the individual. We address this issue by articulating a model of collective structure, which highlights the unique properties of constructs at collective levels and how the structure of constructs might change across levels.

In terms of integrating constructs across levels of analysis, even though scholars generally agree that the development of multilevel theories is sorely needed, there exist few mechanisms for describing exactly how one is to do this. We address this issue by describing how a functional analysis can allow scholars to link constructs across levels. Together with an understanding of collective structure, this functional analysis offers a general model for the development and testing of multilevel theories.

The article begins with a brief definition of constructs and the terminology that we use throughout. Next, the structure of collective constructs is outlined, in which we focus on how constructs acquire meaning and structure at the collective level. Following this, we offer a functional analysis of collective constructs, which has implications for the generalization of constructs across levels. Finally, we discuss implications for research and theory and develop a set of guidelines for multilevel research and theory.

DEFINING CONSTRUCTS AND COLLECTIVES

Constructs are hypothetical concepts that are not directly observable (MacCorquodale & Meehl, 1948), whose existence remains in the world of conception (Ghiselli, 1964). As such, constructs are simply abstractions used to explain some apparent phenomenon (Kozlowski & Klein, in press). Thus, constructs can generally be thought of as conceptual notions whose existence must be inferred from more observable

actions or features of an entity. They function as heuristic devices for making sense of observables (Nunnally & Bernstein, 1994), and they are implicitly defined in terms of a network of associations with observables and other constructs (Cronbach & Meehl, 1955; Messick, 1975). For example, an individual's cognitive ability is not directly observable but, instead, is a conceptual notion (i.e., a construct) that accounts for a set of observable behaviors (e.g., correctly solving mathematical and vocabulary problems).

In the abstract, constructs are indifferent to level-of-analysis issues. That is, as conceptual notions, constructs simply serve as shorthand for a variety of phenomena that can be posited at any hierarchical level. Because we focus in this article on constructs used in multilevel theories, however, it is necessary to outline a terminology for discussing constructs at the collective level. In our model the term *collective* is used to describe any interdependent and goal-directed combination of individuals, groups, departments, organizations, or institutions. In other words, the model to be outlined is applicable to any set (or grouping) of entities and, thus, represents a general model for developing multilevel theories. Constructs that reside at the collective level of analysis represent descriptions of collective phenomena. Throughout the article we refer to these constructs as "collective constructs."

THE STRUCTURE OF COLLECTIVE CONSTRUCTS

There is little question that collective entities exist and can be identified. Our task, therefore, becomes not one of identifying their existence but, rather, describing their operation. For example, if asked to identify a collective, we would have little difficulty in providing a succession of examples: General Motors, an engineering department, the London Philharmonic, an intensive care nursing team, and so on. If asked to describe what these collectives actually do, we might suggest that they, variously, manufacture automobiles, design bridges, perform Mahler, and care for patients. But what does it mean when we say that groups or organizations "act?" Do engineering teams design a bridge? Does a symphony perform Mahler? At one level the answer is, yes, they do these things because this is the output they produce. Such an

explanation, however, runs the risk of reifying or anthropomorphizing collective activities.

In this section we attempt to address this issue by forwarding an account that establishes interaction as a fundamental component of collective action. The discussion centers around how constructs emerge in collectives and how these collective structures influence the interaction of individuals and collectives. This shows how constructs with no lower-level analogue emerge in collectives—one of the biggest challenges facing multilevel research (Chan, 1998). It also highlights how collective constructs can take on structural properties that can exert influence that is independent of the interaction that initially caused the construct to emerge.

The Emergence of Collective Structure

To understand how collective structure emerges, one must first understand the components of collective action. That is, what underlies any "action" taken by a collective? An extensive body of organizational (e.g., Brass, 1995; Katz & Kahn, 1978; Schneider, 1987; Watson, 1982; Weick, 1979, 1987; Weick & Roberts, 1993), sociological (e.g., Giddens, 1979, 1993; Parsons, 1937, 1951), and social-psychological (e.g., Allport, 1924, 1967; Stogdill, 1959) theory suggests that collectives "can and should be studied as systems of interaction" (Giddens, 1993: 128). As such, we focus on the systems of interaction among organizational members and collectives.

A number of researchers (e.g., Allport, 1954, 1962, 1967; Parsons, 1951; Watson, 1982; Weick, 1979) have attempted to describe the nature and structure of collective behavior. Integrating these perspectives allows us to begin to understand how structure can emerge at collective levels. To begin, Parsons (1951; see also Frese & Zapf, 1994) suggests that the most elementary unit of analysis in any social system is the individual behavioral act. Individual action, however, does not occur in a vacuum, nor is it random. Instead, individual action is limited by the surrounding context, and, thus, the admissible range of actions is influenced by a multitude of situational or contextual factors (Cappelli & Shearer, 1991; James & Jones, 1976; Johns, 1991; Peters & O'Connor, 1980). These actions and the context within which they occur generally can be referred to as the ongoings of the individual system (Allport, 1955).

Within a collective, however, the ongoings of individual-person systems are likely to "meet" or "encounter" one another (Allport, 1967). That is, the actions of individuals will meet in space and time, resulting in interpersonal interaction. This interaction results in a discrete event, and subsequent interaction produces what can be termed an *event cycle*. These events and event cycles represent points of "contact," or "encounters" between ongoing individual processes. Events and event cycles, thus, define the system of interaction between individuals and consist of the following minimum elements:

When individuals respond to one another... a social stimulus, given, for example, by the behavior of individual A, is likely to evoke from individual B a response which serves in turn as a stimulus to A causing him to react further. The direction of the stimuli and of their effects is thus *circular*, the responses of each person being re-evoked [sic] or increased by the reactions which his own responses called forth from others (Allport, 1924: 148-149).

Also called a "double interact" (Weick, 1979), this interaction is the basic building block upon which all larger collective structures are composed (Fairhurst, Rogers, & Sarr, 1987; Watson, 1982; Weick, 1979, 1987). In other words, mutual dependence (or interdependence) between individuals creates a context for their interaction. This interaction, in turn, occasions a jointly produced behavior pattern, which lies between the individuals involved. Collective action, thus, has a structure that inheres in the double interact rather than within either of the individuals involved. As interaction occurs within larger groups of individuals, a structure of collective action emerges that transcends the individuals who constitute the collective. Therefore, collectives are open interaction systems, where actions and reactions determine the structure of the system (Stogdill, 1959; see also Filley & House, 1984). These collectives then interact, composing yet larger collectives.

For example, organizations, by themselves, do not "remember" how they responded to a crisis in the past. Rather, it is the organizational members who recollect which behaviors were enacted in previous times of crisis. By interacting, probing their memories, and utilizing organizationally based information systems, organizational members engage in sensemaking activities that render an understanding of the crisis;

determine the extent to which the present event is similar to past events; and recall (in a social context) how the organization responded in the past, particularly where there is some degree of uncertainty or equivocality (Anand, Manz, & Glick, 1998; Daft & Weick, 1984; Hofmann & Morgeson, 1998). This patterning of action is a type of collective structure and forms the basis for the emergence of the collective construct we might call "organizational memory."

Thus, the structure of any given collective (e.g., a work team) can be viewed as a series of ongoings, events, and event cycles between the component parts (e.g., individuals). This structure, in turn, forms the basis for the eventual emergence of collective constructs. In other words, the collective action (which is composed of ongoings and events) enables collective phenomena to emerge. Labels then can be affixed to this phenomenon, resulting in what could be termed the *emergence of a collective construct*. Absent this action, the construct simply does not exist.

Interestingly, these ongoings, events, and event cycles occurring within a given collective can serve as the ongoings to other collectives. For example, the system of interactions among members of work team A defines it as a unique entity. These interactions, however, are (mostly) transparent to work team B, who views work team A as an undifferentiated entity (i.e., as simply another work team). When the two teams have occasion to interact (e.g., to transfer sub-assemblies in the manufacture of an automobile), the ongoings of the two teams meet and produce an event—albeit a more molar event (i.e., an event between the ongoings of the two teams).

The structure of yet larger collectives (e.g., the department or the organization) is similarly composed of ongoings, events, and event cycles from more molecular structures. In this way, a hierarchy of collective structure emerges, each containing a subsystem made up of its own set of ongoings, events, and event cycles. Therefore, analyzing systems of interaction can occur at any level of analysis, as can the emergence of collective constructs.

The Persistence of Collective Structure

One of the interesting features of the collective structure that emerges from this interaction

is that it assumes an a posteriori permanence that can subsequently influence individual and collective action. That is, the constructs that emerge can have a reality that is partly independent of the interaction that gave rise to it. Giddens calls this the "duality of structure," where "social structure is both constituted by human agency and yet is at the same time the very *medium* of this construction" (1993: 128-129); structure is both a product of and a constraint on behavior (Barley, 1986). Acknowledging this dual nature allows us to understand not only how collective constructs emerge but how these constructs can influence interaction.

In describing how normative rules developed in a team-based setting, Barker (1993) demonstrates how interaction can allow collective constructs to emerge and how their emergence subsequently influences behavior. The setting was an organization that had recently switched from a traditional bureaucratic structure to one oriented around teams. The switch to teams created "mass confusion" and forced the team members to discuss their values and to develop patterns of behavior that supported these values. Emerging out of this interaction was the shared value of customer service. For example, Barker (1993) recounts an instance in which a tight deadline necessitated that the team members work late. In a team meeting the interaction took the following form:

[Lee Ann] looked at the team, "We've got the 'pots' in but it's gonna take us two extra hours to get this done. What do you want to do?"

Larry groaned, "Damn, I've got plans for five-thirty!"

Johnny countered, "But we told Howard Bell [their customer] that we would have these boards out today. It's our responsibility."

Tommy followed, "We're gonna have to stay. We have to do this right" (Barker, 1993: 421-422).

Thus, the team was engaged in its normal task activities when a sequence of events occurred (the late delivery of parts, coupled with a tight deadline), disrupting the ongoing activities. This necessitated a cycle of interaction and negotiation, which resulted in a behavioral pattern that reinforced the abstract values initially identified by the team as important. But most important, "These points of agreement set strong precedents for future action" (Barker, 1993: 422). Thus, interaction resulted in the emergence of a behavioral norm centered around

customer service. This norm became codified and strengthened as a result of the cycle of interaction, significantly influencing subsequent behavior.

Summary of Collective Structure

By examining the systems of interaction among organizational members and the processes (e.g., psychological, sociological, political, and economic) that underlie these interactions, one can understand how and why collective constructs emerge. Collective structures emerge, are transmitted, and persist through the actions of members of the collective (or the collective as a whole). In this sense, the structures are built from the "ground up;" therefore, it is not the collective construct, per se, that determines the behavior of individuals—rather, it is the individuals (or collective) who determine the collective construct, and, through their actions, influence the behavior of others in the collective.

For example, Barley (1986) examined the interaction that resulted when similar technologies (CT scanners) were introduced in two hospitals. He showed how different organizational forms emerged from ostensibly similar environmental events. Only by considering the interaction and its dynamics was he able to understand the forms that ultimately resulted.

Because collective constructs (once established) can influence interaction, however, we must also recognize that they can enable or constrain it. For example, Gersick and Hackman (1990) demonstrated how habitual routines can so constrain interaction systems that major system failures result. A particularly compelling example involved the preflight procedures of the crew for Air Florida Flight 90. The standardized nature of the procedures restricted interaction to such an extent that changes in external conditions (e.g., ice on the wings) did not prompt an appropriate response (the use of anti-ice equipment). In short, the routine was so powerful that the crew members were not even aware that the current flight required a nonroutine response. The results were tragic, and the plane crashed into a bridge shortly after takeoff. Although extreme, this example illustrates how strongly collective constructs can influence interaction systems.

THE FUNCTION OF COLLECTIVE CONSTRUCTS

With the structure of collective constructs more clearly defined, we can now address the implications this underlying structure has for the generalization of constructs across individual and collective levels. Within the organizational sciences, a number of researchers have discussed constructs that exist at both individual and collective levels. In multilevel research, questions often arise with respect to what characteristics these constructs have in common.

Take, for example, individual and collective memory. Researchers commonly conceptualize individual memory processes as occurring at the intraindividual level via biochemical and cognitive means. Collective memory processes, however, occur at the interindividual and intergroup levels (Walsh & Ungson, 1991; Wegner, 1986). These differences in conceptualization imply that although the constructs share a number of similarities, they are not similarities of underlying structure. This is due to the fact that, across levels, the construct manifests itself in a distinctly different manner. Instead, this discussion implies a similarity in function or outcome (i.e., the recollection of past events).

Understanding a Construct's Function

A focus on a construct's function has a long history, being deeply rooted in the pragmatic philosophy of Peirce (1878, 1905). In short, pragmatism holds that the meaning of a proposition resides in its outputs or effects. If there are no differences in effects, there are no differences in the propositions. Pragmatism was ultimately conceived as a method for ascertaining the meanings of abstract or intellectual concepts (Peirce, 1940). Specifically, Russell suggested that "in order to attain clearness in our thoughts of an object, we need only consider what conceivable effects of a practical kind the object may involve" (1945: 816). Thus, if two constructs lead to the same outcome, they are (functionally) equivalent. By examining these effects, we can render a more parsimonious account of objects.

This pragmatic philosophy was partly reflected in the psychological theorizing of Dewey (1896) and Angell (1907), resulting in the loosely defined functionalist school of thought within psychology (Hilgard, 1987; Marx & Hillix, 1963).

Applying a similar line of thought to the domain of sociology, Merton (1949) noted that attention to function is "expressed in the practice of interpreting data by establishing their consequences for larger structures in which they are implicated" (1949: 47). As these ideas were developed, however, teleological aspects were added (see Hempel, 1965, and Nagel, 1961, for examples). That is, the functionalist perspective came to focus not only on outputs or effects but attempted to specify the purpose, ends, or adaptive value an object might have. This purposive aspect of functionalism met with considerable criticism and led many to reject a functional approach (Giddens, 1993; Marx & Cronan-Hillix, 1987).

Because this latter aspect of functionalism is problematic, we have chosen to focus solely on a construct's outputs or effects, thereby rejecting the notion that these outputs have any wider teleological implications. In fact, scholars have forwarded just such an approach in the philosophical literature as a way to avoid the liabilities inherent in functionalism (Bechtel, 1986; Cummins, 1975, 1983). In this view a function is simply any causal output of some component in a system. This does not require an appeal to any other inherent or higher-order properties (i.e., purpose) and allows access to another form of explanation (i.e., examining the effects of a construct), without the liabilities that attend traditional functionalist arguments.

Thus, here the term *function* simply refers to the causal outputs or effects of a given construct, and *functional analysis* refers to an assessment of a construct's outputs in the organizational system. Therefore, we make no claims about the purpose or adaptive value of such an effect. In addition, our model makes no attempt to prescribe which specific outcomes should be chosen. Instead, we suggest that it is incumbent upon the researcher to identify and justify his or her particular outcome. It is only after this decision is made that the present model becomes relevant.

Collective constructs frequently have been defined in terms of their function. For example, Cartwright (1968) defined cohesiveness as the attraction of individuals to the group, thus indexing the construct in terms of its effect on group members. Klimoski and Mohammed (1994) have suggested that team mental models primarily function to facilitate coordination, foster

efficiency, and promote predictability. Shea and Guzzo (1987) have described potency as a group's collective belief that it can be effective, suggesting that the output of potency is increased confidence.

As recognized by these scholars, a given collective construct's function can provide a useful and flexible mechanism by which to discuss collective phenomena. Often left unrecognized, however, is the fact that it can also provide a mechanism for linking constructs across levels. That is, because functions generally remain the same across levels, a functional analysis provides a way to utilize the knowledge accrued about lower-level constructs when articulating theories about collective phenomena. Focusing on a construct's function allows scholars to create a level-free metric with which to link similar constructs across levels. In this way, one can justifiably speak of collectives "thinking," "learning," and "behaving," provided that outputs across individual and collective levels are comparable—that is, the construct actually has the same function at different levels.

Special Considerations of Function

This discussion highlights five important issues to consider when examining the function of collective constructs. First, our approach focuses on the causal outputs or effects of a given construct. To assess the function of a construct, one must examine its consequences in the organizational system. For example, Staw, Sandelands, and Dutton (1981) discussed the effects of threat by examining the similarity in consequences of threat across multiple levels. Under threat conditions, there is a restriction in information processing as well as a constriction of control across all levels. By focusing on these outputs of threat, Staw et al. (1981) were able to effectively integrate across individual, group, and organizational levels.

Second, constructs with similar functions may have dissimilar structures. Thus, functions have multiple realizability in that numerous structures can result in the same output. Walsh and Ungson's (1991) model of organizational memory exemplifies this. Specifically, memory has the same output or effect at the individual and organizational levels (i.e., the recollection of past events, facts, or information). The structures that underlie memory at each level, however, differ

markedly. That is, the nature of the interaction and the processes through which the construct takes form are radically different across levels. This suggests that structure and function are not equivalent and that any function can be satisfied through a number of different structural means (see Gresov & Drazin, 1997: 407).

Third, although an analysis of functions can help integrate across levels, it also entails a somewhat less differentiated conception of the constructs themselves. This is due to the fact that an analysis focusing on outcomes concerns itself primarily with the manifestation or appearance of the construct. Although valuable, such a "surface-level" perspective tends to acknowledge differences only to the extent that outcomes change, thereby ignoring underlying differences in structure. Thus, instead of describing the constituent parts (or structures) of a construct, scholars focusing on function do not need to define the elements of a construct, which results in a more molar perspective. This, in turn, may result in the loss of some explanatory power, depending on the application.

For example, Morgeson and Campion (1997) recently outlined a series of psychological processes that underlie inaccuracy in job analysis. They found that although there were 16 social and cognitive sources of potential inaccuracy, there were only 6 possible effects. If one took the perspective of examining only the effects (i.e., consequences) of a given construct, one would find that a complete understanding of the phenomena would be difficult to achieve. Although not a multilevel article per se, this does highlight some of the losses that might occur when considering functions in the abstract.

Fourth, when focusing on outcomes, researchers may be faced with questions of causality. That is, how does one know that an entity actually produces an outcome? In addition, how does one know that a construct accounts for a given outcome? Such questions often occur in the organizational sciences. In terms of the first issue, we suggest that scholars should adhere to normal evidentiary standards when assessing causality (e.g., temporal precedence, covariation, and no other causal explanations). The second issue is primarily one of construct validity and can be assessed by examining convergent and discriminant validity evidence.

Fifth, in attempting to identify similar functions, one may question whether the outcomes

are truly similar. There is a host of evidentiary standards one might apply to demonstrate similarity, and the choice of standards would appear to depend upon the level of measurement precision one desires and the minimum amount of evidence deemed necessary to establish similarity. Perhaps the most rigorous standard would be an examination of the network of relationships these outcomes at different levels have with other variables. Other possible standards include simple agreement percentages among trained raters or judges, a more involved Delphi consensus process, or pairwise comparisons. In practice, when developing theory and linking outcomes across levels, scholars will find that similarity judgments will be likely to occur in a less rigorous manner. We suspect that researchers will develop an idea, try to make it work within the context of their particular research area, and then test it in the marketplace of ideas.

IMPLICATIONS FOR RESEARCH AND THEORY

The preceding discussion highlights a number of conceptual issues surrounding the structure and function of collective constructs. Although a consideration of these issues is critically important for multilevel theories, it appears that many of these issues have gone unacknowledged and unaddressed in the organizational literature. This is unfortunate, because the issues raised have a number of implications for multilevel investigations. It is important to point out, however, that focusing on structure and function does not preclude other perspectives on collective phenomena. In this article we focus on structure and function because they provide a useful mechanism for discussing collective phenomena and integrating constructs across levels, thereby facilitating the development of multilevel theories.

This final section serves to summarize the issues that arise and may be considered when developing or testing multilevel theories. In addition, we present a set of guidelines to facilitate multilevel inquiry. These guidelines are derived from the implications summarized below and reflect issues that arise when multilevel theories are developed. As such, they represent issues scholars should consider when articulating multilevel theories.

Implications of Structure

The mechanisms through which structure occurs have a number of implications for understanding collective phenomena. At its most basic, the structure of collective constructs is composed of the actions and interactions of organizational members. Thus, attention needs to be given to studying and understanding the nature of this interaction. We suggest that ongoings and events form the fundamental structure of collective action, and constructs acquire meaning via this structure. Therefore, the structure of collective phenomena is really the structuring of events. Absent ongoings and events, social structure does not exist. Such a perspective provides a way to understand collective constructs without reifying them. It also demonstrates how larger collectives are "constructed" from more molecular units.

Given this importance of interaction, it is clear that the view suggesting that constructs are simply entities that subsequently exert an influence on individual members or collectives is mistaken. That is, only through interaction does a construct acquire meaning and structure. As a result, interaction allows collective constructs to emerge and to be sustained, and it is this interaction that exerts an influence on organizational members.

For example, the regulation of output observed in the bank wiring observation room of the Hawthorne studies (Homans, 1950) has often been interpreted as the powerful influence a norm can have on regulating the behavior of organizational members. If one examines the manner in which this norm was enforced (Homans does not make clear how the norm was established), however, an entirely different picture emerges. Thus,

if a man did turn out more than was thought proper, or if he worked too fast, he was exposed to merciless ridicule . . . and ridicule was not the only penalty a nonconformist had to suffer . . . a man who was thought to be working either too fast or too slow might be binged [hit very hard on the upper arm] (Homans, 1950: 60-61).

Because of these interactions, the output of the bank wiring room was remarkably constant. Thus, the norm itself did not regulate individual or group output—rather, it was the actions and interactions of members of the collective. These interactions codified the collective construct (the

norm) and lent it a certain a posteriori reality that inhered in the interaction.

In addition, because these systems of interaction define the structure of the construct, it is clear how the construct can continue to exist when the individuals who were initially involved in establishing it leave the collective or contextual conditions change. This is because, over time, systems of interaction become codified or routinized, particularly if there are few unusual events (Gersick & Hackman, 1990). When a member leaves or the context changes, these systems of interaction typically continue undisturbed. Indeed, the smaller the change in membership, the less likely systems of interaction will be disrupted (Arrow & McGrath, 1995). Although this can have positive effects (e.g., the transmission of positive safety practices), it can also have negative effects (e.g., the retention of unsafe shortcuts) for the collective as a whole.

Guideline 1: The investigation of constructs at the collective level could begin with an understanding of the interaction of organizational members. Because these interactions allow collective constructs to emerge and be maintained, focusing on the interactions that define and reinforce the collective phenomena can provide a better understanding of how collective phenomena arise and continue, particularly in the face of contextual or membership changes. Such understanding is facilitated by explicitly identifying systems of ongoing and events, particularly those events that lend structure to collective phenomena.

It is also important to note that the emergence of certain constructs is conditional, and the emergence of others is inevitable. That is, some constructs may emerge simply owing to the passage of time, whereas others may require the occurrence of particular events. Generally speaking, as organizations accrue greater experience in a given industry, their memories increase. Individuals in the organization will have had exposure to more events and will develop mechanisms with which to recall these past occurrences. Thus, organizational memory will increase simply with the passage of time.

Other phenomena may only emerge if certain critical events occur. For example, collective routines emerge in response to environmental events and the demands of the task. Absent the events, certain routines will never emerge. For example, a set of rules, procedures, or policies (i.e., a routine) for responding to customer complaints about late deliveries may not exist until a key customer does not receive its usual shipment of material or until there is a series of missed shipment dates. Thus, the construct does not emerge unless and until certain kinds of events occur.

These examples serve to emphasize that collective structure is dynamic in nature, may develop over time, or may require the occurrence of significant events. As a result, it is critically important to outline and understand the process by which constructs emerge.

Guideline 2: Because the emergence of some constructs is conditional and of others is inevitable, accounts of collective constructs should provide details about their developmental aspects and should specify the processes through which the constructs emerge, particularly in terms of the importance of critical events as compared to usual ongoing.

Implicit in this discussion of collective phenomena has been the notion that the organizational setting provides a context for the interaction that occurs among organizational members. Although it is true that this interaction defines the structure of collective constructs, it is equally true that the context delimits the range of possible interaction. Although many researchers have taken the context into account, many others have not (see Cappelli & Shearer, 1991).

For example, the range of possible and permissible actions and interactions is likely to be radically different depending on whether one works in a traditional bureaucratic organization or in a team-based organization. That is, the levels of centralization, formalization, and span of control are likely to differ markedly among different organizational forms. These contextual differences will then be reflected in the systems of interaction, which, in turn, define the structure of the collective phenomena that emerge. For example, team-based organizations typi-

cally have fewer levels of management and allow workers greater autonomy. In addition, there is often greater task interdependence between and among jobs. This creates a context that potentially fosters the emergence of cohesiveness, trust, and satisfaction.

Research in organizational demography suggests another important set of contextual factors. Organizational demography has been defined as the study of a social entity's composition in terms of its members' attributes (Lawrence, 1997; Pfeffer, 1983). Scholars have suggested that this organizational demography influences such things as communications, conflict, and social integration (e.g., Jackson et al., 1991; Smith et al., 1994; Tsui & O'Reilly, 1989). This, in turn, suggests that the demographic composition of a collective entity can have a pronounced influence on collective behavior and systems of interaction, thereby influencing the phenomena that ultimately emerge.

As these examples illustrate, the context within which interaction takes place serves as a limiting factor on interaction and, therefore, plays a potentially large role in determining the ultimate structure of collective phenomena.

Guideline 3: In explicating the structure of a collective construct, one should acknowledge and understand the context within which individuals operate. Because the context limits the range of potential interaction, it may have a particularly influential role in determining the emergence of a construct and its structure.

Implications of Function

In addition to these implications of collective structure, a functional analysis also has a number of implications for collective constructs. Perhaps one of the most important insights provided by a functional approach concerns how it can help integrate constructs across levels. As suggested earlier, a focus on the structure of a given construct tends to highlight the differences across levels. For example, there has been a large amount of research into the structure of individual personality (Barrick & Mount, 1991; Block, 1995; Costa & McCrae, 1985, 1995). It is readily apparent that this structure cannot be retained at the collective level. Indeed, the mere

mention of "group personality" is enough to incur the disapprobation of researchers (see the debate between George & James, 1993, and Yammarino & Markham, 1992). Yet, there is something to the notion of group personality. Groups do seem to differ in personality-like ways. For example, some groups are more helpful (i.e., conscientious) than others, whereas other groups are generally more outgoing and gregarious (i.e., extroverted).

Do these structural differences preclude a discussion of personality at the collective level? Not if one examines the function of personality at both levels. This is because the outputs of personality are consistent across levels (e.g., helping behavior). Thus, it becomes important to clearly specify the function of a construct at the collective level and demonstrate how it has a similar output at the lower level (e.g., Staw et al., 1981). This similarity in function, however, has nothing to do with the underlying structure of the construct. This is an important point to keep in mind when developing theories—one to which we return later. Thus, structural dissimilarity belies a functional similarity across levels. A functional analysis provides a mechanism for integrating many different constructs across levels. Indeed, it may provide a unity to multi-level research that previously has been lacking.

Guideline 4: Explicit consideration of a construct's function may allow scholars to integrate functionally similar (but structurally dissimilar) constructs into broader nomological networks of constructs. This can serve as an integrative mechanism in multi-level research and theory.

Attention to function also helps us understand collective structure. As noted, collective action is a structuring of events and ongoing, rather than of physical parts. Thus, collectives have no structure apart from the actions and interactions of organizational members. These interactions, however, are not random. Instead, they are guided by individual and collective goals (Katz & Kahn, 1978). But a question still remains: Why do organizational members engage in certain systems of behavior and interaction? One potential answer comes from an examination of the role the construct plays in achieving these goals. For example, in some instances team members may engage in interlinked behavior

because it facilitates the achievement of production goals and team-based rewards. Thus, the utility of cohesiveness for achieving these goals helps explain the pattern of behavior that comprises its structure.

Guideline 5: To understand the structure of a collective construct, it may be helpful to identify the role the outcome plays in the collective, particularly in terms of how it facilitates goal accomplishment. This can help provide insight into why the construct exists and why it persists (or fails to persist) over time.

Integrating Structure and Function in Multilevel Research and Theory

Up to this point, our discussions of structure and function have occurred somewhat independently of each other. As has been suggested, however, the consideration of one can inform conceptualization of the other. The joint consideration of structure and function is perhaps most useful when developing multilevel theory.

For example, when beginning the theory development process, a functional perspective can act as an important starting point. That is, a researcher can first establish the function of his or her constructs. Specifying the function achieves several goals. It enables a scholar to begin to understand the nature of complex collective phenomena, but in a language that is more familiar and readily understandable. For example, discussing the "ability" of a team allows one to conceptually relate to the intuitive understanding others have about individual ability. The fact that the structure of this construct differs becomes more important later, but when articulating the theory and tying constructs into a nomological network, a functional analysis provides the scholar with a language and useful heuristic for theory development.

The identification of similarity in function allows one to integrate across levels of analysis. As noted, however, this approach ignores the differences in structure among these constructs. Thus, in order to fully develop multilevel theories, scholars must move beyond descriptions of function and consider the nature of structural differences at multiple levels of analysis. That is, theorists need to explicate the structure of

their constructs at each level of analysis, which provides them with the opportunity to identify the unique processes and structure of a construct.

Staw et al. (1981) and Walsh and Ungson (1991) have employed a similar theory development strategy with great success. For example, Walsh and Ungson (1991) have described the structure of organizational memory in terms of how information is acquired, stored, and retrieved and then discussed its function in terms of its effects on decision making, control systems, and political processes. For their part, Staw et al. (1981) have shown that threat results in restriction in information processing and constriction of control and then have proceeded to discuss the structure of this effect at each hierarchical level. Thus, these scholars have identified the function of the constructs under consideration and highlighted their structure at each level of interest.

Guideline 6: Scholars could begin multilevel theory development with a functional analysis, examining the output of a given construct. This would identify commonalities across levels that could be used to provide insight into the construct's structure at a particular level. That is, identifying the function naturally will lead into a discussion of the processes or structures that underlie the function. The theorist then could articulate the structure of the constructs at each hierarchical level.

One important consideration to keep in mind when articulating the structure of a construct, however, is that a number of different structures can result in the same output. That is, numerous structures can produce the same function (Gresov & Drazin, 1997). As a consequence, there are many possible ways for a given function of a construct to manifest itself. This suggests that describing a given function may require articulating many different processes or structural mechanisms. Scholars, thus, should identify the entire range of factors that result in the function they have identified. It may be the case during the early development of a theory that only a small number of the underlying mechanisms are discussed. As the theory matures, however, investigations aimed at uncovering these other processes should take precedence.

Guideline 7: Because a number of different structures can result in the same function, it is incumbent upon the researcher to specify the particular structure of a construct at a given level. As an area of research matures, identification and acknowledgment of the different structures or processes that account for the function should become a high priority.

It is also important to acknowledge the fact that similar structures (as indexed by interaction and underlying processes) may result in different functions. This is particularly true in underdetermined systems, where only broad processes or forms of interaction underlie the structure. This suggests that an understanding of structure and function may require understanding the unique contextual factors that enable similar structures to produce different outcomes. It may be the case that a certain set of contextual factors or structural properties may reliably result in divergent outcomes, and it is important for theorists to identify and understand how these mechanisms work within the context of their theories.

Guideline 8: Because similar structures can result in different functions, it is important for scholars to understand the factors that influence divergence in outcomes. Identification of the contextual factors or structural properties that regulate this divergence is important for an adequate understanding of the phenomena.

Focusing on different underlying structures of functionally similar constructs also has significant implications for the way in which constructs at the collective level are operationalized. Perhaps most significant is the implication that measures of an individual-level construct cannot always simply be aggregated and assumed to be a veridical representation of its collective counterpart.

For example, measurement of mental models (Klimoski & Mohammed, 1994), memory (Walsh & Ungson, 1991), or reaction to threat (Staw et al., 1981) likely will require different measurement strategies at the individual and collective levels of analysis. This is because the structures of these constructs are different across levels. In

particular, understanding constructs at the collective level involves identifying and articulating their interactive elements. Such elements should be taken into account when attempting to measure collective constructs. Although a complete consideration of different measurement strategies and aggregation rules is beyond the scope of this article, we provide two examples below and refer the reader to Chan (1998) for a more detailed treatment of these issues.

In order to talk about a group's ability, one must consider not only the individual abilities of the group members but the way in which these abilities are integrated and coordinated. This is of paramount importance, because there are both conceptual and empirical reasons to believe that the whole is greater than the sum of the parts. As an example, Tziner and Eden (1985) found that the performance of uniformly high-ability military crews far exceeded what would have been expected on the basis of individual members' ability alone.

In addition, recognizing that there are potential synergies in team (as opposed to individual) performance, Kozlowski, Gully, Nason, and Smith (in press) recently outlined the process through which knowledge, skills, and performance capabilities compile across levels and time. They recognize that teams are not the sum of their individual parts and suggest that team performance emerges from a compilation process that begins at the individual level and proceeds to the dyadic level where individuals are linked by role interdependencies, through an adaptive and continuously improving team network. Explicit in this model is the critical role played by such things as interdependencies (and the associated integration and coordination requirements) and social interaction. This suggests that researchers and theorists should begin to investigate and understand the nature of the interactions, integration, interdependencies, and coordination mechanisms that drive collective phenomena.

Guideline 9: Scholars should not simply assume that the measurement of collective phenomena is the same as the measurement of analogous individual-level phenomena. There is a host of potentially important factors at the collective level, such as interac-

tion, integration, coordination, and interdependence. In their theories and operationalizations, scholars must take these factors into account in order to fully understand the nature of such collective constructs.

Having said this, however, recognize that it is entirely possible to measure relevant collective phenomena at the individual level and still address theoretical questions at the collective level. This involves clearly distinguishing between the level of theory and the level of measurement (Klein et al., 1994; Rousseau, 1985; Schneider, 1990). The level of theory, on the one hand, describes the target (e.g., individual, group, or organization) that the researcher or theorist is attempting to describe and explain. As such, it concerns the level at which constructs and theoretical relations are hypothesized to exist and the level to which inferences are to be drawn. The level of measurement, on the other hand, describes the actual source of data. This suggests it is possible for constructs and theoretical relationships to reside at one level (e.g., the group), while actual measurement occurs at another level (e.g., the individual).

As an illustration, Katz and Kahn (1978) discuss how a sociologist and a psychologist might view the same event (e.g., the overthrow of the Batista regime in Cuba). Whereas the sociologist might be interested in investigating how the unstable social system in which the society existed collapsed when an agrarian uprising defeated the military, the psychologist might investigate the motivations behind individuals who took action against the visible source of their frustration. Clearly, both sets of inquiry involve individual action and behavior, and, in fact, both researchers might very well use individual interviews as the source of measurement. That is, for both inquiries, the level of measurement would be at the individual level. The nature of the constructs intended to be assessed by the individual-level measurement, however, will differ qualitatively across the two inquiries. The sociologist's constructs will be too gross or blunt to account for individual motivations, whereas the constructs studied by the psychologist will be too narrow—and too few—to address the sociologist's questions. As Katz and Kahn note, it is not so much that the sociological

frame "calls attention to a different level of phenomenal facts as to more and different facts of human behavior at the same phenomenal level" (1978: 14). In short, theoretical and measurement levels can be, and often are, different.

This suggests that the choice of level of measurement should be guided by one's theoretical model, the nature of the construct under investigation, the question one is trying to investigate, and whether one is concerned with assessing structure. For example, if a researcher is able to establish relationships among constructs across levels (i.e., to establish a compositional model), he or she will most likely be able to undertake an individual-level measurement of a collective construct's structure and function. When establishing these relationships is not possible, measuring a construct's structure will more than likely have to occur at the collective level and take into account the interactive elements that allow the construct to emerge.

In addition, the actual measurement of collective constructs should be guided by at least two other considerations. First, it is important to focus on the collective and frame measures in collective terms (see Glick, 1985). Second, when measuring these constructs, one may find it useful to focus on an individual's particular role in the context of the wider collective, thereby treating individuals as informants about collective processes. In this way, the researcher can collect individual-level data that are relevant for collective phenomena. In short, it is incumbent upon the researcher to carefully consider theoretical and measurement levels and operationalize his or her constructs accordingly.

Guideline 10: When operationalizing collective constructs, researchers may justifiably collect individual-level data. To collect data that are meaningful at the collective level, however, one must have a conceptual rationale for the level of measurement chosen. Inferences at the collective level will be facilitated by focusing on collective phenomena, framing questions in collective terms, treating individuals as informants about collective processes, and focusing on the role of individuals in terms of the wider collective.

Making distinctions between the structural and functional aspects of constructs at the collective level necessitates mentioning the tradeoffs that can occur if one chooses to focus on one aspect to the exclusion of the other. For example, one could choose to focus on the functional aspects of collective constructs. This would result in examining a construct's outputs and thereby allow integration across levels of analysis, which provides a more molar perspective on the phenomena of concern but may result in loss of some descriptive richness that would be gained by considering the construct's structure. Alternately, focusing on a construct's structural aspects offers one the opportunity to obtain a richly detailed description of the construct but often entails the loss of generalizability across levels.

The dilemma this tradeoff poses becomes readily apparent when considering the measurement of collective phenomena. For example, researchers who are primarily interested in the underlying structure of a group's cohesion might view a detailed communication network analysis investigating the nature, frequency, and quality of communication linkages among group members as an effective way to understand its structure. Researchers interested in investigating the outcomes of cohesion (e.g., the attraction of group members to the group), however, will find that a communication network analysis provides information that is too fine grained. Given this, a researcher interested in the functional question will turn to functionally oriented measures.

This suggests that although structural and functional aspects of collective phenomena are complementary when developing theory, it is unlikely one will be able to simultaneously maximize both features in a given construct operationalization. That is, in any given measure of a construct, researchers must decide on an approach oriented around either function or structure. This does not preclude measuring the same construct in two different ways, but it does mean that any particular measure will be oriented in a specific way.

Guideline 11: Researchers should be clear in how they operationalize their constructs with respect to whether they wish to assess the constructs' structure or function. Failure to do so

may result in inadequate construct operationalization.

SUMMARY AND CONCLUSION

Perhaps the most important insight in this article is that constructs can be described in terms of their structure and function. Structures emerge from interaction and can, over time, come to influence systems of interaction. Functions represent the causal outputs of constructs and provide a mechanism for integrating constructs across levels. As should be clear, however, these are not mutually exclusive ways of examining collective constructs. That is, a discussion of structure does not preclude a consideration of function. Explicitly considering structure and function allows the researcher to provide a fuller articulation of the construct, thereby facilitating theoretical integration and practical operationalization.

Examining structure and function, however, should be done only to the extent that it is useful and helps solve some of the problems that arise when developing and testing multilevel theories. The guidelines offered here are our attempt to address some of these issues and to summarize the range of issues that must be considered when researchers develop and test multilevel theories. By carefully attending to issues associated with collective constructs, we are more likely to arrive at a veridical account of multilevel organizational phenomena.

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