Strategic Management Journal, Vol. 15, 311–324 (1994)

EXPLORING STRATEGIC JUDGMENT: METHODS FOR TESTING THE ASSUMPTIONS OF PRESCRIPTIVE CONTINGENCY THEORIES

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Several generally untested assumptions about strategic judgment and choice exist in strategic management theories. Direct examination of these assumptions is necessary for sound theory building, and for sound prescription based on current theory. This paper presents techniques for eliciting and analyzing the strategic judgments of strategy makers, and discusses the potential of these techniques for increasing the internal validity and practical relevance of strategy research. We argue that incorporating managerial judgment more directly into the mainstream of strategy research will lead to both new theory and the extension of existing theory.

The strategic choice perspective of organizational adaptation (Child, 1972) is central to the field of strategic management. This perspective suggests that choices made by top managers influence organizational design outcomes and firm performance (Bourgeois, 1984; Hambrick, 1989; Hrebiniak and Joyce, 1985; Stubbart, 1989). Executive judgment is thus seen as an important source of competitive advantage (Penrose, 1959; Schoemaker, 1990). Mintzberg, for example, notes that 'it is the power of (a manager's) mental models that determines to a great extent the effectiveness of his decisions' (1973: 183). Given the long-standing acceptance of this perspective, one might expect that much research in strategic management would involve comparing executives' judgments and choices with the realized attributes of and performance achieved by their firms. Such is not the case.

Therefore, in this paper we identify a number of generally untested, yet critical, assumptions about strategic choice that exist in strategic management theory. Clarifying these assumptions helps to expose weaknesses in the linkage between the choice concept and its research operationalizations to date. We then argue that more direct operationalizations of strategic judgement and choice will likely lead to the modification and extension of existing theories, and to the building of new theory. Further, direct examination of the choice-related assumptions is necessary before prescriptions can be offered based on current theories. We then present several techniques for eliciting and analyzing the strategic judgments and choices of strategy makers, and discuss the potential of these

Key words: Strategic judgment, decision analysis, research methods, top managers, contingency theory

CCC 0143–2095/94/040311–14

Received 22 June 1993
Final revision received 19 November 1993

techniques for increasing the internal validity and practical relevance of strategy research.

ASSUMPTIONS REGARDING STRATEGIC CHOICE

The central role of strategic choice in the strategy paradigm is shown in Figure 1. The dashed lines indicate, however, that choice-based links in the paradigm remain relatively unexplored. As noted by Drazin and Sandelands, choice has been defined by the outcome that is achieved. They argue that such 'achievement verbs . . . are inherently deceptive when used in explanation because they substitute a semantic connection between process and outcome for an empirical one. Genuine explanation, however, relies on the latter' (1992: 231).

It is paradoxical that normative scholarship should give little empirical emphasis to strategic choices and the judgments on which they are based, while assuming their importance. Bettis has suggested that strategy researchers should 'encourage the development of realistic prescriptive implications as a normal part of the research process' (1991: 318). Before valid prescriptions can be made from the results of much of the empirical work on strategy, however, assumptions associated with the unmeasured strategic judgment and choice variables require examination. Much of the theory that drives strategic management research is contingent in nature (Randolph and Dess, 1984; Venkatraman, 1989). Assume, for example, that X, Y and Z represent strategy-related variables that a theory suggests must be aligned properly for high performance. Business-level strategy-structure-environment fit (Miller, 1988) is one concrete illustration. The following discussion is purposefully general, however, so it may easily be applied to other contingency theories in strategic management and organization theory. Even if congruence among the X, Y and Z variables is found to be related to high performance (P), the following assumptions *must also be correct* for meaningful prescription.

Assumption 1: Information about X, Y and Z is or can be perceived and attended to by

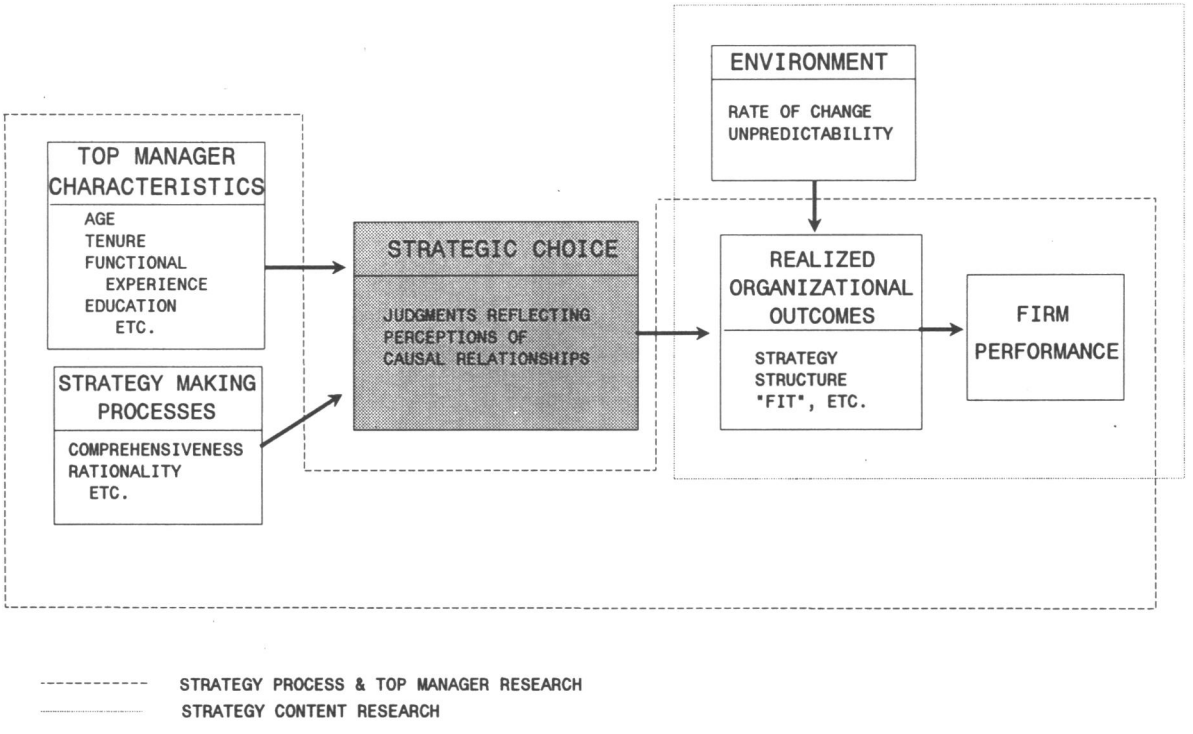

Figure 1. The central role of strategic choice

the executive(s) involved in strategic decision making.

Assumption 2: Implicit or explicit judgments are formed about:
a. present quantities (levels) of X, Y and Z,
b. the simple, bivariate contingencies (i.e., linear correlation strength or some other functional form) between the possible pairs of X, Y, Z, and P, and
c. the multivariate contingencies (or configurations) of X, Y, Z, and P, representing an implicit theory of 'how the world works'.

Assumption 3: These judgments form the basis for the intended strategies (Mintzberg and Waters, 1985) of the firm, either directly, when the individual top manager is the only strategy maker, or indirectly, through discussion and information/judgment exchange among a team of strategy makers.

Assumption 4: The intended strategies are executed and come to fruition as realized strategies.

Although these assumptions may seem reasonable, particularly when used to explain relationships between top manager characteristics, strategy making processes, etc. and firm performance, they have seldom been subjected to empirical test by strategy scholars. The largest amount of work, related to Assumption 1, has involved top manager perceptions (e.g., Bourgeois, 1985; Daft, Sormunen and Parks, 1988; Dutton, Walton, and Abrahamson, 1989). Assumptions 2 and 3, which focus on managerial judgment, have received scant attention, and little work has been done on the link between intended and realized strategies (Robinson and Pearce, 1988, provide one exception, although their work equates perceptions of executives with intentions).

The untested strategic choice assumptions suggest a number of research questions: What combinations of X, Y and Z are actually sought by top managers? Do executives see relationships among X, Y, Z and P in a manner consistent with the empirical evidence from strategy research? Are executive intentions reflected in the realized X, Y, Z outcomes of their firms? What factors might influence executive perceptions of X, Y, and Z, and their relation to P? Do firms whose executives see relationships among X, Y, Z and P that are consistent with the prescriptions of theory outperform firms whose executives see different relationships? Do executives of successful firms feel that X, Y, Z alignments, or some unexplored Q, R, S alignments, are more important to P?

The following sections introduce techniques that may be particularly useful in obtaining and analyzing the judgments of top strategy makers. A key question in evaluating each technique for use in strategy research is the degree to which it allows modeling of the *contingent* judgments prescribed by strategic management theories.

METHODS FOR EXPLORING STRATEGIC JUDGMENT

We have argued that there are a number of judgments implicit in contemporary theories of strategic management. These judgments vary in complexity from relatively simple judgments about the magnitude of variables, to judgments about the strength and direction of relationships between two variables, to complex judgments about multivariate patterns of relationships among several key variables and firm performance. Unlike most of the research concerning decision making heuristics and biases (Dawes, 1988), the judgments made by strategy makers cannot readily be compared to known probabilities; strategy-relevant judgments are made in the presence of uncertainty *and* ambiguity—i.e., unknown or second-level uncertainties: Ansoff, 1965; Einhorn and Hogarth, 1981). This paper focuses on concurrent, rather than retrospective, techniques for soliciting and analyzing executive judgments in the complex, ill-defined situations most typical of strategic problems.[1]

There are several conceptually and technically distinct methods for exploring such individual judgments. The techniques can be grouped into two categories: decomposition methods and

[1] We focus in this paper on the individual judgments and choices of a single executive. Group-level judgments and choices by top management teams are important components of the strategic processes of many firms. The techniques we describe may be used for group-level studies to, for example, identify a dominant coalition's judgment consensus, or explore the judgment change process within top management teams over time.

composition methods. Both sets of methods can be used to test 'least-explored' Assumptions 2, 3, or 4 listed above (since Assumption 4 deals also with a *post*judgment outcome, firm-level data on the implementation of chosen strategies is also required). The techniques are compared in detail in Table 1. Each decompositon method involves presenting an executive with combinations of different levels of salient strategy variables and assessing the executive's preference judgment in response to each combination. The goal is to develop a representation of the judgment policy employed by executives for the strategy variables. Each composition method involves 'talking through' or 'walking through' a decision situation. The goal is to gain insight into the processes used and the variables considered in making the decision.

Decomposition methods: Focus on the judgment itself

Four similar methods for exploring individual judgments require executives to rank or rate expected firm performance (P) for many different 'profiles' consisting of different combinations of levels of strategy variables X, Y, and Z. Axiomatic conjoint analysis, nonmetric conjoint analysis, metric conjoint analysis, and policy capturing each use a variant of regression to *decompose* an executive's judgments into a weighted linear or multilinear equation summarizing his or her judgment policy (Rude, 1991).

The decomposition methods assume that the relevant judgment attributes are known *a priori*. Therefore, an important decision for researchers is the choice of strategy variables and their levels in the judgment stimuli. The substantive nature of those variables must come from existing strategy theory, or from previous process-based elicitation studies (see 'Composition Methods'). Therefore, the decomposition methods have the greatest utility when a body of existing theory and evidence, such as that from strategy content and process research, is available. All of the decomposition methods can be classified as judgment tasks (McGrath, 1982). These tasks seek to obtain the maximum amount of information from a small number of subjects. This may make them especially useful to strategy scholars, who typically are interested in the judgments of top managers: an elite and difficult-to-access group. In fact, each decomposition method can be used to do an in-depth, *quantitative* analysis of an *individual* executive's judgment policy. Few other research techniques combine these idiographic and quantitative virtues, allowing statistical tests of the relative importance of the different strategy, structure, and environment variables in an executive's perceptual field (Brunswick, 1952).

As with all research methods, however, there are weaknesses of the decomposition techniques. As vehicles for eliciting responses to descriptions of 'paper people' or 'paper organizations', they have often been criticized for having low external validity (Murphy, Herr, Lockhart and Maguire, 1986). The internal validity of such methods has also been criticized—when researchers who propose sequential judgment processes attempt to test those propositions with the holistic linear models that are the foundation of decomposition techniques (Einhorn, Kleinmutz and Kleinmutz, 1979). The strengths, weaknesses, and details of each technique are discussed more fully below.

Axiomatic conjoint analysis

All conjoint analysis methods stem from the original axiomatic techniques, developed to provide interval-level measurement of utility functions from ordinal judgments that satisfy a set of axioms (Luce and Tukey, 1964; Krantz and Tversky, 1971). In the axiomatic approach executives could be presented with at least nine (two variables, each with three levels) possible combinations of strategy variables. For example, they could be shown all possible combinations of levels of environmental dynamism (high, medium, low) and levels of decentralization (high, medium, low). They would then rank order these combinations in terms of how well they feel a firm with each combination would perform, *ceteris paribus*.

The next step would be to check these rankings to see if they meet or fail to meet axiomatic assumptions of the analysis. For example, the ranks must be monotonic with respect to increasing levels of all of the combined strategy variables. If the axioms are not met (and they frequently are not), another analytic method is necessary. If the axioms are met, the executive's judgment policy can be represented by a linear combination of utility weights incorporating each of the

Table 1. Comparison of methods for exploring executives' strategic judgments

	Judgment focus (decomposition techniques)				Process focus (composition techniques)		
	Axiomatic conjoint analysis	Nonmetric conjoint analysis	Metric conjoint analysis (functional measurement)	Policy capturing (lens model, social judgment theory)	Verbal protocol analysis	Information search	Cause mapping
Essential features of method	Executive ranks preferences or expected firm performance for all factorial combinations of chosen levels of strategy variables, Z, Y, Z . . .	Executive ranks preferences or expected firm performance for some or all of the factorial combinations of chosen levels of strategy variables X, Y, Z . . .	Executive gives two or more replications of preference ratings or expected firm performance ratings for all factorial combinations of chosen levels of strategy variables, X, Y, Z . . .	Executive gives preference or expected firm performance ratings for all or some orthogonal or correlated combinations ('profiles') of chosen levels of strategy variables X, Y, Z, and possibly irrelevant variables Q, R, S . . .	Executive makes judgments about and/or choices among given combinations of levels of strategy variables X, Y, Z, and potentially important variables T, U, V; 'talks aloud' to reveal cognitive processing in judgment	Executive makes judgments about and/or choices among given combinations of *covered* levels of strategy variables X, Y, Z, all arranged in large table or matrix; sequentially uncovers information about the variables' levels as choice is made	Executive tells researcher his/her perceptions about the existence and direction of causal relations between n^* $(n-1)$ pairs of n previously elicited strategy variables T, U, V . . .
Eventual goal or important result	Linear utility or importance functions for each strategy variable (u(X), u(Y), u(Z), . . .) as used in executive's judgment rule	Weights or 'part-worths' gauging the linear importance of each strategy variable for each executive's judgment rule (i.e., implicit theory of performance)	Linear (additive) or multilinear (multiplicative) function describing each executive's combinatorial judgment rule (implicit theory of performance)	Linear function or judgment 'policy' equation relating strategy variables ('cues') to firm performance 'criterion'; compare consistency of executive with policy	Flow-chart reflecting sequence of executive's cognitive processing about performance; develop algorithm that mimics process and predicts future strategic judgments	Frequency and stage-based evidence about sequences and the types of processing (e.g., alternative-based vs. attribute-based) that executives use	An 'etiography' linking strategy variables and performance in a network of loosely coupled relations as they are perceived by like-minded sets of executives)
Definition of strategy variables (number and content)	All defined or assumed known by the researcher (based on previous theory or evidence)	All defined or assumed known by the researcher (based on previous theory or evidence)	All defined or assumed known by the researcher (based on previous theory or evidence)	All defined or assumed known by the researcher (based on previous theory or evidence)	Some defined or assumed known; others derived from content of protocols	All defined or assumed known by the researcher (based on previous theory or evidence)	Elicited from sample at hand via interviews and naturalistic observation
Functional relations of strategy (Stimulus) variables	X, Y, Z . . . are orthogonal	X, Y, Z . . . are orthogonal	X, Y, Z . . . are orthogonal	X, Y, Z . . . can be orthogonal or correlated, but should be orthogonal to irrelevant variables Q, R, S . . .	Relations can be orthogonal, correlated, or nested; interest is in processing, not judgment outcomes	Relations can be orthogonal, correlated, or nested; interest is in time spent and sequence of acquisition	Relations defined by executive; dichotomous (causally related = 1, not = 0) and signed (+,−) if causally related
Number of strategy variables in stimulus	Few: usually 2 and always ≤ 5	Few: 2 to 7	Few: 2 to 5	Moderate, possibly many: 4–20	Moderate: 3–10, provided by researcher; levels need not be crossed	Moderate: 3–10; variables crossed with alternatives on information 'board'	Moderate to many: 5 to 20; depends on how many are salient to executives

Table 1. Continued

	Judgment focus (decomposition techniques)				Process focus (composition techniques)		
	Axiomatic conjoint analysis	Nonmetric conjoint analysis	Metric conjoint analysis (functional measurement)	Policy capturing (lens model, social judgment theory)	Verbal protocol analysis	Information search	Cause mapping
Number of levels of strategy variables	Each variable *must* have at least 3 levels; more makes analysis extremely complicated	At least 2; 3 is much better; rarely more than 5	At least 2; 3 allows for limited test of nonlinearity; no more than 5	At least 2, perhaps many; possible to use random effects-type levels	Levels can vary from 2 to 10; there is no real modelling of their relation to response	2 to 10 levels with enough variance to ge germane in executive's search	Levels are undefined and unnecessary
Number of combinations (config's to be judged)	Product of number of levels of each strategy variable	Usually product of number of levels of each strategy variable. Can be less in incomplete block designs	Product of number of levels of each strategy variable multiplied by # of within-executive replications	Large number, between 25 and 200; large enough to get stable estimates of regression parameters	Moderate number, usually 3–10	Moderate number, usually 3–10	One stimulus, the executive's firm, but n^* $(n-1)$ judgments about pairs of variables within the firm
Assumed response scale	Ordinal	Ordinal	Interval	Interval	Categorical; derived variables ordinal	Categorical; interval; derived variables ordinal	Categorical; derived variables ordinal
Functional relation between variables and response	Weighted linear (additive) if axioms hold; otherwise unknown	Assumed to be weighted linear (additive)	Weighted linear (additive) or multilinear (multiplicative); check best fit	Weighted linear (additive); sometimes possible to check nonlinear	Step-function, defined by correspondence between variable and utterance	Monotonic (possibly logistic) if response is choice or reaction time (RT)	Step-function
Statistical tests	None; misfit to axioms checked with simple tests (e.g. monotonicity)	Possible to use within-subject ANOVA to construct quasi-F's on additive terms	*F*-tests for all equation terms via ANOVA; power is function of executive's reliability and # of replications	*F*-tests for policy weights in equation; *F*-tests for configurality of policy; R and R^2 to assess predictability	χ^2, ANOVA (on RT), and Markov-based tests available on data *aggregated* over executives	χ^2, ANOVA (on RT), and Markov-based tests available on data *aggregated* over executives	χ^2 and rank-based tests available on scores derived from data *aggregated* over executives

strategy variables. This approach, though useful in many applications (e.g., marketing), is limited for strategic management. The presence of contingent judgment policies produces a violation of the axioms. Thus, the strength of any contingent thinking by executives (e.g., preference for decentralization in dynamic environments but centralization in stable environments) cannot be estimated.

Nonmetric conjoint analysis

Nonmetric conjoint techniques are effective for examining additive (main effects only) models, and thus have been used extensively in marketing studies to evaluate consumers' utilities for attributes of products ranging from spot removers to commercial airline flights (e.g., Green and Wind, 1973). Nonmetric analyses assume that the respondent's preference data are ordinal. 'Part-worth' utilities (similar to beta weights in regression) are calculated based on the marginal means of the preference data. The part-worths generated are interval-scaled representations of the respondent's utility for particular attributes or levels. Estimation of part-worths in nonmetric conjoint analysis is possible without complete factorial combination of all levels of all manipulated strategy variables.

Nonmetric conjoint studies require that the decision model (composition rule) used by the respondents be specified *a priori*, and typically also assume that interaction terms in the respondents' preference models are zero (Green and Wind, 1973; Louviere, 1988). This again limits the usefulness of nonmetric conjoint techniques for studying the *contingent* decision strategies prescribed by strategic management theories. De Sarbo, MacMillan, and Day's (1987) work provides an example of a strategy-related nonmetric conjoint study. Their research examines the decision rules used by venture managers in making go/no-go decisions regarding potential new ventures. Each venture manager was asked to make a go/no-go decision on 30 new ventures that differed along attributes such as fit with the venturing firm, size of investment required, presence of an experienced venture champion, and so on. De Sarbo *et al.* (1987) specify an additive (main effects only) model by assuming insignificant interactions. Thus, their work gives no indication as to whether venture managers may employ contingent decision rules in making new venture decisions (e.g., whether the simultaneous presence of venture fit *and* low investment may significantly increase the likelihood of a 'go' decision).

Metric conjoint analysis

Metric conjoint analysis is based on the Information Integration Theory of Anderson (1981). It requires that respondents' preference data are interval-scaled. Thus, executives completing a metric conjoint task would rate, rather than simply rank order, the combinations of different levels of strategy variables presented to them. Under the interval assumption the error theory of analysis of variance and multiple regression may be used to diagnose and/or test competing decision models at the individual-respondent level (Louviere, 1988). With replications, each parameter estimate in a decision model may be tested in a repeated measures ANOVA with the appropriate within-subject (source by replication) variance as the error term. Thus, rather than assuming that the interaction terms are not significantly different from zero, with replication one may test at the individual level whether an additive (main effects only) or multilinear (main effects and interactions) model is being used by the respondent.

Metric conjoint analysis is therefore particularly appropriate for evaluation of the interaction-based judgments prescribed by contingency theories. Priem's (1992, 1994) work, for example, uses metric conjoint techniques to examine chief executives' judgments. His individual-level analyses suggest that many manufacturing firm CEOs employ contingent judgments regarding key business-level strategy variables. Further, CEOs whose contingent judgments matched the prescriptions of contingency theory led the higher performing firms.

Policy capturing

The policy-capturing approach to understanding strategic judgments is similar to the previous methods, but is based on the social perception or 'lens' model developed by Egon Brunswik, 1952 (Brehmer and Joyce, 1988; Hammond, 1966). The basic differences between policy-capturing and the other decomposition techniques

is a possible lack of complete replication, a relaxation of the mandate for orthogonal (factorially crossed) strategy variables, and a typically large number of judgments needed from each executive.

Hitt and Tyler's (1991) work provides an example of strategy-related research that employs policy capturing. Their study examines executive judgments concerning the desirability of firms for acquisition. Aggregating across their sample of 65 executives, Hitt and Tyler (1991) found that 15 objective criteria explained the variance in acquisition evaluations better than did either executive or industry characteristics. Individual executives' acquisition policies were neither evaluated nor compared in this research, although policy capturing would allow such evaluations.

Policy-capturing, as other judgment-focused methods, has some inherent dilemmas that must be addressed in each application. One involves the choice between presenting profiles as either sets of *correlated* or *orthogonal* strategy variables. Correlated variables have better generalizability to actual states of the world, but do not allow a researcher an unambiguous way to estimate the independent effect of each variable, or to construct the independent interaction terms essential for comparing executive judgments to the prescriptions of contingency theories. However, orthogonality of the presented strategy variables, achieved through special arrangements of the combinations of the stimulus levels or through randomization (e.g. Hitt and Tyler, 1991), brings the potential for unusual combinations that do not reflect realistic strategic scenarios. Also, tasks such as those presented for the decomposition techniques may have potent demand characteristics (Allen and Madden, 1985); executives may tend to focus their attention on the variables presented during task completion, even if they pay little attention to those variables in their day-to-day activities.

A common validation procedure in policy capturing is to allow the subjects to demonstrate their insight into their own judgment policies (see Cook and Stewart, 1975; Reilly and Doherty, 1989). However, the *lack* of detailed insight into their own judgment policies exhibited by subjects in prior research (e.g., Stahl and Zimmerer, 1984), particularly on such well-defined tasks, with well-defined variables and levels, is one basis for criticism of the process-focused composition methods, discussed next.

Composition methods: Focus on the cognitive processes underlying judgment

Verbal protocol analysis, information search techniques, and cause maps are all methods for eliciting information from executives about the components and timing of cognitive processes that lead to the *composition* of strategic judgments. In these process-based approaches, the relevant strategy variables and their levels can be unknown; the key variables are elicited from the subjects as they 'talk through' their thoughts, search for information, or verbalize causal relations. These techniques would be especially useful in identifying dimensions that are used by executives in making strategic decisions, but that are not included in current strategic management theories or research. Thus, composition methods may be particularly useful for theory building, and could be employed in a manner consistent with Eisenhardt's (1989) suggestions for theory building from case research. The newly-identified variables could then be used in application of the decomposition methods.

Process-focused methods attempt to identify the mediating operations between input and output. In strategic contexts, this would involve identifying the processes occuring between the perception of strategic variables and the development of a strategic judgment. These methods allow for the specification of time order in judgment mechanisms—something that cannot be inferred from the decomposition methods, all of which implicitly assume holistic processing (Carroll and Johnson, 1990). An important temporal consideration in process-based methods is the researcher's choice between retrospective and concurrent techniques. Retrospective techniques have been used frequently in strategy process research. Since guidelines for their use have been offered in the literature (e.g., Huber and Power, 1985; Schwenk, 1985), and because of the severe problems with recollections (Golden, 1992; Russo, Johnson, and Stephens, 1989), our discussion is limited to concurrent techniques.

Despite the rich information available from composition methods, they do not allow rigorous statistical analyses of a single subject's data. Instead, data need to be aggregated across

executive subjects before statistical tests, based on contingency tables or Markov transition matrices, are possible. The criteria for statistical aggregation are complex; few hard-and-fast rules have been developed for how to aggregate data from these process-based methods. The lack of statistical rigor of the composition methods, however, is offset by the detail and insight they can offer into an executive's cognitive mechanisms. The first two composition methods discussed, verbal protocol analysis and information search, are often referred to as process-tracing techniques (Ford, *et al.*, 1989). The third method, cause mappping, is based on directed graph techniques (Haray, Norman, and Cartwright, 1965).

Verbal protocol analysis

Researchers who use verbal protocol analysis present their subjects with a limited set of stimulus configurations (3–10). An executive would be asked, for example, to choose his or her optimal (in terms of firm performance) strategic configuration from the set of alternatives while verbalizing the decision process. The types and levels of strategy variables included in the configurations are important, but they are augmented by other variables that can be identified from the executive's stream of verbalizations as he or she considers the choice problem.

Although some tasks make verbalization difficult, higher-order mental processes are unlikely to interfere with the task at hand. This is particularly true if the processes, as in strategic decision making, are not so well practiced as to be automatic (e.g., trying to describe how one processes driving information while driving a car; Ericsson and Simon, 1984). Executives are likely to be able to verbalize easily following training on an independent practice task (Carroll and Johnson, 1990).

Protocols are discreetly tape-recorded with the permission of the executive subject. Once the protocol data have been collected, they are transcribed and analyzed by independent coders who segment and categorize what the executive has said. From this content and sequence analysis, a flow chart and, finally, a formal algorithm can be constructed to predict the executive's processing, judgment, and choice on a future task. Verbal protocols have been used successfully in many contexts, including applications in the organizational literature (see Carroll and Johnson, 1990, for a brief review). Melone (1994), for example, examines the reasoning processes used on strategic-level tasks by executives in the diversified foods industry.

Techniques involving self-reports of cognitive processing, such as protocol analysis, are not without strong critics (e.g., Nisbett and Wilson, 1977). Some subjects may have difficulty in saying what they are thinking; trying to verbalize their thoughts could interfere with their basic thought process (Ericsson and Simon, 1984). Schweiger (1983), however, found no performance differences among individuals making strategic decisions either with or without concurrent verbal expression of their thought processes. One thing is clear about the use of verbal protocols: it is an extremely labor intensive process. Transcription can be difficult for subjects who do not enunciate well. Transcripts for even short sessions can be dozens of pages. Content coding schemes are not readily available, and usually have to be developed and checked for interrater reliability in a pilot study. Finally, there is no guarantee that one can produce a comprehensible flow chart from a lengthy verbalization. Still, the effort invested in using verbal protocol techniques can produce large dividends in the richness and uniqueness of eventual data.

Information search

The information search method monitors overt acts of executive subjects rather than verbalizations. In this method, the strategic judgment task would be arrayed as a matrix of alternative configurations (say, as columns) by the strategy, structure, and environment attributes of those configurations (say, as rows). Such matrices can be presented on large 'information boards' or on computer screens. Information about the levels of each attribute for each of the configurations are concealed. An executive subject would first be given the opportunity to uncover the pieces of information he or she feels are relevant, then make a final ranking of the presented configurations (e.g., Payne and Braunstein, 1978).

The purpose of search methods is to gather data on the timing and pattern of information

acquisition. Instead of focusing on an executive's use of internal, memory-based information, search methods record the executive's use of external data. On an information board, for example, the researcher would record in what order an executive uncovered information about key strategy variables and for how long the executive examined each piece of information. Inferences can be made about the importance and use of certain kinds of information by executives through analysis (via aggregate data) of whether or not it was acquired, how soon it was acquired, and how long it was considered. A possible extension of this technique, incorporating archival data, would involve examining the order and amount of requests an executive makes to his or her staff for information about an upcoming strategic decision.

Both the weaknesses and strengths of the information search technique result from the more formal and more organized way it uses potential information. One advantage of the technique is that it is not nearly as labor intensive as verbal protocols, because of the increased structure and control the researcher has over the information presented. Yet this is also a disadvantage, because the researcher chooses the level, amount, and types of information the executive can search through—foregoing some of the richness and natural context that one might gain from using verbal protocols.

Cause mapping

Axelrod (1976) diagrammed causal cognitive maps through the use of techniques for analyzing directed graphs (see Coombs, Dawes and Tversky, 1970, for examples). Bougon, Weick, and Binkhorst (1977) applied and extended this technique in an organizational setting. In the strategic management context, this method would not be used to discover causal relationships between strategy variables and performance. Instead, it would be used to identify the causal structure that is perceived by a firm's executives concerning firm performance and elicted strategy variables. The realized product of the method is a picture of the causal network called an 'etiograph' (Bougon *et al.*, 1977). In essence, it is a method for representing a specific executive's implicit theory of firm performance based on primary data. Cause mapping can be contrasted with techniques such as strategic argument mapping that rely on secondary data (e.g., annual reports; see Fletcher and Huff, 1990).

Cause mapping requires two stages of data collection. First, executives must be interviewed and observed to develop a manageable set of variables perceived to be part of the system of relations that involves firm performance. This data collection procedure can be a combination of ethnographic and quantitative methods, and would be a slightly modified version of what is described in Bougon *et al.* (1977). The n retained variables of the initial data collection eventually become nodes in the cause map system. These variables must be identifiable to all participants in the study, rather than idiosyncratically worded or understandable to only a subset of executives.

Then, an n^*n matrix of these elicited variables is constructed. Executives would be asked to place 1s in the upper triangle of the matrix where they believe the row variable has a causal influence on the column variable. In the lower triangle, executives would put 1s where the column variable has a perceived influence on the row variable. For each 1 in the matrix, the executive would also place a plus or minus sign, indicating whether the perceived effect is positive or negative. A set of nodes (the elicited performance-relevant variables) and arrows can then be constructed from the data matrix. To unfold the relations in the system, the data matrices are aggregated over executives and an etiograph, or causal map, is constructed, resulting in a node and arrow diagram that leads eventually to a performance node.

Cause mapping is limited by several specific weaknesses. Although data are collected at the individual level, there are no well-accepted ways for constructing a testable and reliable within-executive cause map, and no accepted ways to statistically compare cause maps across executives. To rigorously or statistically examine cause maps, one would have to aggregate the (0,1) data matrices over demonstrably similar executives. It could be possible, for example, to construct a 'shared' caused map based on aggregated information from each member of a firm's top management team. There are also no known techniques for assessing the potential interactive effects of cause map variables on each other. Therefore, despite considerable promise, cause mapping may be most useful simply for identifi-

cation of potentially important variables used in strategic judgments, or for understanding an executive's implicit theory of firm performance.

INTERNAL VALIDITY AND PRACTICAL RELEVANCE

Internal validity

Venkatraman and Grant note that 'inferences of relationships between constructs is (are) critically dependent on the correspondence between theoretical constructs and their respective operationalizations' (1986: 83). Thus, a match between a construct and its operational indicator is required for meaningful interpretation of empirical results. In the strategy literature, however, strategic judgments and the resulting choices are generally inferred from tangible organizational outcomes rather than directly measured. The assumptions discussed earlier—generally, that tangible organizational outcomes perfectly reflect executive intentions—expose the weak correspondence between the choice construct and its operationalization. Strategic choices, and the judgments on which they are based, remain one step removed from other strategy constructs in the same way that Child suggested early work on contingency theory was 'at one remove' (1972: 16) from the critical choice variable.

This lack of correspondence between the strategic choice construct and its indicators has important implications for the interpretation of empirical results and, therefore, for inductive theory building. For example, Hambrick and Mason's 'upper echelons' perspective suggests that observable characteristics of top managers are 'determinants of strategic choices and, through these choices, of organizational performance' (1984: 197). Empirical researchers, however, have assessed choice only indirectly, as realized organization outcomes (e.g., Eisenhardt and Schoonhoven, 1990; Finkelstein and Hambrick, 1990; Wiersema and Bantel, 1992). These studies address the question, 'do top managers matter?' rather than the question, 'do the *strategic choices* of top managers matter?' These questions are conceptually distinct. Only more direct measures of strategic judgment and choice will allow researchers to address the questions of when and how much the choices of top managers matter.

Practical relevance

The methods discussed in this paper may also improve the practical relevance of strategic management research. Thomas and Tymon (1982) suggest five dimensions for evaluating the relevance of organizational research: descriptive relevance, operational validity, nonobviousness, timeliness and goal relevance. Bringing executive judgment into the mainstream of strategy research will help to address the first three of these areas of research relevance.

Descriptive relevance is the degree to which the phenomena addressed by the research reflect the phenomena encountered by the practitioner. The composition methods described earlier may provide the most help in improving the descriptive relevance of choice-related strategy research. These techniques are particularly effective in describing the variables attended to and the causal attributions made by practitioners during decision making.

Operational validity 'concerns the ability of the practitioner to implement action implications of a theory by manipulating its causal (or independent) variables' (Thomas and Tymon, 1982: 348). No matter how consistent content research findings may be that certain variables (or their congruence) are related to firm performance, prescriptions for practitioners are not valid unless it can be shown that it is practicable to manipulate those variables (i.e., that Assumption #4 holds). Prescriptions solely based on content research may even be *harmful* in situations where they direct practitioner attention toward variables that are difficult to perceive or manipulate. The decomposition methods described in this paper may be helpful to strategy researchers in establishing operational validity. These techniques allow the separate examination of intended and realized strategies (Mintzberg and Waters, 1985), so that the strength of the linkage between executive intent and realized organizational outcomes can be evaluated. Where the linkage between intent and realization is found to be strong, prescriptions can be offered with greater confidence.

The nonobviousness dimension of relevance asks that theory contribute beyond that which one could deduce from common sense. Each strategy theory can be evaluated on its own merits with respect to this dimension. It has been

suggested, however, that executives' commonsensical expressions of their thinking processes may *not* be reflected in their behaviors during actual decision making (Argyris and Schon, 1974; Brunsson, 1989; Stahl and Zimmerer, 1984). Indeed, their actual decision making processes may be nonobvious to the executives themselves. Both the decomposition and composition methods may make descriptive contributions concerning the degrees to which executive decision making in practice is consistent with executive descriptions of their decision making substance and process.

ACKNOWLEDGEMENTS

We thank Greg Dess and Abdul Rasheed for their helpful comments on earlier drafts of this paper.

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