ISSUES OF LEVEL IN
ORGANIZATIONAL RESEARCH:
MULTI-LEVEL AND CROSS-LEVEL
PERSPECTIVES

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ABSTRACT

Implications of the concept of level for organizational theory and research are presented in this chapter. Issues of level enter into the researcher's choice of the organizational unit of measurement and analysis (e.g. organization, department, work group, or individual). Research and theory combining different units in measurement and/or analysis risk biases of misspecification and aggregation. To avoid such biases, theory, and research must explicitly address the role of level in organizational phenomena. A typology of models combining different levels in the study of organizations is presented to help organizational scientists avoid measurement and conceptual difficulties in studying mixed-level, organizational processes. The three models, compositional, cross-level, and multi-level, are described with a review of representative organizational studies illustrating each model. Theory explicitly addressing the role of level in its specification of concepts and their interrelations is essential to sound cross-level and multi-level research. This chapter addresses some issues pertinent to the development of cross-level and multi-level theories, including the nature of the hierarchical relations between organizational level. Finally, guidelines for the conduct of cross-level and multi-level research are presented.
As the field of organizational behavior develops and establishes itself as a social science, it is inevitable that researchers advocate a multi-level approach to the study of organizations. The phenomena under study require more emphasis on multi-level research. Organizations are becoming increasingly differentiated due to increased bureaucratization and technological change (Scott, 1975). This differentiation is both vertical and horizontal and gives rise to the need for research to include both cross-level and cross-unit assessments. Dynamics within the field of organizational behavior itself also contribute to this changing emphasis. Originally an outgrowth of applied research in the more basic disciplines of psychology and sociology, research in organizational behavior has reflected the traditional levels emphasized by the parent disciplines in which the researchers were trained (Roberts, Hulin, & Rousseau, 1978). Multi-level research is a natural consequence of the establishment of organizational behavior as a discipline in its own right, integrating the study of different levels of human activity relevant to organizations.

Recent discussions of multi-level research issues have focused primarily on problems of aggregation (e.g., James, 1982; Roberts & Burstein, 1980). Substantive conceptual issues in multi-level organizational research have not really emerged to date (see Staw, Sandelands, & Dutton, 1981 for an exception). Cross-level research, examining the effect of variables at one level on those at another, has, however, identified many conceptual issues and is beginning to generate theory (e.g., Dansereau, Alutto, Markham, & Dumas, 1982; Rousseau, 1978). But even here the identification of cross-level effects has been restricted largely to the areas of leadership and work-unit design. It may be that the problems surrounding aggregation and related cross-level methodological issues have distracted us from the dearth of substantive, theory-driven research on multi-level phenomena. This chapter discusses conceptual problems and substantive issues, current methodological concerns in multi-level research, and the links between them. It will develop the distinction between multi-level and cross-level theory and research and present guidelines for developing theory and research consistent with the multi-level and cross-level character of organizational phenomena.

Before discussing these conceptual and methodological issues, I must acknowledge my personal perspective and biases. In my opinion, the issue of level is of paramount importance in the field of organizational behavior. It sets the field apart from its parent disciplines in that most of what we study in and about organizations are phenomena that are intrinsically mixed-level. Learning, decision making, structure, technological systems, productivity and effectiveness, all of these and other major topics in the field are neither strictly micro or macro in character. In an interdisciplinary field such as organizational behavior where mixed-level phe-
nomena are the inevitable subject of study, mixed-level research should abound. Of course, it does not. The reasons for this, I believe, are twofold.

First, little theory in our field directly addresses the role played by variables at different levels. Theory in organizational behavior is derived from the parent disciplines the field is tied to and the levels they emphasize. Roberts, Hušín and Rousseau (1978) described the differentiation of the micro and macro approached in terms of the allegiance of their proponents to the basic disciplines of psychology and sociology. Even with the increasing number of scholars from schools of administration and management, theory continues to reflect the field's origins.

Second, methodologically, mixed-level research is messy. The difficulties of doing mixed-level research using conventional research strategies are the emphasis of methodological writings. The result is no surprise. We use macro data for macro questions, micro data for micro questions, and largely ignore the no man's land where mixed-level issues require data mirroring this mixed-level quality. The emphasis on methodological issues focuses attention on the inherent problems of using data derived from one level to represent something at another level. Moreover, these discussions fall short of actually specifying the links between concepts from different levels. Thus, the methodologically-oriented literature on levels seems to have both discouraged mixed-level research and to have failed to advance theory. It is my belief that methodology cannot address the basic problems that mixed-level issues and research pose to our field. But theory can. This chapter begins with some basic concepts and methodological concerns and will link these to theoretical issues of mixed-level research.

A Beginning: Some Concepts and Definitions

To understand the issues surrounding research involving multiple organizational levels, it is necessary first to define some major concepts. The central notion is that of level. Defined as a position, plane or standard in social, moral, or intellectual matters (Oxford English Dictionary, 1971), level implies a hierarchical relationship among things. Miller (1978, p. 25) describes levels in terms of a hierarchy of systems (e.g., organisms, groups, organizations, societies, supranational systems) that the universe contains. This hierarchy implies that there are advanced or higher levels consisting of lower level, less complex systems. Criteria for distinguishing any one level from another include differences in the complexity with which a given system level is organized, the size in physical space of its constituent units, the physical proximity of these units, their characteristics, and the distinctive structures and processes characterizing these units. Thus, in organizations containing multiple groups and in groups
containing multiple individuals, the nature and attributes of their constituent units differentiate one from the other. It is important here to distinguish between the concepts of level and echelon. Miller (1978) uses the term level to describe qualitatively different entities (e.g., individuals and organizations) while echelon refers to different hierarchical subgroupings within a level (e.g., positions in an organization’s chain of command). This chapter concentrates on the implications of differences in level for theory and research.

Miller (after Herbst, 1957) recommends a procedural rule applicable to organizational research:

Every discussion should begin with an identification of the level of reference, and the discourse should not change to another level without a specific statement that this is occurring (Miller, 1978, p. 25).

The level of reference mentioned above (that is, the organization, department, work group, or individual) is generally referred to as the focal unit by organizational researchers. In research on a focal unit, two types of levels exist: level of measurement and level of analysis. Level of measurement refers to the unit to which the data are directly attached (e.g., self-report data are generally individual level, the number of group members is measured at the group level). The level of analysis is the unit to which the data are assigned for hypothesis testing and statistical analysis. However, the level of analysis is not necessarily the level to which generalizations are made. The level to which generalizations are made is the focal unit. In practice, the focal unit often is not identical to either the level of measurement or the level of analysis. Researchers take information on classrooms or grade levels and then infer that individual student characteristics affect their performance on tests (e.g., Bidwell & Karsada, 1975). Or, a researcher may measure an individual’s sense of autonomy and the number of formal rules and regulations in an individual’s job and conclude that an organization’s technology affects its structure (e.g., Bell, 1967). What are the consequences of differences in focal unit, level of measurement and level of analysis? The problems involved in answering this question represent the basis of the methodological difficulties of multilevel research. This chapter will address some major methodological and conceptual concerns multiple levels introduce to organizational research.

**Biases and Fallacies**

Methodological issues predominate in discussions of multi-level research in organizational behavior and other social sciences. This emphasis derives from the great concern over the meaning, utility, and appropriateness of aggregated data. Aggregation refers to the combination of in-
formation from one level to represent attributes of a higher level unit (from pupils to schools, from departments to organizations). Disaggregation is its opposite, referring to the separation or breaking down of information at one level by assigning its component parts to individual units at a lower level (Cronbach, 1976). Aggregation and disaggregation alter the variances and covariances of the data, thereby influencing their correlations and regression coefficients, and possibly the meaning and character of the data themselves. Whether these arithmetic operations add meaning or error to the information value of data is a function of both the operations performed and the phenomena the data reflect.

The task of explicating the complex statistical problems involved in aggregation and disaggregation has been performed by a number of writers (e.g., Hannan, 1971; Langbien & Lichtman, 1978). It will not be duplicated here. Instead, this section will describe the major types of bias and misinformation which may arise in multi-level research.

**Misspecification.** The basic problem is misspecification. This occurs when we attribute an observed relationship to a level other than the actual behavioral or responsive unit. When employee descriptions of participation in decisions correlates with their performance, any extrapolation about organizational structure and performance risks misspecification. Use of individual-level data to say something about organizations may be an unjustified shift in level. Otherwise known as the "fallacy of the wrong level," misspecification arises from failure to establish specific-level construct validity, which is the extent to which the operationalization the researcher employs is a valid measure of a construct at the focal level. Much of the debate surrounding research on organizational climate reflects the absence of evidence establishing the validity of perceptual measures of organizational characteristics. Johannesson (1973) and Guion (1973) addressed the methodological overlap between climate and job satisfaction and inaugurated the concern with validation and misspecification now characteristic of climate research. James (1982) has addressed this issue of climate by exploring the extent to which data derived at the individual level can tell us something about a specific unit-level phenomenon. A question pervades all these writings: does aggregation add meaning to individual level data? As yet, the issue has not been resolved. A case has been made for use of aggregated data when they meet such criteria as homogeneity of within-group variance (Drexler, 1977) or interrater agreement (James, 1982). It should be noted that meeting these criteria implies that a unit-level construct is assessed by the aggregated variable, whose construct validity is thus supported. Aggregation may add meaning when the error component of the individual-level datum is reduced. Error may result from perceptual bias or other cognitive limi-
tations. Here aggregation improves reliability by averaging those individual level errors and biases that are random. It will not necessarily improve reliability where the biases are systematic across persons. Meaning can also be added by aggregation when each individual's score on a variable (X) reflects the result of a unit-level phenomenon whose overall effect is of interest. For example, if perceived leader behavior (X) impacts individual performance (Y) in a work group by creating a critical mass of job demands and structuring (X), aggregated measures of leader behavior may be more meaningful than individual-level ones. Here, homogeneity within groups on X provides evidence of the meaningfulness of X at the unit level. Within-unit consistency on X implies that X is a unit characteristic.

Aggregation bias. Equally significant is the problem of spuriousness or aggregation bias. Aggregation bias is the extent to which an apparent relationship is an artifact of the data combination method. The problem of spuriousness can be addressed statistically (Hammond, 1973) through the choice of appropriate statistics for a given type of data. Several generalizations seem to hold regarding the effect of grouping data in multi-level research:

1. Correlations of aggregate variables based on homogeneous groups (i.e., by workgroup, department, or organization) are higher than their individual-level counterparts (Hammond, 1973, Robinson, 1950).

2. In the absence of contextual effects, regression coefficients based on aggregate variables from homogeneous groupings have the same expected value as their individual-level counterparts (Fiedbaum, 1978; Hammond, 1973).

3. Consistent with (2), regression coefficients from aggregated data give unbiased estimates of individual-level relations when either of the following is true: (a) the grouping variable (G) is uncorrelated with the dependent variable (Y) when the independent variable (X) is controlled, or (b) the variance of X equals the variance of X, where X is the group mean on X.

These conditions indicate that aggregation bias is a result of the effect of X on the variables of interest at the individual level. Hammond (1973) and Langbein and Lichtman (1978) provide guidelines for reducing the spuriousness in the use of aggregated data; they suggest techniques for dealing with the grouping strategies applied to the data and the types of regression coefficients employed in analysis.

The focus of most methodological discussions in multi-level research is on the general problem of aggregation. Aggregated data are used in social science most frequently, the preference for aggregated data are often of the phenomena. Therefore, aggregated data are valid when many individual-level measures about the same individuals are as individual-level measures. However, the measurement of aggregated data to a number of fallacies may arise.

It has been shown that the correlation is a result of the magnitude of the problem. However, as Allard and Langer (1976) of fallacies illustrate, in the short term, the correlation may alter the relationship between the two measures.

Cross-level errors result from misattribution from within-level relationships. Misattribution (attributing individual-level associations and social effects collectively or selectively) is a major problem. This misattribution occurs in data to more validly reflect higher level processes. Cross-level errors occur in organizational research.

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social science largely for reasons of convenience. They are not generally the preferred type of data. Census data and other archival information are often only available in aggregated form. Researchers interested in phenomena at one level find that pertinent data are available but only in aggregated form. Similarly, some researchers may have information on many individuals and wish to say something about the social settings in which these individuals live and work. Rather than measure something about the settings directly, convenience may dictate the aggregation of individual data to a higher level to approximate information about the focal unit. In either case, there is incongruity among focal unit, level of measurement and level of analysis. It is this incongruity and not the process of aggregation per se that is of concern. Incongruity may give rise to a number of biases or errors that social scientists have labeled as “fallacies.”

It has been several decades since Robinson (1950) demonstrated that correlations and associations observed in aggregated data might differ in magnitude or sign from those observed in individual level data. The problem Robinson referred to as the “ecological fallacy” concerns the inferential errors associated with extrapolating from aggregated data back to the individual responses from which these data originally derive. However, as Alker (1969) describes, the ecological fallacy represents a family of fallacies associated with mixed-level data. In the general sense of the term, the ecological fallacy refers to the role that level itself plays in altering the relationships among variables. This fallacy takes many forms, the two most prevalent being cross-level and contextual fallacies.

Cross-level fallacies. According to Alker, these represent a class of errors researchers make. Alker uses the term to refer to a “false generalization from individual relations . . . to a universe of intercollectivity relationships (p. 79).” Writings that anthropomorphize collective activities (attributing individual human characteristics and processes to organizations and societies) risk Alker’s cross-level fallacy. Researchers may selectively endow certain human characteristics to higher-level systems. This misattribution may occur when inferences are made from individual data to more macro units or when metaphors are used in interpreting higher level data. The term organizational behavior itself may flirt with cross-level fallacy. As Roberts, Hulin and Rousseau (1978) have noted: Organizations don’t behave (people do).

I would argue that cross-level fallacies are more general than Alker’s description. The term cross-level implies that a relationship exists between a construct at one level and another construct at a different level. A major issue in multi-level research is whether isomorphism exists among similar constructs measured at different levels (e.g., conflict,
stress, performance). Isomorphism exists when the same functional relationship can be used to represent constructs at more than one level. In systems theory, isomorphism implies a formal identity between two systems or units and it is analogous to homology among concrete systems (e.g., light sensitive control devices are homologous with the human eye). Is individuality perceived climate isomorphic with departmental climate? Does organizational structure parallel departmental structure? Isomorphism implies that constructs at different levels hold the same position in a nomological network. Nomological networks give meaning to abstractions and place them in context. Isomorphism implies that constructs mean the same thing across levels.

Cross-level theories are models specifying relationships among variables at different levels. Composition theory is a special class of cross-level theory. Theories of composition specify the functional relationships among variables at different levels that are presumed to be similar along some dimensions. When the level is different but the functional relationships underlying each variable are the same, isomorphism exists. As an example of the sort of functional relationship required for construct equivalence across levels, consider the concept of conflict. Defined as the degree to which two or more parties possess differing and mutually exclusive interests (Pondy, 1967; Schmidt & Kochan, 1972), conflict may be said to arise due to the simultaneous existence of differentiation and interdependence between the parties. Differentiation in terms of values and interests and interdependence over access to scarce and valued resources (e.g., time, money, materials) at any level can lead to conflict. Isomorphism then characterizes the conflict construct across levels and we have a theory of composition. But a theory of composition might not always involve isomorphism. If our theory had specified that perceptions of differences give rise to conflict among interdependent persons and perceptions play no critical role at higher levels, then we would still have a theory of composition. But if the functional relationships across levels differ, conflict would not be isomorphic across levels.

When the same construct is used to characterize phenomena at different levels, we risk a cross-level fallacy unless a composition theory specifies functional equivalence. For example, researchers speak of individual and organizational sense making, learning, and stress response; all representing processes which may or may not be parallel across levels. The danger of anthropomorphism and other metaphors is that what begins as literary license in time may establish itself as theory. (This is not an objection to the picturesque and colorful, only to the substitution of these for clarity and specificity.) When making the inference that constructs at one level represent the same construct at another, we initiate the process of creating a composition theory. The defining characteristic of a com-
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position theory is that it specifies functional relationships underlying constructs from different levels; such theories indicate whether the variables are presumed to be parallel, identical, or only weakly related.

Contextual fallacies. Failure to specify the effects that social or physical settings have on the relationships between variables constitutes a contextual fallacy. Firebaugh (1978) demonstrates that aggregated data cannot be used to infer individual-level relations when X effects Y. Hannan (1971) argues that a spurious regression coefficient may occur in aggregated data when the relationship of X to Y is a function of some global unit-level third variable. Inferences to individual-level relations cannot be made from such data. Both cases are instances of contextual fallacy, where setting characteristics affect the relationships of interest in some way not specified by the model under study. Individual-level relationships may be altered by changes in the degree to which some attribute characterizes a unit (e.g., size, racial composition, norms).

Two basic functions characterizing the effects of behavioral settings have been labeled by Firebaugh as comparative and normative. Comparative functions represent the direct effect of group or unit-level characteristics on individual-level relationships. When norms regarding performance lead sales clerks to behave differently in response to customer requests or complaints, a contextual effect exists. Corporate culture may greatly influence individual responses to such stimuli as customer complaints, changing production demands, or new organization members (Siehl & Martin, 1982). Comparative functions act as unit-level moderators of relationships at the individual level. Generalizations of relationships between variables from one setting to the next must take into account the moderating effect of unit level characteristics or risk one form of contextual fallacy.

In contrast, normative functions operate on those individual responses which involve the relationship of the individual to a reference group. Much of the interest in the effects of behavioral settings on individuals derives from research on reference groups (Firebaugh, 1980). When responses are to some extent a function of the differences between an individual’s attributes and those characterizing the group (X-\bar{X}), a normative effect exists (where \bar{X} refers to the group standard on X). Derived from reference group theory (Davis, 1959, Pettigrew, 1967), normative effects occur when an individual’s evaluation of his or her position in the group influences how that individual responds. For example, individual intelligence scores can be expected to correlate with an individual’s emergence as a leader (Shaw, 1976). Persons with an IQ under 100 are likely to emerge as leaders only in groups with a relatively low average intelligence. The effect of intelligence on emergence as a leader can be identified only by taking into
account the level of the group's intelligence. Further, this process of leader emergence may result from assessments made by the individual (and other group members) of the individual's relative intelligence. Such normative functions have been labeled frog-pond effects because a big frog in a small pond may act differently than he or she would in a big one. Generally, normative effects result from appraisal or evaluation of one's relative standing in a group. Unlike comparative functions which assume that all individuals in a unit are equally affected by some composite unit characteristic, normative effects assume differences in individual responses according to one's relative standing.

Firebaugh (1980) has argued that frog-pond effects are not contextual ones because a difference score is computed at the individual level. However, Hammond (1973), in his discussion of contextual effects, includes the behavioral differences observed when individuals are in the company of people similar to themselves and when the group is composed of dissimilar members, what Hammond calls the class-consciousness effect. Thus, Hammond treats degree of difference from the mean as a contextual effect. Because frog-pond effects on an individual will vary as a function of changes in the group mean, they too would seem to constitute contextual effects. By including frog-pond effects in a discussion of contextual fallacies, I would argue that failure to consider both the degree of difference among individuals within a unit and each individual's relative standing within the unit (on any socially significant factor) can lead to misspecification of the effects on individual responses and may constitute a contextual fallacy.

**Conclusion.** The various fallacies described above represent misspecification of the functional relationships characterizing variables of interest. Misspecification may take the form of confusing the focal units or levels involved. It may result from failure to establish the construct validity underlying a variable operating at a particular level. And it may result when unit or group characteristics alter the relationships between individual level variables. To reduce the risk of misspecification, we need to develop theories and research designs that allow us to take issues of level into account.

**TYPOLOGY: THE STRUCTURE OF MIXED-LEVEL MODELS**

Ostensibly, level is an issue to organizational researchers because they often must choose between competing units of analysis. But the more basic underlying issue is how to properly specify our analytic models. This, and the consequent need to establish the construct validity of our
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Operationalizations at the level the model specified, are the basic problems in mixed-level research. As Burstein (1980) points out, different variables may enter a model at different levels and may mean different things from one level to the next. For example, technology-structure compatibility may impact upon effectiveness at the subunit level but not at higher levels where structure-environment fit may be the issue (Pfeffer, 1982). Consequently, we need to systematize the possible role of level in our analytic models. A general typology of analytic models may be useful here to help us understand the role level has played in organizational research and to guide future research to a more comprehensive understanding of issues of level in organizational behavior. This typology describes the various ways analytic models may mix or combine phenomena at different levels.

Table 1 describes the basic forms that mixed-level models can take. Three basic types of mixed-level models exist: composition, cross-level, and multi-level. A theory in organizational behavior may contain elements of any or all of them. The models described here are ideal or pure types.

Composition models. As described above, composition models specify the functional relationships between variables at different levels presumed

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<th>Table 1. A Typology of Mixed-Level Models</th>
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<td><strong>Multi-level</strong></td>
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<td>Relations among independent and dependent variables generalizing across two or more levels</td>
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<td>( X_1 \rightarrow Y_1 ) ( (X_2 \rightarrow Y_2) )</td>
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**Note:**
1. The structures represented here are examples of models meeting the defining criteria for a particular type of model.
to be functionally similar. Such organization-relevant constructs as satisfaction and morale and individual and organizational learning represent functionally similar pairs. A composition model specifies the nature of the similarity (e.g., isomorphic, partial functional identity, etc.). When some, but not all, functional elements are equivalent we have a partial functional identity. Individual satisfaction and group morale may have a partial functional identity; each has an affective component but only morale implies the existence of group cohesion and identification (Jewell & Reitz, 1981).

In his discussion of a composition theory for climate, James (1982) uses a functional relationship to specify how a construct operationalized at one level (psychological climate) is related to “another form of that construct (p. 219)” at a different level (organizational climate). Simply put, James argues that when the definitions of climate at the individual and unit levels are the same, psychological and organizational climate represent the same construct (p. 221). The condition required for equivalent definitions to exist at both levels is, according to James, perceptual agreement. When unit members perceive the unit in the same way, sharing assignment of psychological meaning, perceptual agreement and therefore functional equivalence between these two climate constructs exist. Whether we use agreement among individuals or differences in mean perceptions across units as our criterion depends on what our climate composition model specifies (James, 1982).

Not all composition models postulate isomorphisms. Individual and group learning involve psychologically similar processes, each resulting from individual level cognitive functions. Yet, if we compare the learning curve of a single individual to that of a group, one difference is striking: the individual-level curve is discontinuous with an abrupt improvement in performance at some point; whereas, the aggregated group curve is smooth. The reason for this difference is that the point of greatest improvement for individuals differs. Some people learn more quickly than others. The point of accelerated learning is smoothed out at the group level because individual differences in learning can cancel each other out. Though similar, individual and group-level learning are not entirely the same because individual differences are constant at one level and variable at the other. Hence, the functional specification of these two learning constructs differs.

Similar issues characterize the distinction between individual behaviors and unit-level rates of these behaviors. Suicide, absenteeism, and turnover change their distributions and possibly their meaning when we move from individual behavior to unit rates (Hulin & Rousseau, 1980). In the case of turnover, Hulin and his associates (Hom, Katerburg, & Hulin, 1979; Hulin & Rousseau, 1980; Miller, Katerburg & Hulin, 1979) indicate that while individual rates, the variance rise to turn for individual

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that while economic factors explain 70% of the variance in unit-level turnover rates, individual attitudes and behavioral intentions explain 70% of the variance in individual turnover decisions. The causal factors giving rise to turnover rates (e.g., economic growth) need not be the same as for individual turnover (e.g., dissatisfaction, high reward expectations). Explanations of rates and individual occurrences need not necessarily compete for the same pool of variance. Levels may change the nature of a construct by altering its underlying functional relations.

Composition models are one aspect of the process of establishing construct validity. They reflect part of the theory specifying the nature of a construct and the nomological network of which it is a part. These models can help the researcher resolve a controversial issue in mixed-level research: Are global (indivisible) data more desirable than aggregate data? Roberts, Hulin, and Rousseau (1978) strongly argue for the superiority of global data as measures of unit-level constructs. In asking the question, "Should we aggregate at all?" (p. 83), Roberts et al. argue that aggregate data are not directly linked to the focal level and thus create ambiguity and confusion in interpreting the data. Use of aggregate data raises questions about the phenomenon under study that generally are not raised by global data. These questions include: Is the phenomenon divisible? Is it an integrated whole? Is the whole greater than the sum of its parts?

At the heart of the matter is the issue of the value or meaning added to lower-level data by combination or arithmetic computation. Few researchers who use aggregated data address the issue. A number of assumptions may apply when aggregated data are used. A lower-level datum (e.g., perception of an organizational characteristic, a discrete behavior such as absence) may be seen to lack representativeness. It may be inaccurate due to rater or method bias. Aggregation is often described as a means of improving on lower-level data by overcoming these problems. The researcher must provide evidence for this. The development, description and validation of a composition theory for the variables involved is perhaps the best evidence.

One issue addressed directly by composition theory is whether the form of data measurement should parallel some attribute of the construct. For example, unit-level measures of ambiguity can be derived in a number of ways. People can be asked how clearly specified are rules, norms, procedures, and expectations—a commonly assessed aspect of climate (James, 1982). These data can then be averaged and used as are other dimensions of climate. Alternatively, we can ask a key informant, such as a knowledgeable supervisor, how much ambiguity exists within a unit and assign a score to the unit based on that person's answer. Or, we can ask people to describe company policy and compute the variance in their responses (Blood, 1974). A composition model would indicate the appro-
priateness of these data combination methods. If the same factors give rise to all these responses, we have evidence of convergent validity. A theory of composition for the construct ambiguity would identify what these factors might be.

Like composition theories, cross-level and multi-level models specify the relationships between constructs across levels. However, cross-level and multi-level models address the relationships between distinct constructs, those having different meanings and nomological networks. Each specifies the relationship between heterogeneous constructs from different levels.

**Cross-level models.** Cross-level theories specify causal models of the effects phenomena at one level have on those at another. These theories may take three forms (Table 1). In one form, independent and dependent variables are on different levels. Research on the effects department characteristics have on employee responses (e.g., Herman & Hulin, 1972; Rousseau, 1978) reflects such a cross-level model. A second type of cross-level model involves unit-level moderators of lower-level relationships. Data gathered by Latham and Yukl (1975) suggest that the relationship between goal setting and performance is moderated by locale (Oklahoma and Arkansas versus North Carolina) and exemplify this form of cross-level effect. A third type of cross-level model occurs when comparative effects are postulated where x (which equals X – X̄) effects a dependent variable. Relative standing within a unit derives from both individual and unit-level factors and thus is cross-level. Few examples of this model exist in organizational research, though reference group theory (Davis, 1959) suggests that such effects may be pervasive.

**Cross-level Model 1.** Much cross-level research explores the direct effect of contextual characteristics on behavior. Technology, structure, (Rousseau, 1977), climate (Drexler, 1977), and company policy (Siehl & Martin, 1982) are contextual factors that have been linked to individual-level responses. Cross-level organizational research began largely as an attempt to overcome the narrow intra-level explanations of behavior characteristic of previous research. Based on ecological psychology (Barker, 1968) cross-level research was conducted mainly by psychologists concerned with incorporating situational factors in models of behavior. Thus, cross-level theory has tended to address the effect of higher-level characteristics on lower-level processes.

This downward orientation is not a requirement of a cross-level model. Rather, it reflects the more pervasive influence of social settings on individuals than of individuals on settings (Barker, 1968). Conceivably, components may at times exert a greater influence on the units of which they are a part than vice versa. Organizational research has tended to be
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less concerned with the influence a single individual may exert on the 
organization than it has been with the perhaps more typical effect of 
organizations on individuals. However, upward-oriented cross-level 
models may be valuable in explaining phenomena such as whistleblowing, 
change agency, and problem solving. Similarly, upward cross-level influence is demonstrated by the impact individual group members can have on group decision making (e.g., Maier, 1950; Haythorn, 1953). Behling 
(1978) argues that in its own way the study of organizations is unique in 
that it is concerned primarily with the relations among phenomena at 
different levels. Treating organizational study as a multi-level field, Behl-
ing sheds new light on familiar constructs by viewing them at different 
levels. He suggests that motivational research on the effort-performance 
relationship may involve the cross-level study of how individual action 
effects the organization. Thus, direct effect cross-level models may in-
volve upward (individual→organization) as well as downward (organ-
zation→individual) relations.

Cross-level Model 2. Another frequent type of cross-level model is 
found in the study of contextual factors as moderators of individual-level 
relationships. Moderator analysis traditionally is concerned with the role 
played by individual differences in the relationship between such variables as 
the predictors and criteria of selection research (Ghiselli, 1956, 1960). In 
an organization-level research, technology (Woodward, 1958, 1965) and 
environment (Lawrence & Lorsch, 1969) have moderated the relationship 
between structure and organizational effectiveness. However, moder-
tors need not be at the same level as those variables whose relationship they moderate. Factory settings (Hulin & Triandis, 1981), performance/reward contingencies (Cherrington, Reitz, & Scott, 1971), and en-
vironmental uncertainty (Duncan, 1972) are contextual factors that appear to moderate relationships at lower levels. In the form of contextual moder-
tors, cross-level research has been with us for quite some time in the 
field of organizational study and has provided empirically-derived models 
of behavior (e.g., Blood & Hulin, 1967). White’s (1978) review of the role 
of individual differences as moderators of the job quality—worker re-
response relation contains examples of “individual difference” variables 
that are actually contextual moderators. Rural versus urban plant location and city size have been found to moderate the individual-level impact of 
job quality on employee attitude. It also should be noted that moderators from levels below that of the relations they moderate are conceivable, as 
in the case of the influence an executive’s personality has on the relation 
between organizational structure and effectiveness. The nature of lower-
level moderators is a potentially fascinating area of study.

As a basis for cross-level theory, contextual moderators do have one great weakness: they are often atheoretical and wholly empirically de-
rived. Research based on contingency theories, as in the areas of leadership and organization design, may be an exception (e.g., Lawrence & Lorsch, 1969). But more specification is needed of how and why situational factors can alter observed relations involving such factors as motivation, attitude, and personality characteristics. For a discussion of some of the issues, see Mischel (1973) and Cooke and Rousseau (1983). Moderator variables almost by definition are not the major subject of interest in the research involving them. Rather, moderators tend to be sought out when a relationship proves to be difficult to replicate across studies. Moderators often are the post hoc result of the study of other variables. Thus, there has been little theoretical elaboration of the moderating effect of context on lower level relations.

Cross-level Model 3. With the possible exceptions of research on social justice and equity, little organizational research investigates comparative processes (individual differences from group standards where \( x = X - \bar{X} \) is the independent variable). However, models of organizational behavior examining the effects of deviance or difference from a group average would be cross-level in nature.

Multi-level Models.

Multi-level models are distinct from models of composition or cross-level phenomena. Broad in scope, multi-level models postulate relationships among variables which apply at two or more levels. These models assume formal identity between constructs across levels and therefore require specification of composition models before they can be tested. This requirement of formal identity differentiates multi-level models from analogies. When we anthropomorphically characterize an organization as perceiving or thinking, we aren’t necessarily saying that we believe it does either. Analogy and metaphor (Pinder & Bourgeois, 1982; Pondy, 1977) are ways of expressing abstract processes in human terms; but they are not sufficient basis by theory. Such comparisons often begin as similes, but as their usage becomes more familiar and commonplace, the like is dropped. As Pinder and Bourgeois (1982) point out, it is one thing to say that the organization decision process is like a garbage can, and another to say that it is one. Metaphors are inherently imprecise and open to interpretation, making rigorous specification and testing difficult. It should be noted here that though general systems theory is referred to throughout this chapter, one major critic of it is its proponents’ reliance on analogies and interesting similarities in place of specificity and detailed predictions (Berrien, 1976). The framework described here assumes that formal identity of constructs has been established when multi-level models are developed.
All description is not representation. Analogy and metaphor do not provide sufficient detail for empirical testing. Multi-level models are concerned with representing as accurately as possible the phenomenon under study and thereby making its representations subject to empirical test. Specification of a testable multi-level model requires at once a level of detail that allows operationalization of the model and a level of abstractness that captures those aspects of the phenomena that generalize across levels (Miller, 1978). Functional relations giving rise to constructs must be described along with any conditions limiting the relations studied.

It should be noted that what here is called a multi-level model corresponds to propositions that Miller (1978, p. 90) has called cross-level. The present chapter reserves the term cross-level for models of relationships involving variables at different levels. Multi-level models, as used here, describe relations at one level that are generalizable to other levels. The search for multi-level models of activity has just begun. Miller argues that multi-level generalizations across levels are new to science; much in the way that cross-species generalizations were new in Darwin’s day (p. 90–91). In specifying a series of multi-level generalizations, Miller indicated the degree of confidence he has in each postulation—an unusual caveat for a theorist, indicative of the emergent nature of the multi-level perspective.

In the most rudimentary form, one such multi-level generalization is that the more components a unit has the greater the number of levels it contains (Anderson & Warkov, 1961; Berelson & Steiner, 1964; Miller, 1972). The basis for making such generalizations is the notion that there are critical uniformities across levels in the nature of the components (individuals and groupings of individuals) that lead to similar structures and processes. Support for this view is provided by Parsons (1951) who argued for similarity in structure and process in his functional model of social action.

Parsons’ work provides a fairly elaborate example of multi-level theory. Using roles and clusters of roles as building blocks, Parsons explored the effects of rewards and power on the actions of individuals and their aggregates. His models employ these same constructs across levels to explain how action is motivated in both individuals and in collectivities. Terms like “value-orientation,” “role expectation” and “goals” (p. 203) are presumed to be meaningful across levels. In specifying the relationships among his framework’s basic constructs, Parsons’ (p. 203) notes:

It should go without saying that these considerations apply to any collectivity, no matter how small a part of a total society it forms. This fundamental structural homology between the total society and sub-collectivities within it is one of the most important aspects of the structure of social systems.

This statement constitutes a succinct description of a multi-level theory.
EXAMPLES OF MIXED-LEVEL MODELS IN ORGANIZATIONAL RESEARCH

The study of organizations inherently involves more than one level. The three mixed-level models described above are found in research on such diverse topics as leadership, technology and structure relations, attitude formation, and stress responses. Mixed-level models are found in both the traditional micro and macro areas of organizational research. This section will present examples of the major forms mixed-level research takes in organizations.

Composition models. Organizational researchers investigate two major issues of composition: the appropriate level for operationalizing a construct and the interrelations among similar constructs linked to different levels. Perhaps the best example of composition-oriented research is the study of climate. Like many other composition problems, climate research has addressed the basic question: is it appropriate (or even preferable) to aggregate individual data?

Another less frequently-cited substantive area where composition models are employed is that of leadership. Traditional studies assume that leaders display the same behavioral style toward all subordinates. This presumption of style homogeneity reflects what is known as the average leadership style or ALS approach (Dansereau, Alutto, Markham, & Dumas, 1982; Moss holder & Bedeian, 1982). In this approach, leader self-report and/or averaged subordinate perceptions of the leader are treated as work group characteristics. Since within-group homogeneity of leader behavior is assumed, researchers use aggregate perceptions based on the same rationale climate researchers use to justify aggregating perceptions—that is, member consensus on a variable implies that it is a real and objective work unit characteristic. The traditional approach to leadership assumes that leadership style is a work group characteristic operating similarly on all members of the group. In contrast, the vertical dyadic linkage model (VDL) makes no assumption of homogeneity. Rather, it assumes that a leader's style may vary with each subordinate (Dansereau, Graen, & Haga, 1975; Dansereau & Dumas, 1977; Graen & Cashman, 1975). Here, leadership is considered an individual-level phenomenon not a group one.

The key difference between these models is compositional: The conceptual and operational levels diverge from one model to the next. At what level does the leadership phenomenon exist? Each model provides a different answer. In evaluating their validity, it is necessary to examine the within and between-group variance in leadership style (Katerberg & Hom, 1981; Van de Ven, 1982). Construct may be significant coexistence between the two levels. As computed by within-unit correlation, removing bet

Homeword, 1981; Van de Ven, 1982). Construct may be significant coexistence between the two levels. As computed by within-unit correlation, removing bet
Issues of Level in Organizational Research

Hom, 1981; Vecchio, 1982). To examine the levels to which the leadership construct may be linked Dansereau and his associates (Dansereau, Alutto, Markham, & Dumas, 1982; Markham, Dansereau, Alutto, & Dumas, in press) describe a technique for analyzing the composition of leadership effects: within and between analysis (WABA). When individual level data exist for N individuals and J units, WABA examines the extent to which significant correlations exist at the individual and unit levels. WABA employs two adjusted, independent correlations: (1) a between-unit correlation based on J units each represented by its average score; and (2) a within-unit correlation based on residual individual-level variation after removing between-unit differences. In a multiple unit data set, WABA is used to detect the existence of unit-level and within-unit effects. However, this technique does not establish the construct validity of the aggregated variable; it merely indicates whether there is evidence for a unit-level effect on some lower-level dependent variable.

As competing models, ALS and VDL are subject to this between and within analysis. Nonetheless, as Mossholder and Bedeian (1982) point out, these models may not in fact be mutually exclusive. The leadership phenomenon may be partitioned into individual and aggregate (unit) components of leader behavior, each of which may influence the traditional dependent variables of leadership research (individual attitudes and behavior, e.g., House & Mitchell, 1974; work group effectiveness, e.g., Fiedler, 1971). Cross-level effects may in fact exist simultaneously with intra-level effects. The WABA technique itself can yield evidence of both between- and within-unit effects. Dansereau et al. (1982) have labeled such simultaneous effects “multiplex.” The current debate in the leadership area seems to center around the compositional issue of appropriate level. It is likely that more cross-level models of leadership are in the offing as the composition controversy generates more questions about the levels at which leadership style operates and its effects on individual responses.

Technology research offers an example of an area where investigations into the phenomenon at different levels are a source of some ambiguity. A review of the theoretical and operational definitions found in technology research (Rousseau, 1983) reveals the systematic differences in definitions of technology across individual, departmental, and organizational levels of analysis. Individual-level studies of technologies typically base their assessments upon Perrow’s (1967) model and four-celled typology (e.g., Lynch, 1974; Van de Ven & Delbecq, 1974). Subunit-level studies frequently employ Thompson’s (1967) typology to describe a department’s technology (e.g., Mahoney & Frost, 1974; Randolph & Finch, 1977; Rousseau, 1977). At the organization level, Woodward (1958, 1965) and the
Aston group (Inkson, Hickson & Pugh, 1970) have provided the most frequently cited frameworks for technological measurement (e.g., Child & Mansfield, 1972; Khandwalla, 1974; Peterson, 1975; Zwerman, 1970). Also noted by Gerwin (1981), the trend toward using distinct definitions of technology across levels is striking. There is as yet no theoretical basis to believe that technology means the same thing across levels. The issue typically is not addressed.

But the use of different definitions of technology across levels has no basis in theory either. Moreover, all major contributors to the conceptualization of technology initially addressed themselves to technology as an organization-level phenomena. Research on technology has tended to make unannounced shifts in level; presuming that results at one level generalize to another, despite differences in the aspects of technology that are studied and the way they are measured. Based on the differences in technological measures, we may infer that researchers have defined organizational technology as technical complexity and degree of continuous processing orientation (Woodward, 1958, 1965; Zwerman, 1970) subunit technology as the degree of discretion exercised in the production process (Mahoney & Frost, 1974; Rousseau, 1977), and individual technology as routineness and variability (Lynch, 1974; Van de Ven & Delbecq, 1974). As yet no rationale has appeared for these cross-level differences, providing both an opportunity and a need for creation of a composition model.

**Cross-level research.** Any research problem involving the relationships between independent and dependent variables at different levels is cross-level research. Behling (1978) argues that organizational research is set apart from other social and behavioral sciences not by the elements in its domain but by its study of the relationships among phenomena at different levels. Conceptually, if not always operationally, organizational research is inherently cross-level. The classic Hawthorne studies of organizational practices and group norms (Roethlisberger & Dickson, 1964), Behling construes as investigations of the link between organizations and groups. As mentioned above, McClelland's (1961) need achievement research provides another instance of cross-level research as it examines the impact of societal rearing practices on individual needs and behaviors. By implication, any issue may be construed as cross-level when ultimate causes are environmental.

Yet despite the apparent cross-level nature of many organizational issues, little organizational research is explicitly cross-level. But, some examples do exist. Beginning in the early 1970s a line of cross-level research arose out of the traditional job satisfaction study. Herman and Hulin (1972) explore the role frame-of-reference has in shaping job atti-
tudes by investigating how departmental membership, organizational po-
tion, and personal attributes explain differences in employee attitudes. Subsequent studies (Herman, Dunham & Hulin, 1975; Rousseau, 1978) treat nonindividual level variables as contexts which may evoke differences in individual responses. A cursory look at these studies will indicate a striking similarity: Each tends to be wholly empirical and without any theoretical basis. Cross-level organizational research generally explores the relationship between context and behavior outside any conceptual framework. Few cross-level hypotheses have been generated in such studies. We know context impacts upon individual responses, but we have little idea why.

Nonetheless, there is a theoretical tradition addressing the context-
response connection: ecological psychology. The study of contextual or situational characteristics as behavior determinants is rooted in objective examinations of human behavior. Building on classical and operational conditioning, Brunswick (1953) describes the interaction of environment and behavior as a stable, time-space bound unit that gives rise to patterns of behavior made predictable through knowledge regarding the context of the behavior. Barker (1968) has extended this work to formulate an ecological psychology for the systematic study of the environment of human behavior. Ecological psychology focuses on behavioral episodes occurring within a specific context where discrete behaviors are clustered into units made meaningful by knowledge of the settings in which they occur. In ecological psychology, contexts structure behavior. The exchange of money for goods in a grocery store reflects a set of micro behaviors recurring in a context which both evokes them and gives them meaning in the larger social system. The attributes and function of contexts are the qualities ecological psychologists use to understand individual behavior.

Organizational applications of ecological psychology are evident in investigations of undermanning theory in system design (Lozar, 1974; Wicker, McGrath, & Armstrong, 1972) and in the social ecology of organizations (Wicker, 1979). Both lines of research indicate that different patterns of behavior are evoked by settings varying in physical size, population density and activity requirements. Both areas of research employ individual behavior as the dependent variable and unit-level characteristics as independent variables.

Cross-level research by its very nature challenges traditional disciplinary boundaries (Roberts et al., 1978). The results of dissolving disciplinary barriers to research at several levels are: (1) improved specification—the recognition of the effects phenomena at one level have at another; and (2) increased generalization—the discovery of the cause-effect relationships that occur across several levels. Cross-level models
are concerned with accurately specifying the causal network operating on a dependent variable, taking into account the diverse levels of causes that may exist. Development of such models augurs well for improved specification in organizational research. However, it is multi-level models that directly address the issue of generalization.

**Multi-level models.** Multi-level models specify patterns of relationships replicated across levels of analysis. Hence they are concerned with generalizations that may be made from phenomena observed at one level to those occurring at another. In multi-level models, the contribution that different disciplines can make to each other is perhaps most evident.

When relationships among variables generalize to two or more levels, multi-level phenomena exist. Models characterizing such relationships have far-reaching implications for the study of organizations. Roberts et al. (1978) argued for recognition of the implications of findings at one level for phenomena at other levels. They did so out of concern for the disciplinary narrowness that leads researchers to focus on a single level of analysis in the study of organizational phenomena.

Though multiple-level theory is not explicitly addressed by most organizational researchers, examples of such generalizations abound in the field. From Parkinson (1957) to Miller (1972), organizational scientists have formulated propositions that have been applied to individual, group, and organizational activities. Parkinson’s (1957) tongue-in-cheek foray into organizational analysis produced a “law” (or more accurately a set of propositions) that has been tested at the individual (Bryan & Locke, 1967) as well as at the organizational levels (Anderson & Warkov, 1961). Miller (1972) acknowledges the generalizability of propositions regarding organizational activity by enumerating his organizational hypotheses using a scheme parallel to that which he used at other system levels. He argues for “large generality across levels” (p. 2).

A multi-level theory is generally derived from some basic proposition whose components have meaning at several levels. For example, Thompson’s (1967) basic notion that power is derived from controlling uncertainty applied to individuals with expertise others lack but need, and to groups so placed in the organization’s workflow that under conditions of uncertainty they make strategic choices on which the well being of others depends. Power, the ability to influence others, and uncertainty, the inability to specify perfectly the outcome of a decision, each have meaning at the individual and group levels, and have a pattern of interrelations comparable from one level to another. In a multi-level theory, both the constructs and their interrelations generalize.

Thompson took a basic premise that reducing uncertainty is essential to the creation of organizational rationality and generated hundreds of
propositions, some referring to individual actors and others to group or organizational processes. These propositions derive from the pervasive effect the search for rationality has on processes within organizations, an effect that may be termed a "dynamic" in the sense of its use by Katz and Kahn (1978). Katz and Kahn employed the term system dynamic to refer to functionally derived characteristics of social organizations (p. 48) where basic properties of organizations as systems give rise to pervasive and recurrent patterns of organizational activity such as resource acquisition and member integration. Thompson's propositions do seem to derive from a systems paradigm, particularly from the notion of open and closed system strategies for organizational study as described by Gouldner (1959). That such generalization should result from identifying system dynamics in organizations is in keeping with the prevailing general systems theory assumption of isomorphism across levels (e.g., De Greene, 1973; Katz & Kahn, 1978).

In what is expressly identified as a multi-level analysis, Staw, Sandelands, & Dutton (1981) confront the generalizability issue. They explore parallel processes shaping how individuals, groups, and organizations cope with adversity and identify a general threat-rigidity effect. While previous models emphasize organizational and not individual and group reactions to adversity (see Smart and Vertinsky (1977) for an exception) Staw et al. reasoned that all three levels experience adverse environmental events ("threats"). Their analysis focuses on patterns of threat responses observed at each level and their essential similarity across levels. Defined as the tendency toward demonstrating well-learned or dominant responses, rigidity in response to threat takes many forms across levels: less flexibility in choice of problem solutions, repetitions of practiced responses, behavioral fixation, reduction of information search (individuals); uniformity of behavior, groupthink (groups); and reduction of policy alternatives, search for supportive information, reliance on standard procedures (organizations). At all three levels, threat appears to produce a restriction of information flow and a narrowing of the behavioral or response repertoire, providing support for a generalized threat-rigidity effect.

Staw et al. employ what they term the "systems metaphor" (p. 517) in describing how threat may induce system rigidity through its activation of internal control mechanisms. Compatible with a systems perspective, this multi-level analysis is the product of both recognition of patterns of relations across levels and attention to the composition or meaning of the threat and rigidity constructs. It also addresses an important issue for those critics who fear that generalization is easily confused with anthropomorphism:
The anthropomorphic quality of macro-level propositions may be the product of parallels in the effect of threat upon individual, group, and organizational behavior. Anthropomorphism may also result from the fact that organizational actions are often initiated by individual and group forces, such that social and psychological effects indirectly influence organization-level phenomena (Staw et al. 1982, p. 301).

In this and other formulations of multi-level hypotheses we see the application of a general systems theory perspective to specific organizationally-relevant processes.

DEVELOPING MULTI-LEVEL THEORIES OF ORGANIZATIONAL PHENOMENA

Organizational applications of systems theory have tended to focus on the general functions and mechanisms common to all organizations and the structuring of different system types. The latter issue revolves around the different elements comprising organizations (i.e., concrete, abstract, and activity systems) and corresponds to the comparative study of species in the natural world. While we have begun the comparative study of organizational types (e.g., profit/nonprofit; Zaltman, 1979) and their component elements (e.g., Georgopoulos & Cooke, 1979; Rousseau, 1981), levels are the new frontier.

Multi-level theory is an ideal of science (Laszlo, 1972). Its major advantage is that:

the many entities investigated by the diverse empirical sciences would be plotted on a map of hierarchical organization and the theories applicable to them could thereby by interrelated (Laszlo, 1972, p. 48).

A synergistic increase in knowledge may be realized with the recognition of patterns of relations across levels. In science generally, and in organizational science in particular, the goal of multi-level theory can be realized only with: (1) the general adoption of interdisciplinary approaches to research, and (2) with theoretical specification and empirical confirmation of a hierarchy of levels. As Berlinski (1976) indicates, the concept of hierarchy is itself made problematic by the difficulties inherent in matching theoretically corresponding levels with empirically known entities. Where does the group end and the organization begin? A well-defined hierarchical scheme is needed to answer such a question.

Regardless of the criteria used to define the hierarchy, a science of multi-level phenomena must seek some sort of boundary conditions for each level. In organizational research, levels may be hard to specify in absolute terms. People can unambiguously be identified as individual-level entities. Organizations have a legal status which can be a defining
attribute. But at times, it is difficult to classify the units studied. Dependent organizations, those owned by a parent firm, and the parent company itself have a somewhat ambiguous status. Most units can be assigned a hierarchical level based on the nature of their components (organizations are differentiated internally into subunits; groups disaggregate into individuals). However, some departments have their own subgroups and some organizations are so highly dependent on a parent organization that in fact they may respond like a department of that larger organization. The problem organizational scientists face is how to identify and differentiate those levels associated with organizational phenomena without a clear typology of organizational units. Miller argues that individuals, groups, and organizations are basic levels of living systems. He distinguishes groups from organizations primarily through the distinction that groups have no echelons. Organizations are characterized as multiechelon systems whose components and subsystems can be subsidiary organizations, groups, and individuals. However, organizational researchers may require a more detailed specification of types of organizational units, particularly since we often generalize from organizations to departments, and from intradepartmental groups to interdepartmental coalitions. In short, we must specify the levels or types of organizational units meaningful to us from the perspective of theory development and empirical generalization.

Level assignment is an issue because it is sometimes necessary or convenient for researchers to draw samples combining organizations and departments, each varying in terms of their relative autonomy and internal differentiation. Can we meaningfully combine data from a large branch bank with 50 employees with those of a small service organization of the same size? Many organizational studies explicitly mix branch banks, government offices, small businesses, and company headquarters (e.g., Sutton & Rousseau 1979). More often, organizational studies are based on unspecified types of "organizations" whose actual status may be difficult to determine. Such samples may confound levels and cloud results, particularly given the difficulty of specifying environmental effects on the phenomena under study when investigating samples combining organizations and departments. Because the nature or status of an organizational unit may be associated with distinct causal mechanisms, the unit's position in a conceptual hierarchy of organizational activity is an issue. In evaluating the level of any organizational unit, it is helpful to consider the issues raised by two perspectives of hierarchy: functionalism/reductionism and inclusion models.

Functionalism/reductionism. The first view of hierarchy emphasizes the functions or processes performed by the unit under study, a perspective
derived from combining the sociological heuristics of functionalism and reductionism. Functionalism identifies and characterizes a system or focal level in terms of its role as a subsystem of a large whole (Kuhn, 1974). It is a static upward-oriented perspective reflecting the teleological notion that a system exists to carry out a function for its (higher-level) sponsor. Departmental activities, therefore, are interpreted in terms of the contribution they make to the total whose processes give rise to the system's character and activity. Reductionism is a downward-oriented view focusing on the components constituting a larger unit. Departmental activities can thus be viewed as the result of individual performance and behaviors from a reductionist perspective. Difficulty with the functionalist perspective arises in that informal organizational activities cannot, by definition, be accounted for by the teleological perspective. No higher-level functions are necessarily served (Kuhn, 1974, p. 452). A major problem with reductionism is how to derive complex processes from simpler ones without ignoring the emergent properties associated with higher-level activities.

Despite their limitations when considered separately, taken together functionalism and reductionism allow the specification of a hierarchy of systems when there is functional interdependence. Individual members performing jobs specified by the organization, and work groups organizing the efforts of individuals, are identifiable through the functional relationships among these entities. The functionalism-reductionism approach to hierarchy allows specification of relative levels (e.g., whether the level studied is higher or lower than other levels for which data are available). It allows us to determine the relative position of departments, subgroups, dominant coalitions, and parent firms. It also leads to the conclusion that the number of distinct units comprising the enacted environment of the focal unit increases with hierarchical level as does the degree of internal differentiation. These conditions result from the unit's performance of increasingly complex tasks at higher hierarchical levels and the corresponding need to coordinate activities of components. Thus, functionalism/reductionism suggests a need to take into account the greater complexity of higher system levels when generalizing from lower to higher level responses. In particular, the effects of environmental diversity and internal differentiation on the higher-level system must be considered. This approach does not allow us to identify and define one level independently of others. In consequence, this approach cannot yield the well-defined hierarchical scheme needed to facilitate comparative organizational research. It does, however, facilitate intra-organizational comparisons.

Inclusion. The second view of hierarchy is based on the concept of inclusion, where higher levels are comprised of lower ones—a relation-
ship of parts to a whole. In presenting his view on phenomenological levels, Spinoza employed the concept of inclusion to specify the properties and requirements of a hierarchy (Churchman, 1971). Under Spinoza’s conditions of inclusion, $S_1$ is higher than $S_2$ if every element of $S_2$ is included in $S_1$ but not vice versa. One result of this condition of inclusion, Spinoza argued, is that every property of $S_2$ can be defined in terms or properties of $S_1$, but not vice versa.

In developing a multi-level perspective, organizational scientists must determine the extent to which the principle of inclusion holds in the hierarchy of organizational phenomena. Certainly, all groups are composed of individuals, and organizations of individuals within groups. But it is unlikely that we can completely link every property of individuals or groups to the organizations of which they are a part. A major reason for this difficulty is the importance of factors outside the organization, notably the non-work roles individuals hold, in shaping their behavior. The multiple roles held by organization members within and outside the organizations lead to what Allport (1962) terms partial inclusion, the segmental involvement of people in social groupings.

From the organizations’s perspective, partial inclusion is the extent to which an organization’s components are shared with other systems. Families, informal social groups, and religious institutions share members among themselves. Moreover, partial inclusion characterizes intra-organizational roles as well. Department members may also be part of extra-departmental groups (e.g., committees, coalitions). Partial inclusion gives rise to the organization’s need to integrate members into their multiple roles (through norms and socialization) and to maintain their involvement in the job (through rewards and sanctions; Cooke & Rousseau, 1981).

Participation in multiple roles complicates any hierarchy based on inclusion. However, the concept of inclusion is useful in exploring cross-level relationships. Every attribute of organization members is obviously not exclusively defined in terms of the work group or organization of which these members are a part. Nonetheless some inclusion does exist, allowing individuals, groups, and organizations to be linked through the effects one level has on another. Cross-level research on the effects of higher level phenomena on lower-level responses suggests that the behaviors and attitudes of partially included members are related to unit characteristics. Between 10% and 30% of the variance in individual responses may be explained by characteristics of organizational settings (Herman & Hulin, 1972; Rousseau, 1977, 1978). But partial inclusion precludes any deterministic view of hierarchy. The responses of lower levels are not wholly determined by higher levels. However, degrees of inclusion may contribute to the strength of cross-level relations; the more included is an entity (individual, group, or organization) in a higher-level unit, the
stronger any cross-level relationship should be. Degree of inclusion may therefore be an important construct in cross-level research.

Both functionalism/reductionism and inclusion principles form the basis of hierarchical schemes differentiating basic types of entities or units linked to organizational phenomena. Functionalism/reductionism specified the hierarchical position of a unit through its relative autonomy (or dependence upon other units) in obtaining inputs and exchanging outputs. As a class, organizationally-linked groups such as departments and workgroups are dependent often exclusively on the organization to provide inputs and consume outputs. Organizations as a class are dependent upon a more highly differentiated environment and must use inputs from the environment to maintain and coordinate an internally differentiated structure. Inclusion hierarchies specify position through the distinct types of components comprising the focal unit and the degree to which the unit is contained by other units. Inclusion hierarchies such as Miller's (1978) differentiate major types of levels by the presence of echelons (if any) and the nature of the components constituting these levels. Organizations, as multiechelon systems, contain lower-order systems (individuals and groups) and directly influence and constrain the responses of these units. To the degree that organizational components are partially included in other systems, we would expect limitations upon the predictability of component responses based on organizational factors.

Both functionalism/reductionism and inclusion principles form the basis of hierarchical schemes. They may both be employed to specify the levels or type of focal unit associated with the phenomena of study. Functionalism/reductionism specifies the hierarchical position of a unit through its relative autonomy (or dependence upon other units) in obtaining inputs and exchanging outputs. Inclusion hierarchies specify position through the distinct types of components comprising the focal unit (e.g., individuals, groups, and organizational systems) and the degree to which the unit is contained and influenced by other units. But neither resolves the question of what we are comparing when we make inferences from departments to branches or from dependent to autonomous firms. Each hierarchical model does suggest, however, that environmental conditions and internal differentiation may moderate observed relations. Organizational science could benefit from conceptual work on hierarchical frameworks such as these.

GUIDELINES FOR CROSS-LEVEL AND MULTI-LEVEL THEORY AND RESEARCH

Mixed-level research methodology has emphasized data aggregation issues, almost to the exclusion of other pertinent design problems. Mixed
level theory development has been sparse in organizational science. Development of mixed-level approaches to organizational research involves new strategies not only in data manipulation and analysis but in hypothesis and theory development and research design as well. Fundamental measurement concerns such as validity and operationalizations are also pertinent and pose special problems. This section proposes strategies and guidelines for developing mixed-level theory and research.

_Hypothesis and theory development_

1. Theories must be built with explicit description of the levels to which generalization is appropriate. Organizational theory abounds with models whose appropriate level is ambiguous. The bureaucratic processed modeled by Merton and Gouldner (March & Simon, 1958) describe individual actions, yet inferences are made regarding the operation of organizational structures. Similarly, the natural systems and goal models of organizational effectiveness have often been applied at the departmental level (e.g., Mahoney, 1967; Ronan & Prien, 1973), though neither model explicitly addresses departmental processes (Etzioni, 1964; Yuchtman & Seashore, 1967).

2. To develop multi-level models of organizational processes, it is necessary to develop composition theories to establish whether constructs generalize across levels. To do so requires specification of the functional relations underlying each construct. The underpinnings of any construct are its causal determinants. Conditions giving rise to a construct must be identified before cross-level generalizations can be made. Multi-level models are thus based on sophisticated and detailed models of the constructs involved.

3. Along the same lines, level-specific construct validity must be determined for any construct taken from one level and applied to another. Researchers often are cavalier in their use of constructs from one level as surrogates for those at other levels. Group behaviors such as suicide rates and classroom reading levels may be substitutable for individual suicide data and student reading achievement; but first one must establish the construct validity of these unit-level variables. Shifts in level alter the base rate and often the distribution of variables and thus their relationship to factors of interest (Hulin & Rousseau, 1980). At the very least, researchers must address the possible effects that measuring constructs from one level at another level may have on the observed relations.
Research Design

1. A number of procedures are necessary to allow cross-level and multi-level hypotheses to be tested. Of paramount importance is the assurance of variability in unit characteristics in cross-level research. For any N individuals, the design strategy should be to maximize the number of units (J). This strategy makes possible the analysis of unit level and individual level relationships while at the same time allowing cross-level relations to be examined by correlating individual-level measures with unit-level scores associated with all individuals in a unit. When J is small compared to N, variability in unit characteristics will be low and will be insufficient to test hypotheses involving relations between unit characteristics or between unit and individual-level variables. For an example of this approach, see Cooke, Kornbluh, and Abramis (1982) or Cooke and Rousseau (1981).

2. In such a research design, it is necessary that individual data be matched to the unit and macro-unit from which they are obtained. Individual-level data should be assigned identification codes that can be used to link them to their organizational units.

3. When unit characteristics are to be assessed through perceptual data and their effects on individuals derived from self-reports, unit members can be divided into two groups to avoid common methods bias: one group can act as raters providing their perceptions of the unit’s characteristics (independent variables) and the other group can act as respondents reporting on the possible effects they have experienced (dependent variables). For example, if the relationship of work group climate to individual motivation is of interest, perceptual measures of climate can be obtained from some group members and measures of motivation from other group members. Correlations computed between these two variables will be free of common methods bias.

4. Whenever possible, global variables should be used in place of or in addition to aggregate data for all pertinent levels. Global variables avoid ambiguity about the level to which the variables are linked. Burstein (1980) disagrees with this recommendation, however, arguing that it is better to measure variables at the lowest level possible. His strategy makes it possible to aggregate individual level data to multiple levels when cross-level studies are conducted. Since the construct validity of any aggregate must be established rather than assumed, I believe that Burstein’s strategy is only appropriate where a purpose of the study is to establish the appropriate level(s) of aggregation where use of aggregated data is un-

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5. When individual level data are aggregated to the unit level to measure characteristics or attributes of the unit, it is important to establish the extent to which unit members agree on their descriptions of the unit prior to aggregation. This approach treats unit members as raters of unit characteristics. The correlation ratio ($\eta^2$) and indices of interrater agreement are appropriate indicators of the degree of within-unit consensus.

Data manipulation and analysis

1. Maintain all data at the lowest measurement level possible. Data should be collected at the most appropriate level, but once collected, it is important that access to the lowest measurement level be maintained. It is thus recommended that researchers build data files in which aggregated measures and their lower level counterparts be simultaneously available. Such file structures allow and encourage examination of cross-level relations.

2. Levels of analysis should be chosen to be consistent with the level of the focal unit. Generally, this level corresponds to that of the dependent variables. Outcomes of interest are often more clearly linked to the focal units: attitudes are individual, rates of performance are unit level; though independent variables often derive from several levels. Though dependent measures often receive less attention than independent variables in conceptualization and assessment, establishing the appropriate level of the dependent variable(s) may be critical to multi-level research design.

3. In cross-level research typically, the dependent variable is at the individual level and (some) independent variables are global variables attached to higher levels. In such cases, where correlational analyses are conducted, all individuals in the same unit should be assigned the same global score for any global variable (Herman & Hulin, 1972; Rousseau, 1977, 1978) and correlations should be computed at the individual level. This approach allows effects of unit characteristics on lower level responses to be assessed at the levels where those effects are hypothesized to occur.

Conclusion

Issues regarding level are inherent and unavoidable in organizational research. Problems generated by mixing organizational levels are largely
conceptual and theoretical. Methodological issues of aggregation or choice of appropriate levels of measurement ultimately must address the underlying theory. Although the bulk of work currently undertaken regarding multi-level organizational research is methodological in nature, hard conceptual work might be what is most needed. Of particular importance is the development of theories for modeling organizational hierarchies (of components and of the relations among various organizational units, e.g., departments, branches, work groups, etc.), the effects of context on individual behaviors and group-level activities, and compositional effects of individuals and groups on higher system responses. Currently, research addressing such issues is found in the area of behavioral ecology (Sommer, 1969; Wicker, 1979), social information processing (O’Reilly & Caldwell, 1979; Salancik & Pfeffer, 1978), vertical dyadic linkages (Dansereau, et al. 1975), and the structuring of organizational components (Rousseau & Cooke, in press).

Much of this research has been conducted without formal recognition of its multi-level implications. Organizational science is in the process of formally acknowledging what has long been evident in its conduct and application: the multi-level character of the field and its subject.

NOTES

1. However, it must be noted that studies may address multiple echelons (e.g., Comstock & Scott’s (1977) comparison of within-unit tasks and sub-unit technology). Since such phenomena essentially occur at the same qualitative level, it is assumed that although distinct processes may operate at different echelons, these are perhaps less divergent than processes occurring at different levels.

2. Strictly speaking, Hammond seems to refer here to groups differing in the degree of heterogeneity or variance along a particular characteristic. Roberts, et al. (1978) have argued that variances in and of themselves are useful measures of unit-level characteristics, since varying degrees of group homogeneity may produce different individual responses. For example, divergent perceptions of work unit structure may produce strain and conflicts among group members.

3. It should be noted, however, that Bryan and Locke’s results support Parkinson, but those of Anderson and Warkov do not.

4. Combining offices, plants, headquarters and small businesses in a study of “organizations” might, in fact, constitute a mixed-echelon study where similar units having different positions in an internal organizational hierarchy can be compared.

5. However, in organizational research particularly, it is important that the psychometric properties of global data be addressed. Many organizational level studies (e.g., Inskon, Hickson, & Pugh, 1970) use a single interview with a chief executive officer or other key informant as a source of global measures of organizational characteristics. Validation of such operationalizations is needed.

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