Cognition and reasoning and the related field of decision making: An investigation of leading writers views to support a study of strategic thinking.

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ABSTRACT

The purpose of this paper is to review the contributions of leading writers in the fields of cognition and reasoning, and the related field of decision-making with a view to gaining a better understanding of the activity of strategic thinking. The strategy paradigm is a contentious area and the subject of considerable debate on the definition of constructs for quantitative empirical research. In setting out to prepare this paper it was anticipated from the outset that the exploration of the contributions of the leading writers in the fields of cognition and reasoning, and decision-making would shed valuable insight into the key issue of the manager’s relative use of intuition and analysis in strategic problem solving.

We have learned from earlier analysis in the strategy literature (O’Shannassy, 1999b) a greater appreciation of the use of intuition in strategic thinking was encouraged in the early 1990s as organisations sought to cope with an uncertain environmental context (Ohmae, 1982; Mintzberg, 1994). Mintzberg (1994) also identified shortcomings in the timeliness of the availability of hard data to assist the use of analysis in the strategy process.

The key insight gained from this paper is the value of achieving balance in the use of intuition and analysis in problem solving with support here from several writers including Simon (1957, 1960a, 1960b, 1965), Thompson (1967), Isenber (1984), Langley (1995), Sauter (1999) and even de Bono (1991) to an extent. Individuals think strategically not organisations, however, organisations can provide a supporting context to staff and manage the strategic conversations that take place within that context. Against this background determination of the relative use of intuition and analysis in problem solving also needs to be balanced with the influence of the political context in organisations (Langley, 1995). A further finding is that advances in information processing and decision support systems (Sauter, 1999) are now able to overcome earlier perceived shortcomings in the analysis of hard data identified by Mintzberg (1994) with better information available on a more timely basis.
INTRODUCTION

A study of the activity of strategic thinking draws on a wide range of subject matter including the strategic planning framework, cognition and reasoning, the related field of decision-making, organisational politics, organisational culture, group dynamics and increasingly technology. The purpose of this paper is to focus on the fields of cognition and reasoning, and the related field of decision-making with a view to gaining a better understanding of the activity of strategic thinking. The strategy paradigm is a contentious area and the subject of considerable debate on the definition of constructs for quantitative empirical research. It is anticipated from the outset that the exploration of the views of the leading writers in the fields of cognition and reasoning, and decision-making will shed valuable light on the activity of strategic thinking. A particularly important issue is the manager’s relative use of intuition and analysis in problem solving and the influence of context in this activity.

THE NATURE OF COGNITION AND REASONING

Cognition

Cognition is the human ability to know (de Wit and Mayer, 1998). Knowledge is stored in people’s minds in the form of cognitive maps or cognitive schemata (Eden, 1992). Cognitive maps or mental models are defined as the sum of interrelated information stored by the individual. Weick and Bougon (1986) observe that these mental models comprise concepts and relationships we use to comprehend different situations or environments. These mental models act as “maps” which facilitate individuals understanding of events on a larger scale, beyond immediate perception (Weick and Bougon, 1986; Huff, 1990). Narayanan and Fahey (1990, p. 110) expand:

“[c]ause maps provide a convenient shorthand to describe the lenses which filter data and a means by which data are interpreted. In this view, decision makers [can be] viewed as active selections and interpreters of data”.

The study of managerial cognition gives insight into how managers deal with uncertainty in their day-to-day activity (Spender and Eden, 1998). Eden (1990, p. 35) links cognitive mapping directly to strategy development in this context:
“the technique of “cognitive mapping” is a useful way of linking (strategy) implementation and formulation. Indeed these tasks are hardly separable. Real managers cannot think about the future of their organization without thinking about action and implementation”.

The cognitive map or schemata managers bring to strategic thinking plays a vital role in the quality of the strategy outcome in an uncertain business environment.

Managers have numerous cognitive limitations with the literature on cognitive psychology arguing that unaided human judgement is often flawed (Langley, 1995; Sauter, 1999). The cognitive abilities of individuals are constrained by a limited information processing capacity, limited information sensing ability and limited information storage capacity (Simon, 1957; Stacey, 1993). Individuals easily believe salient events take place more frequently than they actually do. We also suffer from overconfidence in our ability to make complex judgements. Individuals possess a range of cognitive biases including “hindsight bias”; retrospective confidence in decisions which took some thought and deliberation at the time, and a tendency to seek information that confirms earlier decisions. A further weakness is managers inability to assess the degree of relationship among variables which is key for successful management (Isenberg, 1984). Individuals are prone to simplify what they observe. Stacey (1993, pp. 57-58) expands:

“...we are unable to know reality itself; all we can do is construct simplifications, that is, mental models of reality. What we discover and therefore what we choose and how we act, all depend upon the mental model we bring to the task...In highly complex situations, then, explanations of strategic management need to take account of the possibility that environments may be invented or created in managers’ minds and that they can often only make sense of what they are doing with hindsight”.

The literature indicates that cognitive maps can be studied at the individual (Eden, Jones and Sims, 1979) or the organisation level (Ackerman, Cropper, Eden and Cook, 1991). Johnson, Daniels and Asch (1998) investigated whether understandings of the competitive environment are held at the individual or group level. They found managers did share a level of similarity and this was attributable to both nationality and organisational level. There was little evidence to support a link between
understandings of the competitive environment and organisations. A similar result was found by organisation function. A qualitative differentiation was also apparent by organisational level. Liedtka (1998) observes that it is individuals who think strategically, not organisations however organisations can provide a supporting context to staff and manage the strategic conversations that take place within that context.

Barr, Stimpert and Huff (1992) observe that the demands of organisational renewal require management adjust their mental models on a timely basis where there are significant changes in the environmental context. Kiesler and Sproule (1982, p. 548) suggest that this involves problem sensing: “…the cognitive processes of noticing and constructing meaning about environmental change so that organizations can take action”. Mental models, which are strongly held, can lead managers to not properly assess changes in the environment and as a result fail to revise firm strategy (Hall, 1984). Managers continuing in attempt to apply mental models which are no longer appropriate in the context of the environment can explain firm decline (Hambrick and D’Aveni, 1988). Barr et al (1992) also assert that delays in adapting mental models will also result in firm decline. Experienced managers have more evolved mental maps than inexperienced managers to deal with change and complexity. Interestingly, Weick and Bougon (1986) see mental maps as quite changeable whilst Donaldson and Lorsch (1984) see mental maps as unlikely to change and if they do it is in an incremental fashion.

Fiol and Lyles (1985) note that the firm’s response to a changing environment is dependent on changing or adding to these mental models of managers. Lewin (1947) argues one influential way of undertaking individual and organisational learning and changing mental models focusing on unfreezing, change and refreezing. In the unfreezing stage the manager or the organisation is required to discard old beliefs to make way for the new. This preliminary stage is key in the learning process. In the change stage, after old beliefs have been unlearned, new beliefs with respect to the environment can be achieved often using experimentation. In the freezing stage the new beliefs and changes to the individual’s and the firm’s mental models become entrenched as events occur as anticipated (Argyris, 1977). A two-tiered conceptualisation of learning for the individual and the firm is also apparent from the literature (Argyris, 1977; Fiol and Lyles, 1985). Single loop or low level learning often associated with strategic planning (Heracleous, 1998), is evidenced in changes
in behaviour as distinct from changes in understanding. Learning of this type results in incremental modifications or minor adjustments to immediate interpretations. Double loop or higher level learning, associated with strategic thinking (Heracleous, 1998), requires a restructuring of the individual’s mental models and leads to major changes in understanding. This higher level of learning has two stages; firstly, the unlearning of current concepts and associations and, secondly, associations adding new concepts and connections of ideas.

**Reasoning**

Reasoning is the thought process leading to knowing (cognition) which involves a number of mental activities taking place over time (de Wit and Mayer, 1998). The approach chosen to undertake problem solving, strategic options chosen (Donaldson and Lorsch, 1984) and method of implementation (Isenberg, 1984) are influenced by manager’s mental structures. There are three views in the literature on the path of managers to knowing. Firstly, that strategic thinking is a sequential thought process (Isenberg, 1984, p. 86; Donaldson and Lorsch, 1984); secondly, thinking and acting occurs intuitively and simultaneously (Weick, 1983, Isenberg, 1984, p. 86); and, finally, intuition and analysis can be combined in a non-sequential manner (Isenberg, 1984).


Often when favouring an intuitive approach to problem-solving managers will avoid the sequential approach. Managers can jump from phase to phase allowing implementation issues to influence problem definition (Isenberg, 1984, p. 86). This position is supported by Weick (1983) who observes that managers can act “thoughtfully” combining thinking and action simultaneously, learning as they go. Here managers rely on general expectations about the situation they confront relying on existing mental maps rather than rational analysis.

Managers at all levels can combine intuition and analysis in this approach to problem solving. Isenberg (1984, p. 86) asserts:
“...intuition is not the opposite of rationality...it is based on extensive experience both in analysis and problem solving and in implementation...managers often combine gut feel with systematic analysis, quantified data, and thoughtfulness”.

Clearly the training and experience level of the manager is relevant here. Further the problem solving technique required will vary from one context to another. This position has strong support in the strategy literature (Wilson, 1994, 1998; Raimond, 1996; Liedtka, 1998a, 1998b; Heracleous, 1998).
DECISION-MAKING

The decision-making literature makes a valuable contribution to the discussion of reasoning in the context of strategic thinking, particularly with respect to the sequence of thought and the relative importance of intuition and analysis. Numerous writers have made important contributions to this field (e.g. Bateson, 1938; Vickers, 1965) and writers of particular interest to the development of this study include Simon (1957; 1960a, 1960b, 1965, 1987), Lindblom (1959), Thompson (1967), Isenberg (1984), de Bono (1991), Langley (1995), Klien (1998) and Sauter (1999).

Simon (1957, 1960a, 1960b, 1965) perceives management as decision-making in framing his discussion on the activities of “administrative man”. He observes three stages in making a decision. Firstly, “intelligence” activity where the manager perceives the need for a decision. Secondly, the “design” activity where choices are formulated and analysed. Thirdly, is the “choice” activity where the course of action is chosen from the available options. Execution of the selected policy option is a further stage. Techniques of decision-making available for Simon’s “administrative man” include two polar types-programmed and non-programmed decisions-though they are not mutually exclusive. Similar to the continuum of strategic thinking presented in O’Shannassy (1999b) a continuum stretching from highly programmed to non-programmed decisions can be applied. Where the organisation has no procedure for dealing with a particular situation then the firm will rely on its general capability for intelligent problem-solving. Techniques for programmed decision-making include knowledge, skills, habit, routine, standard operating procedures, well defined information channels, appropriate goal systems, structure and culture. Non-programmable decisions, which in the world of “administrative man” are expensive to make, rely on the recruitment and training of staff with intuition, creativity and judgement. The development of techniques in mathematical analysis, operational research, electronic data processing, information technology and computer simulation facilitating advances in decision-making since World War 2 are noted. In a natural evolution of his ideas Simon’s (1987, p. 63) later writing expresses an appreciation of the demands on the modern manager and the need for flexibility in decision-making:

“Every manager needs to be able to analyze problems systematically (and with the aid of the modern arsenal of analytical tools provided by
management science and operations research). Every manager needs also to be able to respond to situations rapidly, a skill that requires the cultivation of intuition and judgement over many years of experience and training. The effective manager does not have the luxury of choosing between “analytic” and “intuitive” approaches to problems. Behaving like a manager means having command of the whole range of management skills and applying them as they become appropriate”.

This is a key point in this conceptualisation of strategic thinking and one that is to a degree lost on certain writers (eg. Mintzberg, 1994; Hamel and Prahalad, 1994) in the strategy field. There is a need for staff at all levels to have the ability to reason with a full repertoire of analytical and intuitive techniques relevant to their job without bias in order to address the problems they confront in day-to-day management.

Lindblom (1959) discusses decision-making in the context of public policy; however, his offering is relevant to all forms of organisation. He offers another perspective focusing on two rational approaches to decision-making. Firstly, the “rational deductive ideal” with its emphasis on analysis. This method of decision-making requires a thorough and accurate appraisal of data and theory related to the problem at hand, that full information is available, and that a logical process of calculative deduction will bring forth the most favourable alternative. This is a “synoptic approach” to decision-making. Unlike Simon (1987), Lindblom (1959) does not observe the value of intuition, although he does recognise the problem solving ability of manager’s is limited and this renders the synoptic approach problematic. As a result managers adopt an approach of “disjointed incrementalism”, making a succession of limited comparisons as the most prevalent form of decision-making. The emphasis is on marginal and comprehensible change considering a manageable range of alternatives. The ends are adjusted to the means. This is a fragmented process in which analysis and evaluation take place simultaneously, at different times or in different places. Lindblom (1959) calls this the “science of muddling through”. Where the environment requires drastic change on the part of the organisation this can be achieved by speeding the process. Clearly in the context of this discussion and the demands of the present day business environment there are weaknesses evident in Lindblom’s thesis, however, the use of incremental learning and ongoing analysis has a place in the modern business firm. This must be balanced with the use of intuition.
Thompson (1967) addresses this issue of balancing analysis and intuition with the problem of decision-making under uncertainty. He considers decision-making in the context of manager’s beliefs or assumptions in regard to the situation, and the preferences as to the most desirable outcome. There is less certainty associated with particular beliefs in regard to cause and effect relations, and preferences on possible outcomes compared with others and this is illustrated by Thompson’s matrix.

**Diagram 3-Thompson’s Matrix (1967)**

<table>
<thead>
<tr>
<th>Beliefs about cause/effect relations</th>
<th>Certainty</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Certainty</td>
<td>Uncertain</td>
</tr>
<tr>
<td></td>
<td>COMPUTATIONAL STRATEGY</td>
<td>COMPROMISE STRATEGY</td>
</tr>
<tr>
<td></td>
<td>JUDGEMENTAL STRATEGY</td>
<td>INSPIRATIONAL STRATEGY</td>
</tr>
</tbody>
</table>

Similar to observations in the strategy literature, situations of environmental and strategic certainty encourage an analytical approach to decision-making. Alternately, situations that are uncertain with respect to beliefs on cause/effect and preferences for outcomes encourage inspirational thought. Uncertain beliefs about cause/effect and known preferences on outcomes require the use of judgement by management. Certain beliefs on cause/effect married with uncertainty on the preferred outcome calls for a compromise solution.

The step by step approach to decision making put forward by Simon (1957), which is not dissimilar, is seldom used in situations of organisational uncertainty where there is little use for analysis (Thompson, 1967). Indeed Ohmae (1982) in the strategy literature argues that rational analysis must be combined with an understanding of the reality confronting the firm and an “imaginative reintegration” of the situation into a new perspective using a non-linear thought process. Against this background reasoning in the modern firm can be linear, but it does not need to be linear. It depends on the situation, which can be assessed in the context of Thompson’s (1967) matrix for the need for rational or intuitive thought with respect to decision-making. Isenberg’s (1984) view is that action is incorporated into the diagnosis of a business problem, which indicates that these steps in thought processes are intertwined.
de Bono (1991), who has made a key contribution in understanding the human brain as a self-organising system, picks up on this decision-making debate. de Bono (1991, p. 273) recognises the limitations of analysis and provides a useful counter-balancing perspective arguing that creative thinking is key to effective decision-making:

“We need to realize that the analysis of data is not enough. We can find in the data only reflections of the ideas we already hold. This arises directly from the nature of perception. So our reliance on analysis for decision-making is inadequate. We need to develop creative conceptual skills as well.”

New concepts, hypotheses, perceptions, designs are not simply discovered, they have to be created by generative thinking.

Langley (1995) also discusses decision-making as navigating between the two extremes of analysis and intuition. This writer asserts that group dynamics, leadership, power and staff involvement are key factors which determine relative levels of analysis and intuition in decision making. Certainly in Langley’s view formal analysis would be less necessary if staff could simply execute decisions without having to justify their actions internally. Alternately, formal analysis can facilitate debate and verification of decision issues. The fundamental weakness of intuitive decision-making is a strong dominant leadership style, centralised power and limited staff participation resulting in an inappropriate view of the decision situation prevailing. Building organisational processes to facilitate effective strategic thought (Wilson, 1994) can alleviate this problem. Langley’s (1995, p. 74) observations address key organisational aspects to strategic thinking:

“...if we want to influence the ways organizations reason, we must look at the context in which people make decisions. To stimulate both rationality and efficiency in decision making, we need to design organizations and approaches that combine constructive checks and balances with effective ways to arbitrate”.

Clearly the message from Langley’s work is the organisation needs to balance the use of analysis and intuition in decision making carefully and organisational processes play an important role in this. The lesson here is that effective organisational processes will facilitate effective strategic thinking and allow the organisation to
determine an appropriate balance between the use of analysis and intuition. This provides another important perspective in conceptualising strategic thinking.

Klien (1998) discussing the effects of power on effective decision-making also enters the debate on the relative use of analysis and intuition. He observes the importance of rational thought processes, the establishment of goals and the evaluation of alternative options. However, intuition and mental simulation is seen as being more important than rational methods of analysis. Mental simulation is visualisation or imagining how a particular strategic option would work and is most effective with experience in a firm and/or industry. He observes that many of the problems with rational analysis are removed with effective use of intuition and mental simulation.

In the context of this debate on navigating between analysis and intuition Sauter (1999) considers the application of these dialectic approaches to thinking and the usefulness of decision support systems to management decision making. She argues the benefit of using advanced analytical tools with intuition to achieve greater insight into problem solving. Further, Sauter (1999) detects a trend to greater importance of intuition in decision-making. The more experience a manager has of his firm, customers and markets the greater the scope to use intuition. Sauter (1999, p. 109) describes the problems confronting managers in today’s marketplace:

“...the speed of communications makes the environment less stable and predictable and reduces the available time for examining data and relationships...necessary data is unavailable to the decision-maker for analysis or the requisites are infeasible. Not surprisingly managers are increasingly dissatisfied with established procedures for making decisions...decision support systems should blend analytical tools with intuitive heuristics to improve managers’ insights about factors too complex to build into models.”

This insight to strategic thinking from the decision-making literature emphasises the value of achieving balance in the use of analysis and intuition. Advances in information processing and decision support systems (Sauter, 1999) are now assisting in overcoming earlier perceived shortcomings in analysis of hard data (Mintzberg, 1994) giving and receiving better information on a more timely basis. This has happened in parallel with a more balanced appreciation of the value of analysis in the strategy process (Raimond, 1996; Heracleous, 1998). Sauter (1999) also observes that
decision support systems can assist firms by facilitating the use of intuition and analysis, and also simulating market conditions to assist staff in overcoming deficiencies in experience. Determination of the relative use of intuition and analysis needs to be balanced with the political context in organisations (Langley, 1995).

**CONCLUSION**

Insight from both the literature on cognition and reasoning, and decision-making in this paper emphasises the value of achieving balance in the use of analysis and intuition. This contrasts with discussion in the strategy literature in the early 1990s (O’Shannassy, 1999b; 2000a) which emphasised the use of creative, intuitive, divergent thought processes (Ohmae, 1982; Mintzberg, 1994) as distinct from convergent, analytical thought processes (Raimond, 1996). There is now a stronger appreciation in the strategy literature of the need to balance the use of intuition and analysis in problem solving (Raimond, 1996; Liedtka, 1998a, 1998b; Heracleous, 1998) and this is supported by the lessons learned in this paper. Langley (1995) also makes the salient point that determination of the relative use of intuition and analysis in problem solving needs to be balanced with the political context in organisations. We have also seen from Sauter (1999) how advances in information processing and decision support systems are now assisting in overcoming earlier perceived shortcomings in analysis of hard data (Mintzberg, 1994) with managers giving and receiving better information on a more timely basis assisting organizations in adapting to the demands of customers and markets. The learning from this paper provides important support for the model of strategic thinking elaborated in O’Shannassy (1999b, 2000a).
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