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**SWP 15/92 REPRESENTING MANAGERIAL COGNITION:
THE CASE FOR AN INTEGRATED APPROACH**



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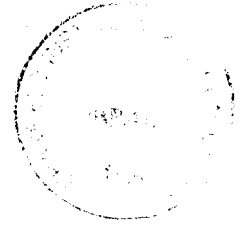
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**Representing managerial cognition:
The case for an integrated approach:**



The study of managerial cognition as a means to understanding strategic behaviour is a developing area of academic activity. This paper discusses two of the more contemporary approaches to representing managerial thought and through an example of studies exploring competitive strategy raises the debate that such methods should not be considered as exclusive approaches to representing cognition, but alternative perspectives which can be integrated to achieve a richer picture of cognitive content and structure.

The purpose of this paper is to generate debate concerning the application of theories of cognition to the study of strategic managerial thought. We contend that historically management researchers have tended to treat theories of cognition as discrete alternatives to representation whereas in practice and arguably, in theory these approaches are moving closer together.

The paper focuses on two theories of cognition - categorisation theory and personal construct theory and argues that only differences in emphasis exist between these two approaches and that greater benefit would be gained by integrating such approaches rather than arguing for exclusivity in one or another.

The application of managerial cognition to the study of complex issues relating to strategic management is finding favour with a growing body of academics. The cognitive perspective has been seen as providing new insights into the study of competitive positioning (Porac & Thomas, 1990; Reger, 1988), organisational dynamics (Ginsberg, 1990), environmental scanning (Huff & Schwenk, 1990), strategy formulation (Fletcher & Huff, 1990) and information processing (Walsh, 1988; Dutton, Walton & Abrahamson, 1989).

This move into cognitive science has necessitated the exploration of theoretical frameworks and methodologies hitherto unused in the domain of strategic management. However this has caused concern that the research undertaken may utilise methodologies without due acknowledgement to the theoretical frameworks on which they are based (Huff, 1990; Stubbart, 1987; Stubbart & Ramaprasad, 1990). The implications being that research into managerial cognition may be building on insufficiently understood and possibly inappropriate theoretical underpinning s.

A fundamental issue in the study of cognition is that of representation (Gardner, 1985). The underlying assumption of cognitive theory is that individuals hold mental representations of the world which guide behaviour as opposed to behaviour being the direct result of responses to stimuli (Tolman, 1948). The question faced by researchers in cognitive science is how should these mental representations be themselves represented?

General terms such as schema (Lord & Foti, 1986; Lurigio & Carroll, 1985; Rumelhart, 1984), belief systems (Fiske & Taylor, 1984; Walsh, 1988), cognitive maps (Bougon, Weick & Binkhorst, 1977; Stubbart & Ramaprasad, 1988) and mental models (Porac & Thomas, 1990) refer to representations of the cognitive structures which enable individuals to make sense of the world. For example, Bougon *et al* (1977) produced an organisational cognitive map of the Utrecht Jazz Orchestra, this represented cognitive process as a causal network with concepts linked by arcs indicating causality and is therefore more accurately termed a cause map (Weick & Bougon, 1986), whereas the mental models of Porac and colleagues (Porac, Thomas & Emme, 1987; Porac, Thomas & Baden-Fuller, 1989; Porac & Thomas, 1990) represent cognitive process as categoric hierarchies which comprise of superordinate and subordinate categories.

Reviews of the area have attempted to identify alternative approaches to representing cognition. Stubbart (1989) identified three forms of representation in managerial cognition: categories, networks and inferences, whereas Huff (1990) identifies five 'families' of maps as alternative approaches to representation.

Two approaches which can be found in the literature more recently are representation of managerial cognition as a categoric hierarchy or taxonomy. *i.e.* a structure of categories; and representation as a repertory of constructs or dimensions. Such approaches have tended to be treated as discrete alternatives, *i.e.* studies have been grounded either in categorisation theory such as Porac & Thomas (1990) or construct theory such as Ginsberg (1990).

CATEGORISATION THEORY

Categorisation theory assumes that individuals see the world through a structure of categories or sets and that stimuli (an object, event, person or concept) possess attributes which allows our cognitive system to allocate these stimuli to particular categories. Cognitive categorisation is therefore primarily concerned with the assignment of similarity (to place concepts in the same category) and difference (to place concepts in a different category).

Early applications of categorisation theory in the field of anthropology treated categories as sharply bounded sets specified by independent attributes (e.g. Tyler, 1969). Such an approach, although greatly facilitating the construction of classification systems, has more recently been regarded as inadequate in terms of representing cognitive process (Kempton, 1978). Fuzzy set theory (McCloskey & Glucksberg, 1978; Rosch & Mervis, 1975; Zadeh, 1965) considers category membership as being graded or positioned on a continuum such as that shown in figure 1. In other words in cognitive science categories are no longer categoric!

FIGURE 1 ABOUT HERE

In the application of categorisation theory to managerial cognition Porac & Thomas have been strong advocates through the production of taxonomic mental models to represent a manager's schema of competitive structure (Porac *et al*, 1987; Porac *et al*, 1989; Porac & Thomas, 1990).

Others too have employed this approach; Walton (1986) and Staw & Ross (1987) have utilised the concept of the prototype (a typical member of a category) to explore its relevance to managerial cognition; Dutton & Jackson (1987) used categorisation theory to relate the cognitive organisation of strategic issues to information processing and the motivation of key decision makers; Shaw (1991) to explore intercultural issues in management.

The strengths of categorisation theory lie in an ability to simplify and describe cognitive structure. This has proved to be particularly valuable in exploring competitive positioning where managers have been found to hold 'cognitive oligopolies'; a far more restricted picture of their competition than that which may be identified by an industrial analyst (Porac & Thomas, 1990).

A practical weakness of categorisation theory is that it is unable to explain the basis on which similarity / dissimilarity is being judged, it simply describes categoric structure. This can be problematic when considering the effects of context or time, e.g. in a highly competitive situation two firms may be judged to be similar on the basis of aggressive pricing activity, whereas in a less competitive situation (perhaps even in the same year) they may be grouped on the basis of location, production processes or level of decentralisation. In other words whereas categorisation theory can present a snapshot of cognition it does not explain the underlying factors which have created this particular categoric taxonomy.

A further limitation concerns situations where concepts are poorly defined and therefore not readily assigned to categories. Porac & Thomas identify such situations as; "newly emerging or highly volatile environments" (1990: 235), surely it is these very environments which are often the context in which strategic decisions are made?

Aside from such practical issues are concerns that the underpinning of the theory, which is developed from the categorisation of natural objects (Mervis & Rosch, 1981), and the methodology (Kempton, 1978) are inappropriate for the study of highly abstract concepts such as those found in the study of strategic behaviour (Hampton, 1981; Huff, 1990; Lingle, Altom & Medin, 1984): *'The relevance for strategic management of studies that show how young people categorise a mug as a "kind of a cup" (Kempton, 1978) is not yet clear'*. Huff (1990: 26)

This issue is also highlighted by the inadequacy with which fuzzy set theory explains how individuals organise their cognitions. Kempton (1978) found that individuals who had already graded a mug as occupying an alternative category to a coffee cup on the basis of a categoric scale (is a member or is not a member) were unable to replicate this when using a graded scale based on fuzzy set theory (see figure 1 for an example). If such problems occur when using highly concrete everyday objects, what leads us to believe that such an approach is a valid measure to represent the cognitions of abstract, irregular, context specific strategic decisions in dynamic conditions ?

In summary therefore categorisation theory has been used successfully to produce cognitive maps which represent cognition as categoric taxonomies. This has allowed for largely descriptive representation which does not explain the dimensions used to form the categories or the effect of context and time. In addition there are concerns with the validity of using methodologies developed on everyday, concrete concepts to the abstract area of strategic management.

PERSONAL CONSTRUCT THEORY

Kelly's (1955) constructive alternativism is the foundation of personal construct theory. Kelly's position is that individuals process information through a system of constructs which allow them to make sense of the world. A construct is a dichotomy or continuum, comprising of two poles, along which stimuli can be positioned allowing the individual to cognitively evaluate or make sense of stimuli: *"The dichotomy corollary reflects the constraint / similarity assertion that constructs have two poles: an emergent pole such as 'descriptive' and a opposite pole, such as 'normative'".* Eden & Jones (1984: 779 & 780).

Whereas categorisation is concerned with whether concepts are similar or different, construct theory places emphasis on the nature of similarity and contrast, *i.e.* the dimensions used to assign similarity and contrast.

Construct theory has found widespread acceptance in a variety of disciplines within the social sciences and in the area of managerial cognition its application appears to be growing in popularity.

One of the attractive aspects of Kelly's theory is that it comes complete with a usable research instrument. Kelly describes an individual's array of constructs as a repertory, this repertory or menu of constructs can be elicited and represented on a repertory grid. The repertory grid has provided one of the first instruments for exploring cognitive structure. Thomas describes it as "*the psychological equivalent of the first rough ground mirror*" (1978: 51).

Dutton *et al* (1989) used the repertory grid to assess how managers sort information related to strategic issues; Ginsberg (1989; 1990) to assess how managers view diversification; Reger (1988; 1990) and Walton (1986) explored how managers made sense of competitor's strategy in the banking industry; Dunn & Ginsberg (1986) used construct theory to develop a methodology for organisational analysis; Dunn, Achilles, Dukes & Ginsberg (1986) developed a cognitive model of policy dynamics; Wan Rafaei (1986) explored strategy formulation through the use of repertory grids; Eden and Jones have made much use of the grid in exploring operational research problems from a managerial cognition perspective (Eden & Jones, 1980; Eden, Jones, Sims & Smithin, 1981; Jones & Eden, 1981; Eden & Jones, 1984).

The strength of construct theory can be found in a fundamental weakness in categorisation theory, *i.e.* the construct defines the dimensions along which similarity and contrast are assigned. The position of the theory is that these underlying constructs are central to cognition, the implication being that constructs, because they are underlying, are less likely to be influenced by context and time and may also be more effective in making sense of abstract, dynamic concepts such as strategies (*e.g.* Wan Rafaei, 1986). Construct theory has been found to illuminate the nature of decision making in uncertainty (Eden & Jones, 1984) and produce new dimensions for assessing competitive structure and competitive advantage (Reger,

1988). From a methodological perspective Kelly's instruments for eliciting constructs minimise the imposition of the researchers perceptions on the respondent (Reger, 1990).

Construct theory however, does not provide a clear representation of the interaction between constructs as can be achieved with a taxonomy of categories. A further weakness of construct theory is that it can be rather ungainly and time consuming when applied to cognitively complex issues: *"A client team will generate ideas, explanations and ways of making sense of the situation that will certainly run into several hundred constructs."* Eden (1988: 3).

The use of the construct approach is often made at the expense of further richness as the focus is exclusively on constructs and elements. Whereas many researchers have undertaken aggregation of grids and lengthy statistical analysis there are concerns that such analysis moves beyond the concept introduced by Kelly (1955) and is antitheoretical (Eden & Jones, 1984).

In summary therefore construct theory provides an avenue to explore underlying cognitions and elicit the dimensions of similarity and contrast which are used by the individual. As a methodology the repertory grid is an attractive research tool which can minimise the effects of researcher bias. However it presents problems when attempting to explore cognitively complex issues and does not offer a method for easily linking constructs to create a more complex cognitive map.

EXAMPLE: EXPLORING COMPETITIVE STRATEGY

The study of competitive strategy is a good example of an area which has been dominated by the conventional view of strategy as a planned, deliberate, phenomena occurring in 'real' environments (*e.g.* Porter, 1980; Rumelt, 1984). More recently a number of studies have attempted to develop understanding of how managers construct competitive environments in a subjective sense (*e.g.* Porac & Thomas, 1990; Hodgkinson, Gunz & Johnson, 1988). Within this area of research the application of methodologies has been relatively narrow; two studies which are prototypical of the approaches undertaken are a study of competitive grouping in the Scottish knitwear industry (Porac, Thomas & Baden-Fuller, 1989) which utilises categorisation concepts to represent cognition through the construction of cognitive taxonomies and on competitive positioning in the Chicago banking industry (Reger, 1990) utilising construct theory to represent the competitive dimensions which managers utilise through the elicitation of repertory grids.

The methodologies utilised by these researchers are interlinked with the foci of the studies; competitive groups are concerned with categories, with membership and similarity whilst competitive positioning is concerned with similarity and contrast, with location on particular constructs and dimensions. Both studies are however concerned with competitive environment but they select differing perspectives which are perhaps driven partly by methodologies rather than cognition *per se*.

Both these studies are exploratory and are based on small samples of respondents (17 & 24 respectively), they are both concerned with aspects of the competitive environment, but their findings are in marked contrast; the categorisation study of Porac *et al* (1989) concludes that cognitive oligopolies are likely to exist in appraising competitive situations, that managers over simplify their

environments and possess common simplifications within particular groups, they therefore regard their competitive environment as one made up of a far smaller group of organisations than a market analyst (for example) may identify as current competition - in this case the groups would include other Scottish knitwear companies but not Far Eastern, or other European companies offering similar products.

In contrast the study undertaken by Reger (1990) found that strategists possess highly idiosyncratic dimensions for assessing their positioning in competitive space and that dimensions were often utilised which were not acknowledged in the academic literature in this area, whilst there were some common dimensions such as geographic scope in the main these were highly individual such as asset based lending, market segmentation etc. Here the methodology places emphasis on contrast and is able to produce a highly variable output across individuals who are competing at a fairly intimate level, whereas in contrast the previous study utilised a cognitive theory which represents thought on the basis of similarity, and produce a strong grouping of individuals competing in close proximity.

The question that we wish to raise is how sure can we be that such output is the result of manager's cognition or the result of particular cognitive methodologies utilised by the researcher? The important issue is not the validity of these particular studies, both of which provide important contributions to the body of knowledge in this area, but whether or not researchers are constraining the study of managerial thought and all its contextual complexity through the application of relatively narrow methodologies adopted from clinical and child psychology? In short where are the theories of managerial cognition onto which we can build our methodologies?

DISCUSSION

Much of the work on managerial cognition has involved the adoption of an exclusive theoretical frame to provide a basis for representation. Each author has presented their adopted theoretical position as providing the solution to understanding managerial cognition, whether it be construct theory: *"The concept of cognitive construction systems thus provides both a unifying principle for the study of organizational dynamics and an approach to operationalising the dominant logic which top managers use to construe their businesses and to make critical resource allocation decisions."* (Ginsberg, 1989: 420). Or categorisation theory: *"A taxonomic approach to mental models adds another dimension to research and theory concerning manager's understanding of their environments."* (Porac & Thomas, 1990: 238). Or causal theories: *"Causal analysis is built into our language and it would be very difficult to think completely in other terms even if we tried."* (Axelrod, 1976: 5).

It is the authors' contention that such treatment of selected theories, as providing the only basis for the representation of cognition, is at best misleading and, as identified by Reger (1988) all such theories can only be partial theories of cognition: *"The theoretical position of this dissertation is that personal construct theory is a partial theory of how individuals cognitively organise some aspects of some knowledge domains"*. Reger (1988: 41).

Such theoretical perspectives for representing cognition could be compared to Smith's (1975) outline of a group of blindmen who have been asked to identify an entity (in this example an elephant) by touching one part - Smith observes that surely it must be better to pool the information of all the blindmen each having touched a different part. As cognitive methodologies are partial representations

surely a form of methodological pluralism which combines categoric, construct and causal approaches is needed to provide a more complete understanding of the nature of thought. It is for this reason that management researcher's need to become less partisan in their use of methodologies and be prepared to integrate alternative theories of cognition.

For example, categorisation theory and construct theory are not discrete alternatives but overlapping theories of cognition. Both are concerned with cognitive discrimination, *i.e.* similarity and contrast. Categorisation theory represents the results of assigning similarity and dissimilarity between concepts as a taxonomic structure whereas construct theory represents the dimensions which are used to assign similarity and contrast as a matrix or grid. Both approaches require the respondent to identify concepts (*e.g.* competitors) which are similar, as with the studies of Porac & colleagues (1989) or the basis on which they are regarded as being different as with Reger (1988).

Categorisation theory therefore provides an important approach for describing cognitive structure and making it possible to produce parsimonious cognitive maps. However it is unable to explain underlying dimensions of cognition and does not appear to be appropriate for particularly volatile situations. As identified by Murphy & Medin the relationship of similarity may be able to describe categories but this does not determine which concepts will be '*coherent or meaningful*' (1985: 289). Categorisation theory, therefore, does not help explain why particular attributes are selected to define categories or a relationship between categories other than superordinate and subordinate relationships (Hodgkinson, Gunz & Johnson, 1988; Reger, 1990).

Construct theory allows the identification of underlying dimensions but presents problems in developing cognitive maps, it can be an ungainly method for

representing cognitions in rich contexts, the complexity of the resulting grids possibly diverting the researcher from the real issue: the cognitions of the respondent. The management researcher must therefore recognise the partial legitimacy of current theories of cognition and make judgements based on the nature of the research problems being explored, or seek to use methodologies which integrate such theories and therefore seek to present a wider representation of cognition.

Research problems which focus on eliciting the content of strategic thought appear well suited to the theory of personal constructs (e.g. Reger, 1988), whereas research problems which focus on the structure of cognitions are more appropriate to taxonomies of categories as used by Porac and colleagues (1987; 1989). Similarly further approaches to representation such as causal mapping may provide a suitable basis for modelling and simulating cognitions.

However for many studies which are exploratory in nature the research problem may require a more flexible approach to representing managerial thinking as the domain of interest requires greater illumination from a number of theoretical perspectives. In such situations it must be appropriate to search for ways of integrating theories of cognition to provide a more balanced exploratory methodology.

A method of representation which combines categorisation, construct and causal theories is the Means - End chain (Gutman, 1982). In the context of managerial cognition this has been utilised by Jolly, Reynolds & Slocum (1988) to explore managerial evaluation of subordinates. In this study constructs were elicited by the triadic method developed by Kelly (1955) to establish how managers differentiate between employees in a performance appraisal, once the constructs are elicited the respondent is asked to identify the preferred pole of each construct, this decision

therefore represents the transition from a pole of a construct to a category (from bipolar to unipolar). In the subsequent stage the respondent then identifies the consequences of this category *i.e.* a causal link is established, which can then be used to develop a hierarchical structure of categories termed a hierarchical value map (Jolly *et al*, 1988). This methodology has therefore elicited underlying dimensions (constructs) and created a categoric structure linked by causal relationships.

This is one illustration of how three theories of cognition may be integrated into a meaningful and flexible methodology for representing managerial cognition (Eden and colleagues have pioneered the application of constructs with causal linkages to managerial cognition). The complementary strengths and weaknesses of categorisation and construct theories make their integration an attractive proposition. By combining further approaches to representing managerial cognition perhaps research can move forward in developing an understanding of how and what managers think.

It is not yet possible to compare the advantages of such composite methodologies but intuitively the added richness provides a more comprehensive methodological framework for qualitative explorations of managerial cognition. As stated at the beginning the purpose of this paper is to generate debate into approaches to methodologies for representing managerial cognition. There are many areas of cognitive study have not been raised in this paper, however the thesis presented is that management researchers should be less partisan in their adoption of theoretical positions and be prepared to integrate approaches to representation in order to provide richness, context and predictive qualities in the exploration of managerial thought.

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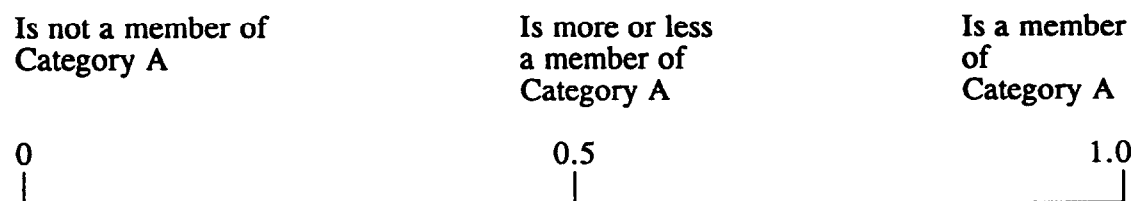
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FIGURE 1

Fuzzy set theory represented as a continuum, based on the work of Kempton (1978)



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