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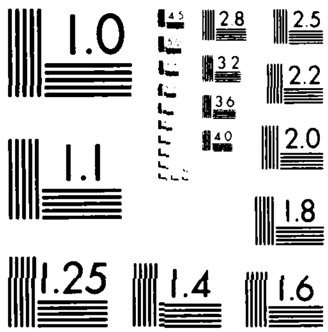

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THE CONCEPT OF FIT IN CONTINGENCY THEORY

by

Andrew H. Van de Ven

and

Robert Drazin

THE STRATEGIC MANAGEMENT RESEARCH CENTER

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University of Minnesota

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This paper identifies and compares three basic approaches for examining contingency theories of organization design: selection, interaction, and systems approaches. These three approaches clarify much of the current confusion in the literature on contingency theory, and suggest ways that future theorizing and research can become more systematic and constructive.

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THE CONCEPT OF FIT IN CONTINGENCY THEORY

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Abstract

Contingency theories dominate scholarly studies of organization behavior, design, performance, planning and management strategy. While they vary widely in subject matter, they have the common proposition that an organizational outcome is the consequency of a "fit" or match between two or more factors. "Fit" is the key concept in this proposition, and the core problem common to contingency theories is not defining this term clearly. This paper examines three ways to define and test this concept of fit: Selection, Interaction, and Systems approaches. A critical discussion of these three approaches will clarify much of the current confusion in the literature on contingency theories, and suggest ways that future theorizing and research can become more systematic and constructive.

Introduction

Structural contingency theory, which has dominated the scholarly study of organizational design and peformance during the past twenty years, has recently been losing currency because of apparent inability to address its theoretical and empirical problems. Witness, for example, the disparing commentaries on structural contingency theory by Schoonhoven (1981) and Mohr (1982). Ironically, however, scholars have increasingly begun to propose and embrace other management theories which are, at bottom, even more complex and unresolved systems of contingency propositions. For example, there has been a wave of enthusiasm for the McKinsey 7-S framework (Paschal and Athos, 1981), Theory Z (Ouchi, 1981), the eight characteristics that fit together in excellent companies (Peters and Waterman, 1982), and expansions of Leavitt's diamond model for designing innovative organizations (Galbraith, 1982a) and for organizing the stages of growth of new ventures (Galbraith, 1982b).

Like the earlier structural contingency theories now fallen into disrepute, these models are commonly based on the basic proposition that organizational performance is a consequence of fit between two or more factors --such as the fit between organization environment, strategy, structure, systems, style, culture, etc. Structural contingency theorists have tended to focus more simply on the fit between organizational context and structure to explain performance.

Much of the instability and confusion with these models arise from the lack of explicit and careful development of the underlying concept of "fit." Despite the central and critical role that this concept plays, few scholars have seriously examined its implications. Rather, it appears that scholars approach their investigations with a general meta-theoretical perspective in mind that includes a definition of fit as part of a large, implicit pool of assumptions. We contend that little scientific progress will be made with these more complex models until their basic common problems -- especially their failure to deal explicitly with this underlying concept of "fit" -- are worked out in the simpler structural contingency theory setting.

The definition of fit that is adopted is central to the development of a contingency theory, to the collection of data, and to the statistical analysis of the proposition. In the historical evolution of structural contingency theory, at least three different conceptual meanings of "fit" have emerged, and each significantly alters the essence of a contingency theory of organization design and the expected empirical results. These three different approaches to fit are illustrated in Figure 1, and are the focus of this paper. We believe that the Selection, Interaction, and Systems approaches to fit illustrated in Figure 1 include most -- not all -- of the interpretations that have been taken to examine contingency theory. Morever, we believe that the three approaches clarify much of the confusion in the structural contingency theory literature and provide a repertoire of alternative directions to further the development of contingency theories in general.

The purpose of this paper is to examine the historical development of the Selection, Interaction, and Systems approaches to structural contingency theory, and to make some suggestions to further develop theory and research within each approach. We will discuss the different kinds of information each approach provides for understanding relationships among organizational context, design, and performance. We will also discuss how the three approaches compliment each other for obtaining a broader appreciation of contingency theories in general than have been provided in the past. In so doing, we hope to clarify and build upon the diverse and conflicting literature on contingency theory, and to suggest ways that future theorizing and research can become more systematic and constructive.

-- Insert Figure 1 Here --

THREE APPROACHES FOR DEFINING "FIT"

1. The Selection Approach

Initially, the most common interpretation of "fit" was that the design of an organization must adapt to the characteristics of its context if it is to survive or be effective. In other words, organizational context is hypothesized to cause organization design, based on the premise that effective organizations adopt structures that fit their situations relatively better than those that are not effective. Here, "fit" was initially an unquestioned axiom, but more recently it has become viewed as the result of natural selection forces in which the distribution of resources in the environment determines organization structure.

Many early contingency researchers did not test the basic assumption underlying their particular contingency theories; they only examined the organizational context-design link and did not explicitly include an analysis of organizational performance. For example, Perrow (1967, 1970), Grimes and Klein (1972), Van de Ven and Delbecq (1974), and Dewar and Hage (1978) similarly defined task or technology by two dimensions: the number of exceptions, and the degree to which search is analyzable. They found that these two task dimensions distinguished alternative types of organizational structures. Using other technology dimensions, other researchers found strong relationships between various characteristics of technology and structure in the overall organization (Harvey, 1968; Hage and Aiken, 1969; Freeman, 1973), in units within organizations (Hall, 1962; Fullan, 1970; Hrebiniak, 1974; Tushman, 1977; Marsh and Mannari, 1981), and across levels of organizational analysis (Comstock and Scott, 1977; Pierce et al, 1979; Nightingale, et al., 1977). However, none of these studies presented evidence on whether the types of structures found to exist under different task or technological conditions were effective.

More recently, the assumed relationship of performance in explaining context-structure links has been developed with greater clarity as a natural selection argument by Hannan and Freeman (1977), Comstock and Schroger (1979), Aldrich (1979), and McKelvey (1982). Using an extended

Figure 1. Alternative Interpretation of "Fit" in the Evolution of Structural Contingency Theory

	SELECTION APPROACH	INTERACTION APPROACH	SYSTEMS APPROACH
INITIAL VIEWS	Assumption	Bivariate Interaction	Consistency Analysis
--Definition	Fit is an assumed premise underlying causal organization context-structure models.	Fit is the interaction of pairs of organizational context-structure factors on performance.	Fit is the internal consistency of multiple contingencies, structural, and performance characteristics.
--Test Methods	Correlation or regression coefficients of context (e.g., environment, technology or size) on structure (e.g., configuration, formalization, centralization) should be significant.	Context-structure interaction terms in MANOVA or regression equations on performance should be significant.	Deviations from ideal type designs should result in lower performance. The source of the deviation (in consistency) originates in conflicting contingencies.
CURRENT-FUTURE VIEWS	Macro Selection	Residual Analysis	Equifinality
--Definition	Fit at micro level is by natural or managerial selection at macro level of organizations.	Fit is conformance to a linear relationship of context and design. Low performance is the result of deviations from this relationship.	Fit is a feasible set of equally effective, internally consistent patterns of organization context and structure.
--Test Methods	Variables subject to universal switching rules should be highly correlated with context. Particularistic variables should exhibit lower correlations.	Residuals of context-structure relations regressed on peformance should be significant.	Relationship among latent context, structure and performance constructs should be significant, while observed manifest characteristics need not be.

population ecology framework, Fennel (1980) argued that hospital clusters should be isomorphic with and optimally adapted to the level of resources and institutional expectations of their environments. Underlying this assumption of selection agent is the presumption of an attained equilibrium between environment and organization. Dewar and Werbel (1979) maintain that this assumption may not be viable. Given turbulent environments (Emery and Trist, 1965) and high rates of technological diffusion (Schon, 1971), it is more likely that organizations are in a continuous process of adaptation rather than in a state of being adapted. As a result, structural variations within types of organizational contexts exist, and these variations should affect different levels of organizational performance. In the long run, however, only those forms of organizations effectively adapted to their environments should be expected to survive, and consequently only context-structure relationships need to be examined (Hannan and Freeman, 1983).

A managerial view of this natural selection argument becomes relevant when one takes different levels of organizations into account. Most organizations and units within them are constrained in choosing or adopting the structural patterns that reflect their particular circumstances. No matter what the level of organization one is examining, there usually exists a more macro level that imposes, at least in part, uniform practices and prescriptions upon more micro organizational units (Powell and DiMaggio, 1983). Government laws regulate industries, industrial codes constrain businesses within that industry, organizational policies impose uniformities on divisions, sections, and units within them, etc. Even though it may affect their performance, the focal organizational systems under investigation must conform to these uniform rules and procedures or they are selected out (because they do not "fit" with the prescribed institutional practices) by the macro organizational collectivity of which they are a part. This managerial view of selection means following macro organizational rules or policies that are imposed by authority or convention on all organizational systems under investigation.

These macro organizational rules tend to be imposed on the focal systems in two ways: (1) uniformly without regard for the types of systems to which they apply, and (2) situationally through a set of switching rules that take different types of systems into consideration. These different kinds of macro organizational rules will have different effects in explaining variations in performance among organizational subunits.

Uniform macro organizational rules may affect performance of the overall industry or organization but not performance variations among its subunits. This is because there is little, if any, variation among subunits in the application of these uniform rules; statistically, they are held constant. In the case of organizations, there are many structural characteristics of subunits that do not reflect their immediate task environment, technology, resource dependence, or size, but instead reflect the uniform policies and rules of the overall organization. Performance variations among organizational subunits should only be expected to result from those context and design factors that vary and are at the discretion of the people within the subunits.

Another way that organizations limit the discretion of subunits, yet permit them some flexibility to cope with their particular task contingencies, is to adopt a set of switching rules or contingency programs that uniformly prescribe different structural designs for different types of subunits within the organization. For example, most organizations have switching rules about job classification, personnel recruitment, and incentive systems that largely govern a variety of micro organizational design characteristics, including job standardization, personnel qualifications, and personnel incentive schemes. These schemes prescribe the kinds of job descriptions, personnel qualifications, and reward procedures that must be used for different kinds of subunits. While one will observe variations in scores on these dimensions between different types of subunits and jobs, the switching rules for determining the levels of job standardization, personnel qualifications, and incentive procedures exist external to the focal units. They were established universalistically at the macro organizational level. As a result, one should not expect these "selected" design dimensions to interact with the particular contextual factors of focal units to explain variations in their performance.

If the unit of analysis shifts to a more macro level, these universalistic switching rules, of course, become particularistic or variable. But then one will be investigating a set of questions and performance criteria that are different from those examined at the more micro level. Furthermore, an assessment of these more macro organizational questions and performance criteria will need to grope with the universalistic prescriptions that are particularistic to the next broader level of organizational analysis.

Some support for this managerial selection view can be found in Dewar and Werbel's (1979) analysis of departmental structure. The authors report a high correlation between routineness of technology and formalization ($R = .52$, $p<.01$). This indicates that more variance in formalization between departments exists than within departments. The fact that no interaction effects of technology and formalization on performance were obtained provides support for this selection view. Unfortunately, unlike Dewar and Werbel, most researchers using this selection approach to define fit do not measure performance and are content to merely assume a causal impact of context on structure.

We believe that future developments of the selection approach to fit in contingency thecries may yield promising results if multiple levels of organizational analyses are taken into account, and if one brackets those context and design characteristics that are fixed (or universal) and variable (or particular) at each level of organization. With this modification of the selection approach, "fit" in a contingency theory for focal organizational units becomes one of conforming with natural or managerial selection at the macro organization level, on the one hand, and the interaction of particularistic context and design factors on performance for subunits, on the other hand.

2. The Interaction Approach

A second interpretation of "fit" is that it is an interaction effect of organizational context and structure on performance -- like the interaction of sun, rain, and soil nutrients on crop yields. Unlike those who adopt the first meaning of fit and wish to know how sun, rain, and soil nutrients affect each other, with this second meaning of fit one is principally interested in improving crop yields and believes that the answer lies in the joint covariations among sun, rain, and soil nutrients. In other words, the interest is not so much with possible causes and effects that may exist between organizational context and design, but more in the dependence of organizational performance on the interaction of organization structure with its context.

Overall, mixed results have been obtained from studies that have examined "fit" as the interaction effects of pairs of organizational context and design factors on performance. Correlational studies have found that the relationships between pairs of context and design characteristics are somewhat stronger for high than low performing organizations and units (Khandwalla, 1974; Duncan, 1973; Negandhi and Reimann, 1972; Child, 1974; and Van de Ven and Ferry, 1980). For example, in a study of 103 Canadian industrial firms, Khandwalla (1977) found that the correlations between technology and structural dimensions of vertical integration, delegation of authority, and sophistication of control systems were stronger for effective than ineffective firms. However, many of the differences in the context-design correlations between high and low performing organizations that are reported in these studies are not significant. Furthermore, whether or not interactions between context and design produce effectiveness remains to be demonstrated by these correlational studies.

Mohr (1971), Pennings (1975), and Tushman (1977; 1978; 1979) directly tested the main and interaction effects of organizational context and structure on various measures of effectiveness; and only Tushman provided some support for the interaction hypothesis. Mohr examined 144 work units in 13 local health departments and found no support for the interaction hypothesis that work groups will be most effective when autocratic supervision is employed on routine work and democratic supervision on nonroutine tasks. In fact, supervisory style had a noticeably greater main effect on unit effectiveness than did the fit or interaction between style and technology on unit effectiveness.

Pennings conducted his study on 40 branch offices of a large brokerage firm by examining the main and interaction effects of task and environmental uncertainty and structure (participativeness, power, and communications) on morale, anxiety, and production. The interactions between task environment and structural variables were found insignificant and had little bearing on organization effectiveness.

Tushman (1979) examined the effects of task characteristics, environment, and interdependence on communication structure for about 21 high and 20 low performing R&D projects within a large corporation. He found high performing projects with more complex tasks tend to communicate more, while low performing projects did not show these differences. So also, a stronger relationship between a changing environment and communication structure existed for high than low performing projects; but the differences were opposite to those predicted. Tushman found that the greater the environmental variability and change, the more centralized was the communications structure. Finally, while in the expected direction, no significant differences were found between high and low performing projects in the relationship between task interdependence and communications.

For those who view contingency theory as the interaction of pairs of organizational context and design factors on performance, the results from the Mohr, Pennings, and Tushman studies are difficult to accept. This is because structural contingency theories have emerged primarily as a reaction to universal principles and relationships prescribed by classical management writers. The Mohr and Pennings studies suggest that some structure-performance relationships may be universal (i.e., may apply irrespective of context), while Woodward, Khandwalla, Tushman, and others provide counter evidence that the relationships vary under different task and environmental conditions. However, even the latter have shown that interactions between many pairs of context and structural characteristics have no influence on organizational performance.

Several problems face the survey researcher attempting to use an interaction approach to analyzing fit. An exposition of these problems can serve as an introduction to a new approach that is emerging to address the concept of fit as interaction in a contingency theory of organizations -- deviation score analysis.

First, intercorrelations among context and structure variables, which can be reasonably expected because of selection pressures, of necessity lead to non-orthogonal factorial designs. As discussed by Green (1977) there are difficulties in decomposing and assessing differences between interaction and intercorrelation effects on a dependent variable in such situations.

A second problem resulting from context-structure correlations is the possibility of a restricted range of structural variation existing within each level of context (Dewar and Werbel, 1979; Miller, 1981). Although the total sample may exhibit a complete distribution of structural types, the non-independent relation of structure and context may limit certain combinations from jointly occurring. A true test of interaction, defined as a difference in the relationship among two variables based on the level of a third may be precluded due to these limitations.

A third problem is that survey designs usually measure variables on a continuous basis. Procedures that polychotomize or dichotomize predictor variables result in a loss of information that may reduce the ability to detect interactions (Pierce, et al., 1979; Miller, 1981). Creating multiplicative interaction terms in regression analysis limits the form of correlated with performance. (FN)

Our preliminary tests of the Van de Ven model using this approach has yielded positive results. While pairwise interaction tests of 11 structural and process dimensions show no significant effects, the pattern analysis procedure yielded a correlation of $r=-.25$, $p<.003$, $n=230$. See Drazin and Van de Ven (1983).

---- Insert Figure 6 here ----

Actual (sampled) organizations can be plotted according to their structural scores. Organizations A, B, and C are plotted around their respective ideal type number I, while organizations D, E, and F are plotted around ideal type II.

In this example, the more an organization's pattern of scores deviates from its ideal type the lower the expected performance. This interpretation is compatible with the Van de Ven model of work unit mode presented above. All organizations that are equidistant from their ideal types in any direction are expected to exhibit the same level of performance. To illustrate this isoperformance, contours are drawn as concentric circles around each basic type to represent decreasing performance. The performance ordering from high to low around Type I would therefore be B, A, C. The performance ordering around Type II would be F, E, D. For higher dimensionalities the performance contours would be expressed as spheres and hyperspheres (Caroll and Chang, 1970).

We have been developing a three-step procedure to test this pattern approach to fit. First, ideal type patterns of structure and process scores should be generated either theoretically or empirically from high performing organizations (Ferry, 1979). Second, the sampled organizations' patterns can be compared to their respective ideal types by the following Eucledian distance formula:

$$DIST_{Ij} = \sqrt{\sum_{S=1}^{N} (X_{Is} - X_{js})^2}$$

where,

$DIST_{Ij}$ = eucledian distance from the jth focal unit to its ideal type (I)

X_{Is} = score of the ideal (I) type unit on the sth structural dimension

X_{js} = score of the jth unit on the sth structural dimension

The third step would comprise the actual test of the contingency theory. The derived pattern distance measure (DIST) can now be correlated with performance. Fit or misfit, can be demonstrated if the derived distance measure is significantly and negatively

FIGURE 6: A Geometric Representation Of Pattern Analysis

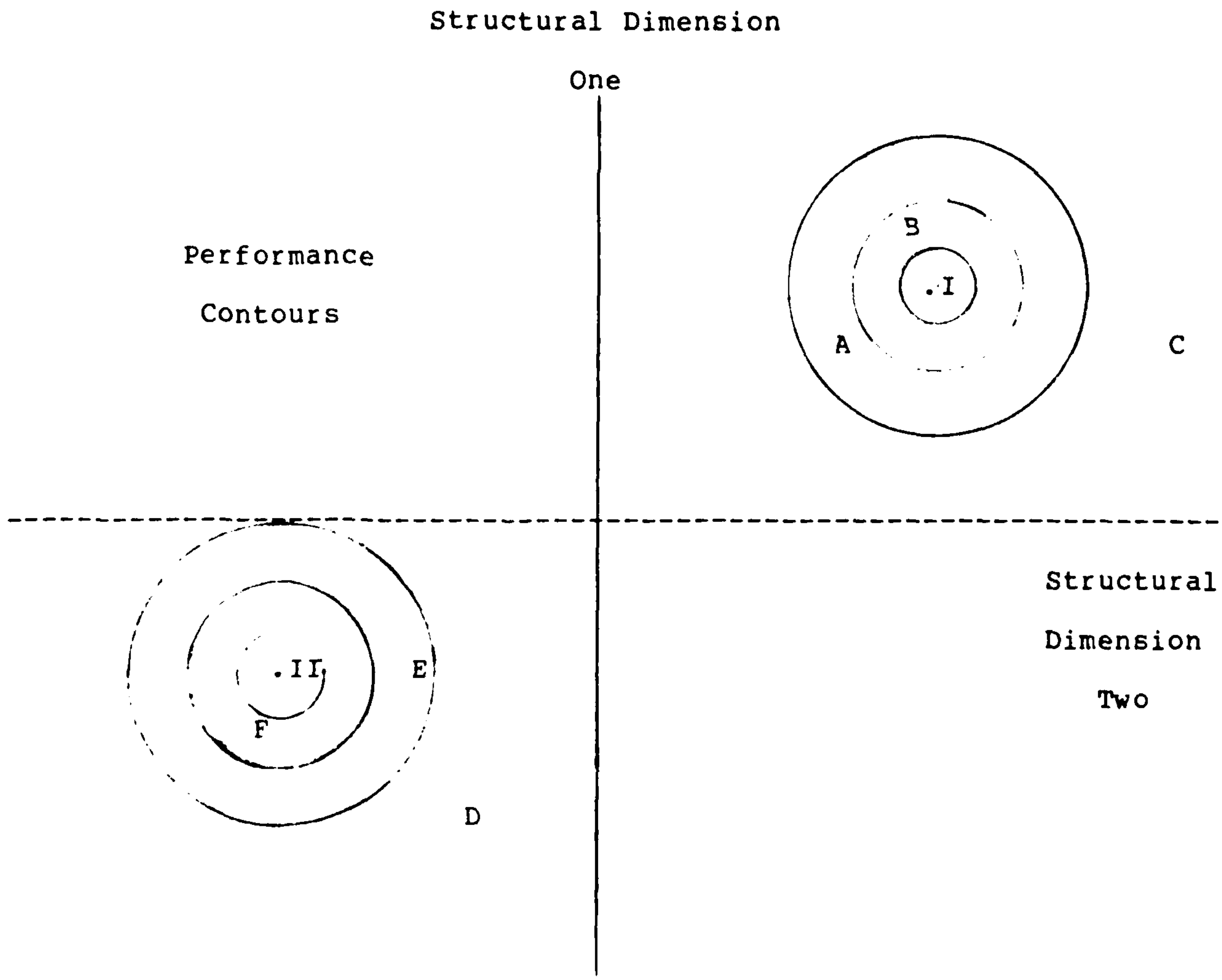


Figure 5. Hypotheses in Task Contingent Model of Work Unit Design

Task Contingent Factor			
Task Uncertainty (Difficulty and Variability)	If Low	If Medium	If High
Unit Structure	Systematized	Discretionary	Developmental
1. Unit Specialization	High	Medium	Low
2. Unit Standardization	High	Medium	Low
3. Personnel Expertise	Low	Medium	High
4. Supervisory Discretion	High	Medium	Low
5. Employee Discretion	Low	Medium	High
Unit Processes			
6. Verbal Communication	Low	Medium	High
7. Written Communication	Low	Medium	High
8. Frequency of Conflict	Low	Medium	High
9. Conflict Resolution By:			
a. Avoidance & Smoothing	High	Medium	Low
b. Authority	High	Medium	Low
c. Confrontation	Low	Medium	High
Performance (With Above Pattern)		Will Result In	
Job Satisfaction	High	High	High
Unit Efficiency	High	High	High
Performance (With A Different Pattern)			
Job Satisfaction	Low	Low	Low
Unit Efficiency	Low	Low	Low

Pattern Analysis

Systems theorists conceive of organizations as holistic entities, both comprised of a series of subsystems and yet still distinguished from components alone. Subcomponents are related to each other in ways that yield a coherent ensemble--i.e., an overall pattern called organization design. In organization theory these elements have been referred to as ideal types, modes, programs, populations, etc. Much of our theorizing is explicitly in terms of types. Burns and Stalker (1961), Perrow (1967), Pugh et al (1968), Minzberg (1979), and others have all identified basic patterns of organizing that are coherently designed to yield a systematic configuration to the components and that affect performance.

The work of Van de Ven and associates (Van de Ven and Delbecq, 1974; Van de Ven, 1976a, 1976b, and 1977; Van de Ven and Drazin, 1978; and Van de Ven and Ferry, 1980) can be considered an example of this approach. At its core, the Organization Assessment program is a contingency theory of organization, work unit, and job design. At the work unit level, for example, the basic proposition in the theory is that high performing units which undertake work at low, medium, and high levels of task difficulty and variability will adopt, respectively, systematized, discretionary and developmental programs or modes of structure and process. These hypothesized modes consist of patterns of a series of underlying dimensions. Deviations from the pattern on any or all dimensions are hypothesized to lead to reduced performance. The theory is summarized in Figure 5.

---- Insert Figure 5 here ----

This theory is amenable to testing at the aggregate level by analyzing deviations in the pattern of a given organizational unit from its ideal type pattern or mode. This approach to fit is shown geometrically in Figure 6. For purposes of illustration we have shown only two ideal types and two underlying dimensions of structure, recognizing that the principles involved can easily be extended to multiple modes or higher dimensionality. One ideal type (I) is shown in the upper right quadrant, while the second ideal type (II) is shown in the lower left quadrant. Each is presumed to represent an ideal pattern of scores for a given level of context.

3. The Systems Approach

Thus far we have seen that the selection and interaction approaches to fit concentrate on how single contextual factors affect single design characteristics, and how these pairs of context and design factors interact to explain performance. This reductionism, empirically if not theoretically, treats the anatomy of an organization as being decomposable into independent elements that can be examined separately and knowledge gained on each element can be aggregated to understand the whole organizational system. A systems approach to contingency theory has emerged which reacts against such reductionism. Advocates of this approach assert that our understanding of organization design can only advance if we address, in simultaneous manner, the many contingencies, structural alternatives, and performance criteria inherent to organizational life. The systems approach is based on and uses the conceptual frameworks of systems theory, and seeks to further these approaches through empirical analysis. However, in comparison with the selection and interaction approaches to fit, the systems approach is the most embyronic, consisting not of a dominant, well-developed perspective but rather of several novel alternatives tied together by their interest in characterizing the holistic patterns of interdependencies that are present in social systems.

Another view of fit in the systems approach is equifinality. It relaxes the assumption of a one-best-way implicit in the selection, interaction, and pattern approaches to fit. Rather than assuming that there are unique, best-structured solutions for given levels of context, the equifinality approach recognizes that multiple, equally effective alternatives may exist.

Both pattern analysis and equifinality differ from the previous two general approaches to fit by addressing multiple contingencies, and multiple design elements.

disaggregated, pairwise analysis is rudimentary, it is presented to illustrate the existence of multiple context-structure fits in a contingency theory.

However, the problem with subcomponent analysis is that it presumes that the effects of pairwise fits or misfits on overall performance will be strong enough to be detected statistically. That is, fitness or misfitness across any single form-context boundary will impact performance, holding all other possible fits or misfits constant. Yet, as discussed by Alexander (1964:17), fitness across any one such division is just one instance of a design's total coherence. Many other covariations between organizational context and design may be equally significant, may substitute for each other, or may even combine to effect overall performance. The number of possible combinations of misfits is almost infinite.

We speculate that there are two primary reasons why this pairwise approach to fit persists. First, our experiences with organizations support our belief that individual organizations, when not properly matched to a given context, have an effect on performance. We can all remember examples -- the leader style not matched to the task, the rule-bound organization in an innovative environment. The problem comes when we generalize beyond one example to a larger population. The organizations we study can each deviate from some ideal type in any variety of ways. This immense variation confounds our ability to detect performance variations as the result of individual pairwise interactions on performance. However, as will be discussed below, by focusing on fit in the overall system itself, rather than the specific forms of fit among individual pairs of variables, we may be able to capture and model fit more adequately.

A second reason has to do more with our background in statistical analysis. Most Organization and Management scholars have been raised on statistical techniques appropriate to educational and psychological research. Based on experimental design principles we think in terms of analysis of variance. Our attention is focused on parsimoniously searching for one or two dominant factors that determine performance and controlling for the remaining variance through randomization. In the complex ensembles of form, context and performance that are present in organization, such approaches may be fruitless and perhaps misleading. Advocates of the systems approach to fit are beginning to deal with these issues, as outlined in the following section.

FIGURE 4: Hypothetical Results Of A Contingency Theory Study

Unit #	Total Performance of Unit	Fit (+) or Misfit (-) for Dimension: CXD1	CXD2	CXD3	CXD4	CXD5	CXD6
1	2	-	+	-	+	-	-
2	2	-	-	+	-	+	-
3	4	+	+	-	+	-	+
4	4	+	+	-	+	-	+
5	4	+	-	+	-	+	+
6	2	-	-	+	-	+	-
7	4	+	-	+	-	+	+
8	2	-	+	-	+	-	-

FIGURE 3: A Generic Pairwise
Approach To Fit Analysis

Variables Measured

Organizational Context: C1, C2, ..., Cn

Organization Design: D1, D2, ..., Dn

Performance: P1, P2, ..., Pn

Dimensional Tests

$$\begin{bmatrix} C1 \\ \cdot \\ \cdot \\ \cdot \\ Cn \end{bmatrix} \begin{matrix} \text{Paired} \\ \text{with} \\ X \end{matrix} \begin{bmatrix} D1 \\ \cdot \\ \cdot \\ \cdot \\ Dn \end{bmatrix} \begin{matrix} \text{To} \\ \text{effect} \\ \triangleright \end{matrix} \begin{bmatrix} P1 \\ \cdot \\ \cdot \\ \cdot \\ Pn \end{bmatrix}$$

Where the total number of possible test = Cn X Dn X Pn

Critical Test

Significant Dismensional Tests > Q, where Q is a researcher determined decision rule.

theory in question is supported. If only a moderate number of significant interactions are found, support for the theory is equivocal.

---- Insert Figure 3 here ----

Consider a hypothetical set of results for a small sample of work units as shown in Figure 4. Here, for the sake of simplicity only, one contextual factor is considered. The results summarize a series of pairwise fits (+) or misfits (-) of a single contextual variable with each dimension of unit design D1...D6 for each organizational unit. Also shown is an overall performance score for each unit. The researcher in this case has hypothesized that organizational units that exhibit consistent (+) context-structure relationships should show higher performance than those units with inconsistent (-) relationships. The theory, however, is tested on a pairwise, dimensional basis, assessing how well consistency for each structural variable effects performance.

---- Insert Figure 4 here ----

The results of this analysis show support only for two interactions, CxD1 and CxD6. In both cases, positive or consistent context-design relationships show higher performance than lower consistency units. However, for the remaining four pairs (CxD2 through CxD5) the average performance level for consistent and inconsistent units is equal (3). Thus only two out of the total six pairwise tests show support for the theory. The researcher thus faces a dilemma and must report only partial support for the theory or perhaps even call into question the overall validity of contingency analysis (as Pennings, 1975, has).

An alternative examination of the results could show that the total number of pairwise fits for a given unit is directly related to unit performance. In the four low performance units the number of pairwise (positive) fits over the six dimensions is always two, for the high performing units the number of fits is always four. High performing units are those having a smaller number of misfits -- results which are consistent with the original theory.

Thus, at the disaggregated level of pairwise analysis, contingency theory is only partially supported. However, in this example, by considering the total set of possible fits or misfits simultaneously for the unit we find very strong support for the theory. While this kind of validity of the base line model.

A Critique of Pairwise Approaches to Fit

The interaction and deviation score approaches to fit share a common analytical procedure. The procedure begins by reducing a total possible set of organizational context and design characteristics to a series of bivariate context-design relationships and then to examine how these individual pairs of variables interact to explain performance. We call this the pairwise approach to fit. By far it is the most widely used approach to assess not only structural contingency theory but many other contingency theories dealing with job design, leadership, task group performance, strategy, and organization culture. The use of this approach is so prevalent and so deeply engrained in our analytical methods as to constitute what Gouldner (1970) calls a domain assumption, an unquestioned axiom of theoretical and methodological practice, widely shared in a field of inquiry. Most researchers find it hard to conceptualize fit as anything other than "interaction" among pairs of individual variables. The use of this approach is so theoretically and phenomenologically pleasing that it has become part of our language and rhetoric.

However, this approach contains a logical error that severely limits its utility. Bateson (1979) has called this an error of logical typing. By reducing or disaggregating an overall pattern of context-structure interactions to its sub-component parts we lose sight of the coherence or fit of the overall system. The whole is often not reducible to a linear combination of its parts. This error will become clear by considering some of the specific problems inherent in searching for interactions among pairs of context-structure dimensions with a hypothetical set of data.

Researchers interested in testing contingency theories typically develop data sets that measure an array of organization context (C), design (D), and performance (P) variables. Figure 3 shows the generic analytical structure of this approach, recognizing that the substantive form of the analysis may use interaction terms, deviation scores or other pairwise procedures. The test of the theory is accomplished in two steps. First, all possible combinations of context, design, and performance are analyzed using the chosen technique. Second, the researcher compares the number of significant results against a predetermined level of acceptable results and then assesses the level of support found in his or her data. If all or a large portion of the results are significant, the contingency

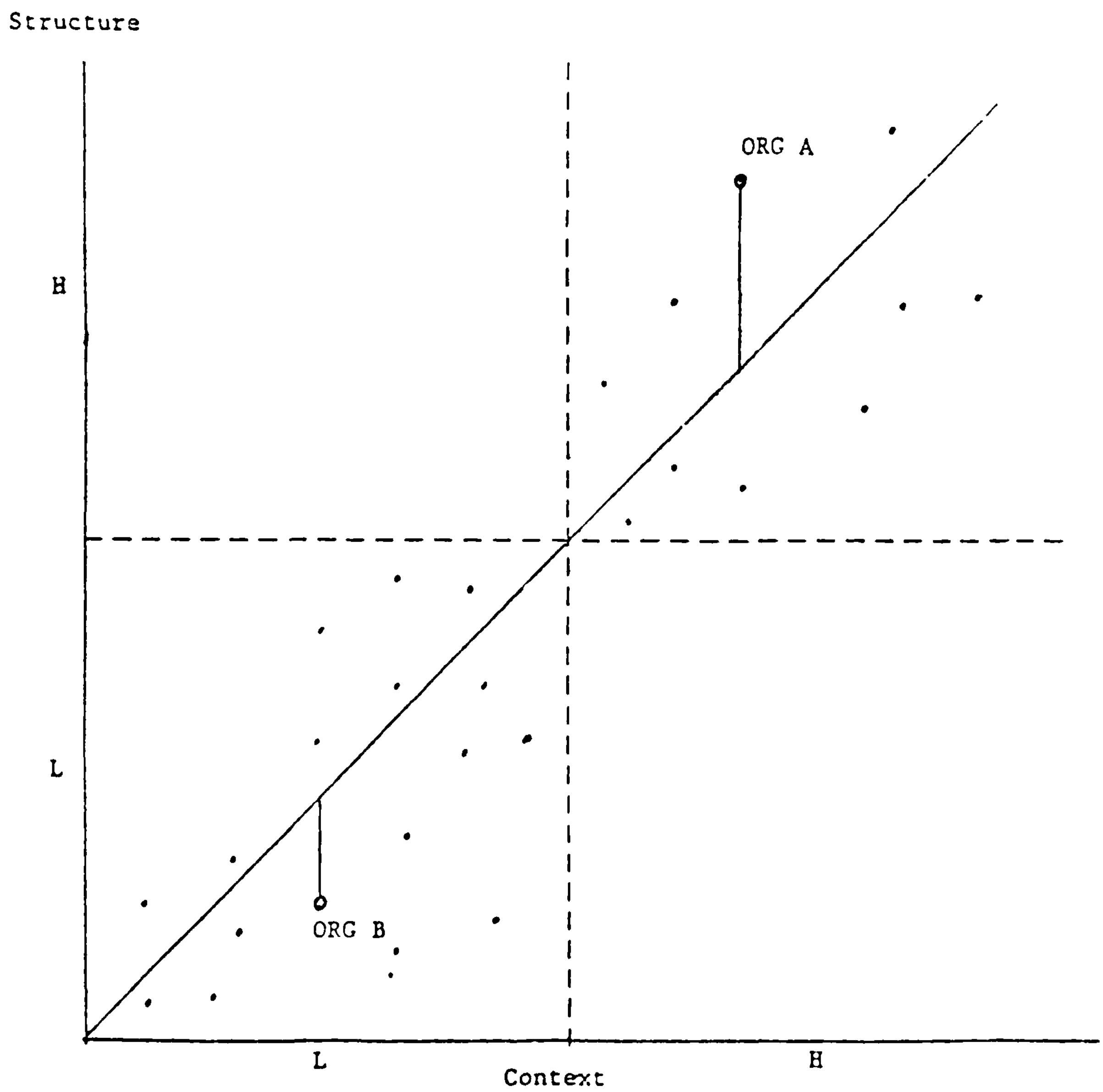
Note that this strategy is conceptually similar to hypothesizing and testing for disordinal asymmetric forms of interaction (Kerlinger, 1973). However, because of range restrictions in the structural variables at each context level due to correlations among structure and context, a completely crossed ANOVA design would not be possible. In the exaggerated example shown in Figure 2 a simple dichotimization of context and structure would result in two cells of the design having no observations. (The dotted lines of the figure represent the dichotimization of context and structure into high and low categories.) Yet, obviously, significant structural variation exists to possibly interact with context to cause performance.

We are familiar with three examples of this novel strategy to evaluate interaction effects in structural contingency theories. Studies by Dewar and Werbel (1979) and Miller (1981) use pairs of context-structure relationships as a basis for calculating deviation, while Ferry (1978) creates a complex multivariate model prior to analyzing deviation scores.

Dewar and Werbel (1979) operationalized the concept of fit using the deviation score approach in their study of credit reporting agencies. Three structural variables -- formalization, centralization, and surveillance enforcement -- were regressed separately on a context variable, routineness of technology. The absolute values of the residuals from these analyses were then subsequently analyzed using multiple regression to determine if they were correlated with performance (satisfaction and conflict). The surveillance enforcement-technology deviation score was significantly related to conflict. The remaining fit variables were not related to performance. Their study then provides some support for interactions in a contingency theory using this deviation score methodology.

One issue associated with this technique is the choice of an appropriate normative prediction line from which to calculate deviation scores. Dewar and Werbel used the sample as the reference base in empirically creating their models (p. 437). As they acknowledge, this approach leads to questions as to the appropriateness of that line as representative of high performing departments. Using a more sophisticated approach, in part feasible because of much larger sample sizes, Ferry (1978) developed a normative model using a sample of only high performing units as the base to empirically create the prediction line and then tested the model on a hold out sample of a range of high and low performing units. This approach, where possible, would generate increased confidence in the

FIGURE 2. Context-Structure Relationship With Deviating Organization



the interaction to one finite variety (Green, 1977; Schoonhoven, 1981). In addition, multiplicative interaction terms are usually correlated with the variables from which they are constructed causing multicollinearity problems in the analysis (Green, 1977; Dewar and Werbel, 1979).

Finally, significant interaction terms may result solely as a function of the scale of measurement of the dependent variable. Monotonic or logarithmic transformations of the dependent varible may reduce the effect of the interaction to insignificant levels (Green, 1977).

These practical difficulties frustrate the attempts of researchers to test for relationships among context, structure and performance that theoretically and intuitively should be capable of being modeled as interaction effects. In lieu of abandoning the effort, recently several researchers have adopted an alternative strategy that retains the basic logic of the interaction argument, but adjusts the methodological approach to deal with survey research complexities. Rather than testing for classical interaction effects, this approach analyzes the impact of deviations in structural properties from an ideal context-structure model.

With this deviation approach, fit is defined as adherence to a linear relationship between context and structure, and a lack of fit is a result of a deviation from that relationship (Alexander, 1964). Deviations in any direction and at any level of context result in lower performance. This approach is consistent with the normative prescriptions of interaction in many contingency theories. Only certain designs are expected to be consistent with a given context, and departures from these designs result in lower performance. Complete variance in structural properties is not necessary to detect lack of fit.

A hypothetical example is shown in figure 2. A linear relationship between context and structure is graphed that represents a normative high performance expectation. The model is developed either theoretically or empirically (Ferry, 1978). If a sampled organization departs from this relationship at any level of context, the degree of departure is hypothesized to predict performance. The greater the absolute deviation the lower the performance anticipated. (In this example, ORG A should have lower performance than ORG B.)

-- Insert Figure 2 here --

Extensions and refinements of the pattern analysis approach are possible. In the above example, we assumed that departures from ideal patterns for any dimension have an equal effect on performance. That is, that a one unit "deviation" from the ideal type along structural dimension one is equal to a one unit "deviation" along dimension two. This assumption can be relaxed by introducing the possibility of differentially weighting the importance of deviation in each structural element in determining performance.

Figure 7 shows an altered set of isoperformance contours drawn as ellipses. In this case changes in structural dimension one are more important than changes in structural dimension two. While units A and B are "equidistant" from ideal Type I, unit B is a lower performer than unit A. Deviations in structural element one are more important than deviations in the other element in determining performance. Extending the eucledian distance performance to include a set of weights, W, one weight for each dimension, we can test hypotheses regarding the relative importance of deviations in design for several dimensions.

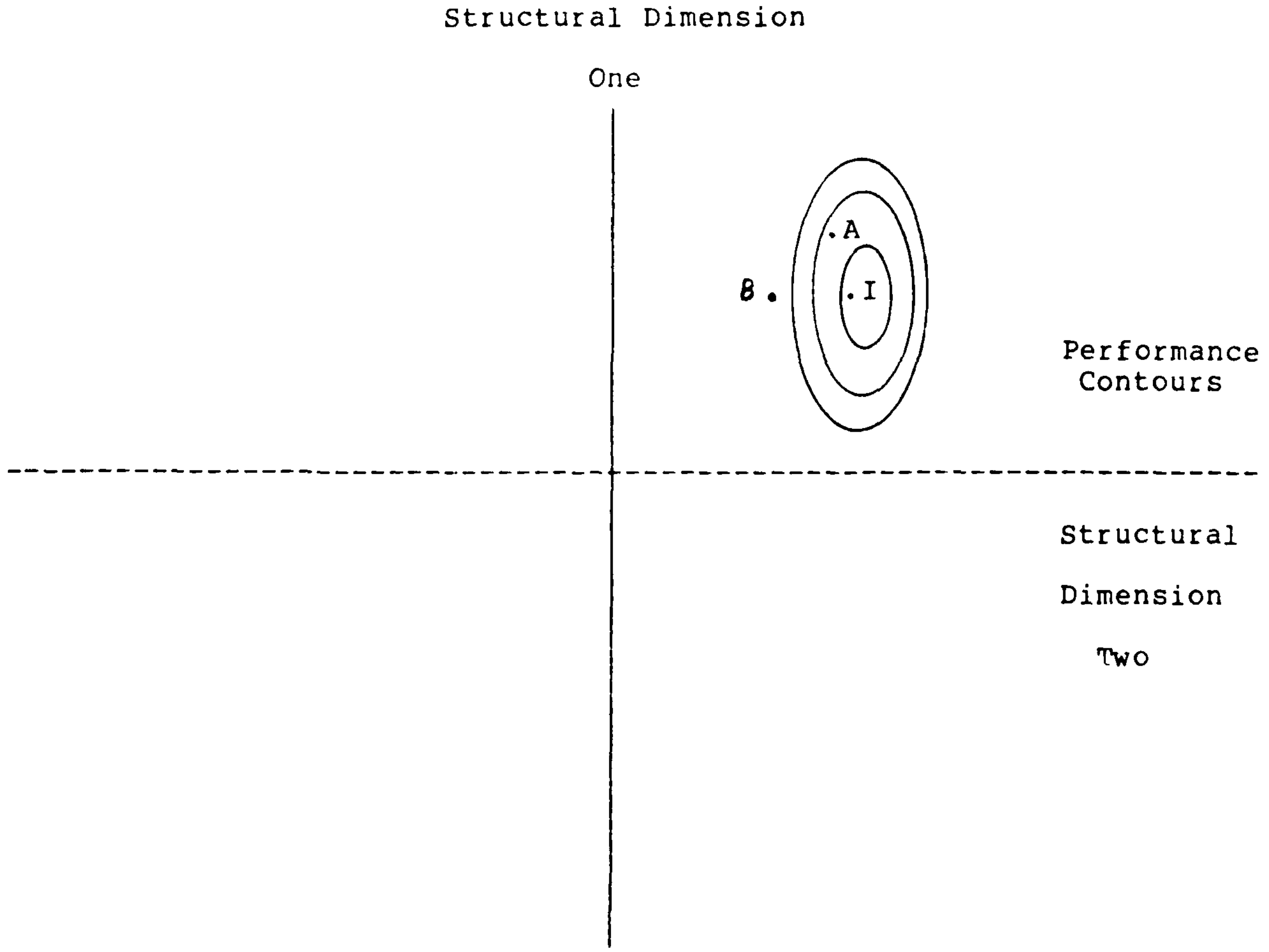
Pattern analysis offers the potential for modelling forms of fit that are not possible with the pairwise approach. It allows for both an appraisal of deviations in multiple dimensions as well as an assessment of the relative importance of each dimension. Pattern analysis does assume certain conditions of fit that other systems approaches relax. Multiple contingencies and equifinality emphasize choice and the possibility of equally effective patterns of structure and process.

---- Insert Figure 7 ----

Equifinality

It is widely acknowledged that organizations operate in contexts of multiple and often conflicting contingencies. There has been an ongoing debate among contingency theorists about whether organization design should be matched with reference to the environment, size, or technology of the organization (Ford and Slocum, 1976). But, as Child (1977: 175) questions, "What happens when a configuration of different contingencies is found, each having distinctive implications for

FIGURE 7: Differential Importance of Structural Elements in Pattern Analysis



organizational design?" Bivariate analysis of a given contextual factor with a structural characteristic cannot address this question. Pattern analysis, as discussed in the preceding section, also assumes a single dominant context element and an ideal pattern of structure. The organizational design implications of multiple contingencies are unlikely to be the same and often in conflict with each other. As a result, trade-off decisions may begin to emerge, and attempts to respond to multiple and conflicting contingencies are likely to create internal inconsistencies in the structural patterns of organizations. To address these problems, a systems analysis is needed to assess the impact of multiple contingencies on structural patterns and subsequently on organizational performance.

Child (1977: 175), for example, addresses the design dilemma of a large organization facing a variable environment; "Should it set a limit on its internal formalization in order to remain adaptable, or should it allow this to rise as a means of coping administratively with the internal complexity that tends to accompany large scale?" In his study of manufacturing firms (1975) and airlines (1977), Child determined that those organizations that performed well had structures that were internally consistent, while the lower performing organizations showed a good deal of inconsistency. He maintains that the inconsistent organizations adopted structures that attempted to respond to multiple contingencies, while the consistent organizations adopted structures matched to a single but often different contingency (either size or environment). Similarly, Khandwalla (1973) has shown that internal consistency among structural variables -- defined as the gestalt of the organization -- is positively related to organization performance. The systems frameworks of Galbraith (1977), Tushman and Nadler (1978), Van de Ven and Ferry (1980), Gerwin (1976) and Alexander (1964) hypothesize consistency among design characteristics as predictive of performance.

As the above discussion suggests, the systems approach introduces an element of choice into the design of organizations. By granting that multiple conflicting contexts can and do exist, we must correspondingly recognize that a single best structure matched to a level of context is no longer a viable option. Managers must consider these conflicting demands and resolve them into a single structural pattern that maximizes total consistency. High performing organizations may adopt internally consistent structural patterns that are largely unresponsive to a set of external contingencies and aligned only with the value perspectives of their designers (Child, 1973), or alternatively, high performing organizations may design their structures to respond to only a few strategically chosen contingencies (Ford and Slocum, 1976). In either case, low performing organizations would be expected to be a result of attempts to structurally respond to multiple conflicting demands which create internally inconsistent organizational designs.

Realistic choices in the design of an organization, of course, are always limited by the feasible alternatives available to decision makers. The greater the number of equally effective options for a given situation, the greater the opportunities for managerial choice in contingency theory. Equifinality, or the existence of several feasible equally effective design options for given contexts, allows for choice in the design of the organization.

Von Bertalanffy (1950) has defined equifinality as a condition in which the "... achievement of [a] steady state is independent of initial conditions.... That is, the final state may be reached from different initial conditions and in different ways." Katz and Kahn (1976) adopt this general approach and draw the implication that equifinality means there are more ways than one of producing a given outcome. Such definitions, while lacking specificity, appear to be accepted as descriptive of a general property of organizations (Tushman and Nadler, 1978).

Galbraith (1979) and Mohr (1982) have implicitly invoked equifinality arguments to criticize the deterministic nature of most current formulations of contingency theory. They both indicate that a single ideal design for a given context setting is not theoretically viable. Galbraith has proposed that in the face of increasing environmental uncertainty managers have at their disposal numerous, rather than single, design solutions. Increased uncertainty may be responded to by centralizing decisions and investing in higher capacity decision support system, or by decentralizing and creating lateral relations at lower levels of the organization. Both strategies can effectively serve as substitutes or complements of each other and increase information processing capacity. Child's (1977) airline study offers some data in support of Galbraith's assertions.

Child determined that both centralized and decentralized organizations were capable of high performance, while operating in similar high uncertainty environments. Similarly, Ferry (1978), Howard and Joyce (1982), and Kerr (1978) have documented a variety of other substitution effects.

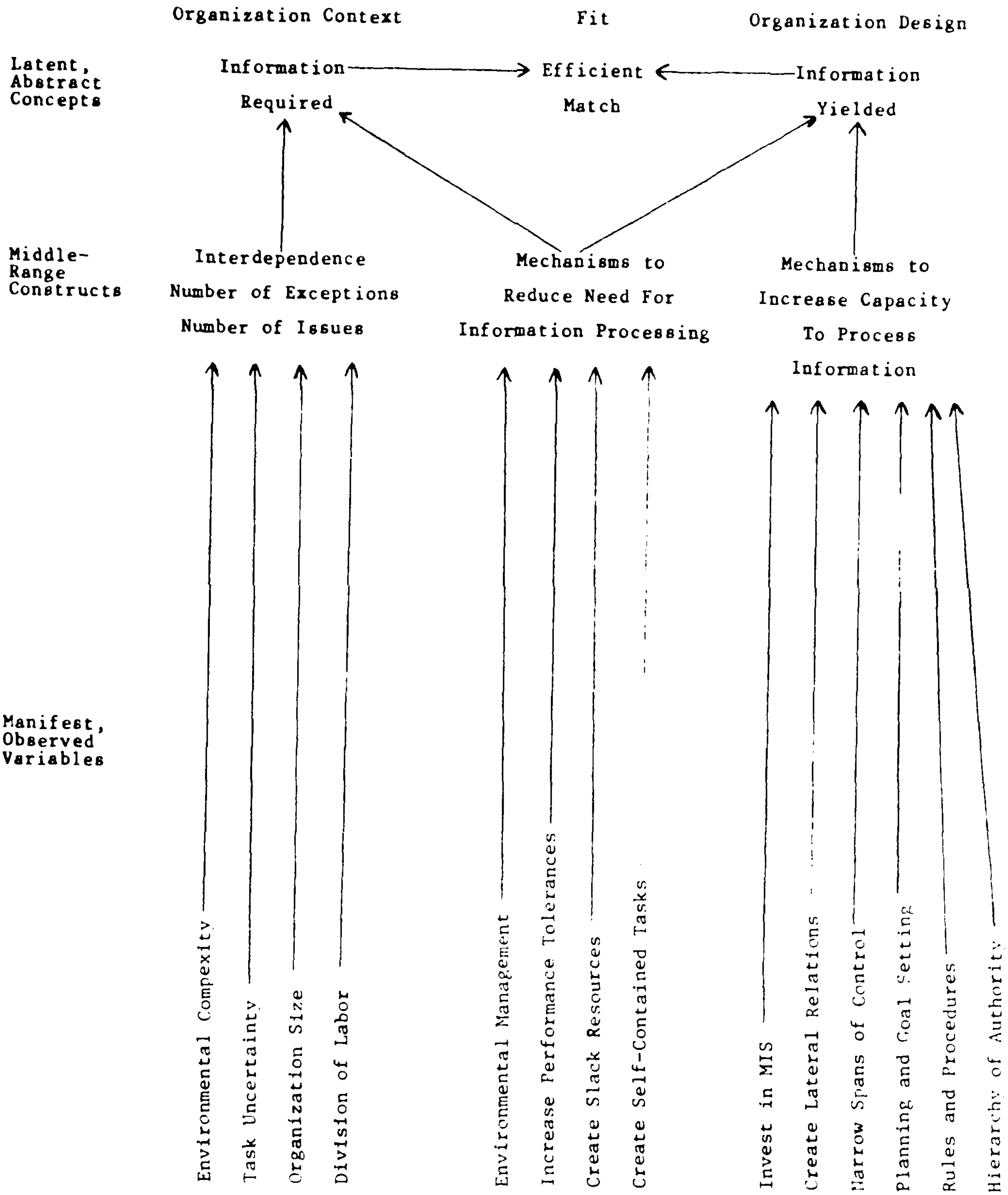
However, none of these researchers have systematically examined how one might incorporate and study equifinality in a contingency theory of organizations. To develop our concept of equifinality, we will first illustrate how the implicit notions of equifinality in Galbraith's information processing model can be made explicit, and then make some suggestions for examining equifinality.

The basic proposition in Galbraith's (1973; 1977) model is that the information processing requirements an organization faces must match (fit) its capacity to yield information if the organization is to be effective. This may sound like the typical imperative formulation of contingency theory but in reality it is not. As Figure 8 illustrates, information required and yielded are abstract or latent (unmeasured) concepts that result from the contribution of many manifest (measurable and observed) features of organizational context and design. *A variety of contextual and design configurations* may yield the same degree of information required and yielded. The choice among alternative combinations is probably a reflection of the decision makers' history, ideology, and performance criteria.

-- Insert Figure 8 here --

For example, consider the issues confronting an organization designer. Using Galbraith's model, the designer will presumably first consider the information processing requirements confronting the organization. Relevant features would include: environmental complexity, task uncertainty, the size of the organization, and its present division of labor. These factors contribute to the number of issues, exceptions, and interdependencies that require information processing in order to manage them. The organization designer considers these factors jointly -- not individually. They are aggregated together into an abstract concept called information requirements.

Figure 8. Galbraith's Information Processing Model



On the organization design side we see a similar pattern. The designer has many alternative mechanisms at his/her disposal to both increase information processing capacity in the organization and to reduce the need for it. Hierarchy of authority, rules, planning, spans of control, lateral relations, and MIS are all methods for increasing information capacity. If these mechanisms, relative to their benefits, are viewed as too costly, the designer has a repertoire of alternatives for reducing the need to process information. For example, creating self-contained tasks, slack resources, increasing performance tolerances, extending deadlines, and reducing environmental demands are all methods for decreasing interdependence and the need for coordination and control.

The overall organization design problem, then, becomes one of finding ways to combine, substitute, and aggregate these alternative options for expanding and contracting information processing capacity to achieve a match with the overall amount of information required. Moreover, it becomes one of designing a research study that permits one to empirically examine substitution effects among some of the manifest structural features contributing to the unmeasured latent organizational concept sought after -- here, information processing. For example, Van de Ven et al. (1976) examined six alternative mechanisms for coordinating information among unit personnel. They found that with increases in task uncertainty there was not only greater reliance on all forms of coordination but, also, that this greater overall amount of information processing came about by systematic substitutions of personal and group forms of coordination for impersonal and codified coordination mechanisms.

Analytically, the basic hypothesis of equifinality in a structural contingency theory is that organizational performance is a function of the the match between latent concepts of organizational context and structure -- here information required and yielded. These latent concepts are obtained by aggregating, combining, or substituting specific and concrete features of organizational context and structure in a variety of ways. In measurement theory it is well known that there are a variety of procedures for aggregating observed variables into latent constructs (including simple summation, addition, substitution, union, and intersection of observed variables), and that theory should guide the specific aggregation procedure employed. A central challenge in testing this equifinality hypothesis is to operationally determine how to aggregate observed organizational features to obtain the theoretically intended latent organizational constructs.

Unfortunately, in the past researchers have not carefully defined their concepts nor the rules of correspondence that must be followed to aggregate observed organizational characteristics into latent concepts. As a result, misguided and illogical procedures have been used to examine equifinality in structural contingency theory. One common procedure, for example, is to test for interactions among pairs of observed context and design dimensions (those along the lower level of Figure 8) on organizational performance. This misguided procedure is not likely to obtain significant results because such a test cannot detect the contributions of contextual and structural elements to the overall system properties of information required and capacity yielded. A second procedure may be to simply average all the observed elements of information required and yielded in Figure 8, and then to examine how these two composite measures interact to explain organizational performance. While this test is appropriately conducted at the latent system level, an interaction effect may not be found because an inappropriate aggregation procedure was used that does not detect substitution effects between the observed variables.

Critics of contingency theory who invoke the general equifinality argument are in a sense pointing out these logical traps. However, lacking a clear definition of equifinality and operational procedures to examine "latent" systems effects, it has been difficult to respond to these criticisms. By searching for equifinality in terms of the contributing effects of measured organizational features on latent systems concepts and then examining interactions among these latent concepts on organizational performance, we preserve the essential argument in contingency theory. However, we also provide for the possibility of organizational variance and, therefore, choice. The variance occurs at the level of measured organizational features. At the latent systems level, a given contextual pattern still implies a needed organizational response -- however achieved. The challenge, then, becomes one of learning how the observed variables substitute and tradeoff for each other, and how they, as a set, contribute to abstract, latent concepts of organizational context and structure.

In summary, the systems approach requires two basic and often conflicting choices of the organizational designer: to select the organizational design pattern that (1) matches the set of contingencies facing the firm and that (2) is internally consistent. The tasks for theorists and researchers adopting this systems definition of fit are to (1) identify the feasible sets of organizational designs that are equally effective for different context configurations, and to (2) understand what patterns of organizational design are internally consistent and inconsistent. By this formulation, an explanation of organizational performance is found in whether an organization has adopted a structure that lies within the feasible context-design set and whether the chosen design is internally consistent. As Child (1977) has shown, what may distinguish high from low performing organizations is both the degree to which their structural patterns match multiple contingencies and the internal consistency of whatever structural pattern they may adopt.

CONCLUDING DISCUSSION AND IMPLICATIONS

In conducting a study, every researcher is faced with a variety of decisions. Included are characteristics of the theory being examined: its scope, complexity, level of analysis, and paradigmatic orientation (Morgan, 1980). Correspondingly there are the methodological issues of sampling, measurement, analytical techniques, and reporting procedures. In addition to these conscious decisions there are an equally large set of decisions that are made implicitely, by adopting state-of-the-art assumptions and conventions commonly used by other researchers at the time of the study. These responses constitute a range of domain assumptions (Gouldner, 1970) that allow research to proceed economically. Advances in scientific knowledge come about when the predictions that result from these domain assumptions are refuted often enough to question their validity and to call them up for inspection.

This chapter has inspected the concept of "fit," which we believe is the root cause of questioning and confusion with contingency theory. As Alexander (1964) stated, "fit" is the essence of design, and as such deserves much more careful attention and development than it has been given in the past. In the evolution of contingency theory, three different approaches to fit have emerged -- selection, interaction, and systems approaches. We have described how each approach significantly alters the essential meaning of contingency theory, and how variations of these three approaches have lead to a repertoire of contingency theories. In the course of the discussion a number of issues were raised which we believe have significant implications for directing future developments in contingency theories. Although we know far too little to be dogmatic, we conclude with the following speculations to stimulate further systematic and constructive developments of the concept of fit in contingency theories.

1. Contingency studies should be designed to permit comparative evaluation of as many forms of fit as possible.

At the most rudimentary level, this means that contingency theory studies be broadly conceived at the outset to avoid serious limitations of narrowness in subsequent analysis of fit. Within an overall conceptual framework, data should be collected on multiple indicators of organizational context, design, and performance. A major limitation of many studies has been an overly narrow focus on only one or a few contextual dimensions, which limit the studies from exploring the effects of multiple and conflicting contingencies on organizational design and performance.

Researchers should also be encouraged to test for a number of approaches to fit in order to obtain a more complete understanding of context-design-performance relationships for organizations in their sample. As discussed throughout the paper, these different approaches to fit are not independent and can provide synergistic information. For example, the selection approach is useful for determining which contingency factors most significantly affect the design of organizational units. The interaction approach provides a rudimentary understanding of how these context and design characteristics individually interact to explain performance. However as will be discussed below, a sample of organizational units in moderate equilibrium with their environments may preclude the possiblity of significant interaction effects. As a result, a more complex but richer approach to the analysis of fit may be necessary. The systems approach focusing on a multivariate pattern of fits among context and design characteristics may yield the the most meaningful information.

2. Part-whole relationships are important in understanding the design of organizational subdivisions.

Managerial selection, operating through macro-organizational switching rules, plays a major role in determining the design patterns of organizational subunits. However, some characteristics of subunits will be less influenced by these macro switching rules, and tend to reflect the particularistic style and discretion of unit personnel. With the exception of Comstock and Scott (1977), these consequences have been overlooked in many studies of organizational subunits. The implication is that the design choice for a particular level of organization is constrained and limited by imposed design criteria from higher levels in the organization. This need to understand part-whole relationships is the essence of managerial selection, but also has important implications for understanding other patterns of fit in contingency theory.

3. Overall, emphasis should be placed on further developing the systems approach to fit in contingency theory.

While this may appear contrary to our prescriptions above, it is not. The results that researchers have obtained from pairwise studies of fit have been exceedingly disappointing. No consistent evidence has yet been obtained across numerous studies to support the mainstream view of contingency theorists that fit is the simple interaction between isolated pairs of unit context and design dimensions on performance. We believe this is not from a fault inherent to the interaction concept itself but rather from the limited probability of a sample containing the right characteristics to yield meaningful results. Except under exceedingly appropriate conditions, the disadvantages of ANOVA and deviation score designs of the interaction approach are serious enough to render them of little use. Specifically, three conditions should caution the researcher in applying the interaction approach.

> First, when evidence for natural or managerial selection exists in the form of strong context-design relationships, the interaction design will probably not be capable of detecting fit or misfit.
>
> Second, when the contingency theory is based (even remotely) on types of modes of organization design, rather than on relationships among dimensions, than multivariate pattern analysis in the systems approach will be more appropriate.
>
> Third, if the theory implies substitution effects at any level (as discussed under equifinality), then pair-wise analysis will not be able to detect fit or misfit. Analysis should then be conducted at the latent variable or effect level.

As these caveats imply, we believe that greater energy should be directed toward developing more general multivariate models of fit in the systems approach. In particular, the systems approach to pattern anaylsis and equifinality are conceptually very appealing for they permit strategic choice to enter into a contingency theory of organization design.

4. Examining multiple approaches to fit in contingency studies and relating the findings to unique sample characteristics can greatly aid the development of mid-range theories of what approach to fit applies where.

We believe that the evaluation of multiple approaches to fit can cumulatively build knowledge across and between organizational levels and populations. This could make a significant advance in mid-range contingency theories (Pinder and Moore, 1978). If a series of studies at the unit, organization, and population levels of analysis were conducted, then some systematic relationships between types (or levels) of organizations may become evident. Knowing that forms of fit differ across conditions will be useful knowledge and may aid in clearing up inconsistent contingency theory findings. Reporting tests of only one form of fit leaves more questions unanswered than resolved.

A related suggestion serving the same end would be to design studies that permit testing of competing approaches to fit. On strong apriori grounds, a planned study could postulate that one form of fit will prevail over others. By conducting crucial experiments (Stinchcombe, 1978) varieties of fit can be tested against their best competing alternatives and thereby provide more meaningful and impactful results than could be provided by testing only one approach to fit.

5. These concepts of fit apply to contingency theories in general; they should not be confined only to structural contingency theory.

Primarily this chapter has addressed the structural contingency theory. Fit, however, is a concept of broad utility that is central to an increasingly wide set of theories on organizational behavior, management strategy, and policy. In any theory that postulates that organizational performance is a function of the match, congruence, intersection, or union of two or more factors, the concepts of fit discussed here are critical to theory building and testing.

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