

**STRATEGIC DECISION MAKING UNDER UNCERTAINTY FROM THE
FOUNDATIONS OF CREATIVITY, PSYCHOLOGY, AND MANAGEMENT
RESEARCH: AN EXAMINATION AND SYNTHESIS**

ELISABETH J. TEAL, Ph.D.
Associate Professor
North Georgia College & State University
Mike Cottrell School of Business
Newton Oakes Center #135a
Dahlonega, Georgia 30597
Telephone: (706) 864-1619
Fax: (706) 864-1607
E-mail: ejteal@northgeorgia.edu

ABSTRACT

Strategic decision making under uncertainty is examined from the perspective of established theories in the creativity, psychology, and management literatures in this paper. Applications from each field are explored within the context of decision making, with particular emphasis placed on innovative decision making under ambiguous and uncertain circumstances. A conceptual framework of decision making from each discipline is developed based on the literature (in the case of creativity) or selected (in the case of psychology and management) and described. An overall conceptual framework for strategic decision making under uncertainty based on the synthesized cross-disciplinary perspectives is proposed.

The temporal dimension of strategic decision making under uncertainty is also examined in this paper. Using the psychological context of prior decisions (T-2), past events (T-1), present conditions (T0), and future outlook (T1) as temporal markers, the creativity context may be observed to include prior decisions (T-2), past events (T-1), and present conditions (T0), where the managerial context considers only present conditions (T0) and future outlook (T1). Therefore, from a temporal perspective the synthesized conceptual framework proposed in this paper provides a more thorough method for considering strategic decision making under uncertainty.

Contributions of this paper include the simultaneous consideration of the foundational literature in three disparate but relevant fields from the perspective of strategic decision making under uncertainty, the development of an overall conceptual framework for strategic decision making under uncertainty based on the review of these literatures, and the consideration of the temporal dimension suggested by the literatures across these fields. This study suggests that an interdisciplinary approach encompassing research from creativity, psychology, and management may serve to expand existing theories which seek to explore strategic decision making under uncertainty.

Strategic Decision Making Under Uncertainty from The Foundations Of Creativity, Psychology, And Management Research: An Examination And Synthesis

Decision making, through its reflection of the past, consideration of the present, and projection of hope into the future, provides a source of interest for philosophers and researchers alike. Successful decision making for a business may be reflected through measures of growth and profitability, whereas successful decision making for an individual may be reflected through both professional and personal outcomes.

Reflecting on the characteristics and importance of decision making, Cochran (1991) observed:

Indecision is necessary for decision...the significance of decision is that it is a way to make one whole. By cutting through a tangle so sharply and deeply that the matter is settled, one becomes whole-hearted. Inner division is resolved. Wavering yields to firm purpose. Disruption is settled and clarity is achieved. A decision involves one of the most remarkable and startling transformations in human experience.

Perhaps researchers find decision making interesting because it enables individuals, families, corporations, and nations to set the course of events and to transform the future through those decisions.

The decision making of both individuals and groups has been studied within the fields of creativity, psychology, and management. This paper will focus on strategic, rather than routine, decision making as it may occur in unique, unstructured situations. We seek to examine the decision making literature and findings from the fields of creativity, psychology, and management for the purpose of developing an interdisciplinary conceptual framework that may be useful in expanding our understanding of strategic decision making under uncertainty.

We first examine decision making from the perspective of creativity studies, followed by a review of studies in psychology and management. A conceptual framework for strategic decision making under uncertainty that incorporates theory from each of these fields is then presented. The conceptual framework, along with an examination of the temporal dimension of decision making, serves to supplement and enhance prior individual theories of strategic decision making under uncertainty.

Strategic Decisions

The use of the term “strategic” in connection with the decision process may be traced to Chester Barnard when he suggested that “strategic factors” should be analyzed when making an “executive decision” (1938). Since this time the term “strategic decision” has been widely adopted and is frequently used in the popular press. From an academic perspective, “strategic decisions” have been defined in the management literature as “...ones that involve a commitment of large amounts of organizational resources for the fulfillment of organizational goals and purposes through appropriate means” (Shrivastava & Grant 1985). Other management

researchers have noted, “Strategic decision processes are multidimensional. They have process, initiation, goal, means/ends, choice, and comprehensiveness characteristics” (Fredrickson 1983) and that “...a given strategic decision is typically an episode in a series of incremental decisions that constitute the strategy of the organization” (Bateman & Zeithaml 1989). Thus, from a management perspective, a strategic decision involves a multidimensional examination of the organization and its goals with a commensurate allocation of resources to support the achievement of those goals.

Creativity Perspectives on Strategic Decision Making

The field of creativity has produced valuable research on human creative behavior. Key to the examination of human creativity is the decision making process that occurs within the creative individual during the time that something new is created. Basadur (1987) suggested that focusing the creative process on decision making, specifically the processes of problem definition and fact finding, may be cost effective because it may enable superior solutions to be found and implemented more quickly. Weisberg (1988) believed that all attempts at the solution of novel problems were creative. In defining the creative task, social psychologist Teresa Amabile (1983) suggested that it required heuristic rather than algorithmic decision-making processes with results that are novel, appropriate, and valuable for the task at hand. The emphasis on heuristic, rather than algorithmic, problem solving may be observed throughout the creativity literature.

Abraham Maslow (1968) distinguished between “special talent creativeness” and “self-actualizing creativeness.” He suggested that “special talent creativeness,” such as the musical talent of Mozart, might reside only in a few persons. However, Maslow believed that another type of creativity, called “self-actualizing creativity,” might be “the universal heritage of every human being” and strongly associated it with psychological health. Maslow believed this type of creativity “originated in the personality” and could be seen in the “ordinary affairs of life.” Maslow’s ideas are reflected in the concepts of “extraordinary creativity” and “lifewide creativity” developed by Craft (2003).

Tardif & Sternberg (1988) examined creative thought processes and concluded that they involve (1) transformations of the external world and internal representations by forming analogies and bridging conceptual gaps, (2) the constant redefinition of problems, (3) the application of recurrent themes and recognition of patterns and images of wide scope to make the new familiar and the old new and (4) nonverbal modes of thinking. Tardif & Sternberg (1988) also noted that a degree of personal discomfort, termed “tension,” was present in the creative process and could be observed (1) in the conflict between staying with tradition or in breaking new ground, (2) inherent in the new idea itself; or (3) in the self-driven need to reach for greater levels of organization or efficiency for ones' self or for society.

Kirton (1987) distinguished between “adaptation” and “innovation” as different types of creative behaviors, noting that adaptation attempts to “do things better” and innovation attempts to “do things differently.” Creative behavior that is adaptive is marked by the tendency of “individuals who, when confronted with a problem, turn to the conventional rules, practices, and perceptions of the group to which they belong...and derive their ideas towards the solution of the problem

from those established procedures.” An adaptive problem solver will modify an existing solution, sometimes even radically, to solve the problem at hand. In contrast, the innovative style of creativity is characterized by “individuals who, when confronted with a problem, attempt to reorganize or restructure the problem, and to approach it in a new light, free from any of the customary perceptions or presuppositions which would be the conventional starting-point for its solution” (1987).

Although Maslow contended that all persons have innate abilities for self-actualizing creativity, most would agree that all persons do not fully utilize those abilities. Researchers have attempted to determine the qualities of the creative problem solver. Kirton (1987) noted “To be able to undertake creative problem solving, a person needs to have appropriate amounts (i.e. not some minimum absolute amounts) of intelligence, knowledge, experience and scope.” Tardif & Sternberg (1988) indicated, “creative personalities are composed of a constellation of many characteristics” that are not always present in every creative individual. Roe (1963) listed eleven attributes of a creative person: (1) openness to experience, (2) ability to see things in unusual ways, (3) curiosity, (4) ability to accept and reconcile apparent opposites, (5) tolerance of ambiguity, (6) independence in judgment, thought, and action, (7) need for autonomy and the willingness to assume it, (8) self-reliance, (9) lack of allegiance to group standards and control, (10) willingness to take calculated risks, and (11) persistence. Despite the diversity of attributes of creative persons, Tardif & Sternberg (1988) observed “the one characteristic that seems to prevail among creative people, however, is what seems almost to be an aesthetic ability that allows such individuals to recognize 'good' problems in their field and apply themselves to those problems while ignoring others.”

An early model of the formation of new thought was developed by Wallas (1926). His four stage model originated from a three stage model suggested by Helmholtz, a renowned German physicist. Wallas’ four stages of creative thought included Preparation, Incubation, and Illumination (which were the three stages included in the Helmholtz model) and Verification. In the Preparation phase, a problem to be solved was thoroughly examined and investigated. Following a thorough examination, a time of Incubation ensued, where the problem-solving process was laid aside, and the thinker either focused on a completely different problem or entirely avoided all conscious mental work. The Illumination phase follows, and may include a period identified as Intimation, where the thinker may feel a sense of discomfort as he or she approaches Illumination, or that instant of “flash,” where the solution to the problem becomes clear to the thinker. In the final period of Verification the validity of the idea is tested and the idea is reduced to an exact form.

Basadur (1987) also developed a Creative Problem-Solving Process Model that attempted to describe how creative decisions are made. His model consists of three stages: problem finding, problem solving, and solution implementation where, at each stage, an ideation-evaluation process is employed to lead the problem solver to the “best” solution. Basadur observed, “Ideation is defined as the generation of ideas, information, and opinions without evaluation. Evaluation is defined as generation of judgments relating to these ideas...perform(ing) a filtering function, selecting out the more important ideas”(1987). This process is also described by the terms divergent thinking, such as brainstorming, and convergent thinking, where the more plausible solutions are selected for further consideration. Basadur's model is valuable because of its emphasis on the incremental nature of most creative problem solving. Although it may be a widely-held belief that creative solutions emerge instantly and completely, these theories and a review of several important creations throughout history reveal that may not necessarily be the case.

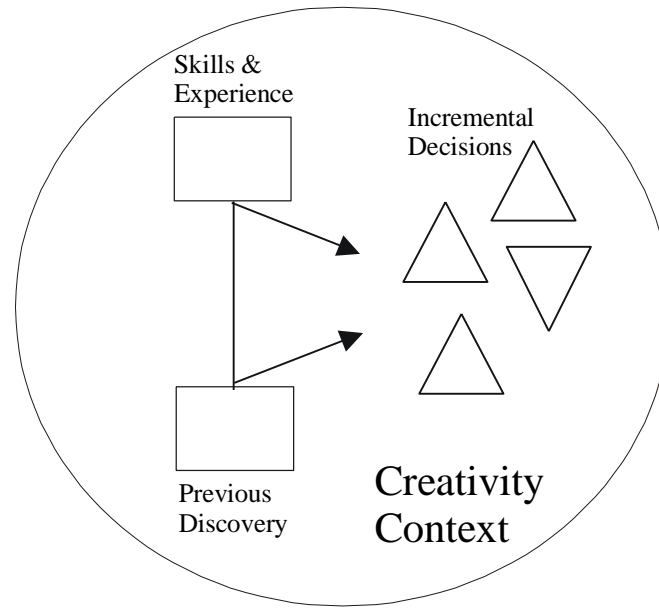
Weisberg (1988) in an historical account of several major innovations, observed that the creative act is often based on the work of others and is an outgrowth of the unique skills and experiences of the innovator. Watson & Crick's modeling of the D.N.A. molecule relied heavily on the work of other scientists (some have recently suggested that their reliance bordered on dishonesty) and was subject to several refinements before the accurate model was discovered. The original idea for Edison's kinetoscope, the first device for storing and reproducing moving visual information, was based on his invention of the phonograph, although the final kinetoscope had little resemblance to the phonograph. Even Picasso's famous “Guernica” mural contained characters that appeared in several of his previous works.

Howard Gruber furthered creativity research by extensively studying the notebooks and sketches left by Charles Darwin and Jean Piaget. His study of Charles Darwin led him to a “theory of the individual” which “can alert us to the relation between early goals and later achievement” (Gruber & Davis 1988). While Gruber did not dismiss the sudden moment of insight, he clearly observed that it “may represent only a minor nodal point, like the crest of a wave, in a long and very slow process—the development of a point of view” (Gruber & Barrett 1981). Gruber also observed that the creative person must be “drawn to his work by visions, hopes, joy of discovery, love of truth, and sensuous pleasure in the creative activity itself” (Gruber 1980) and the contextual aspects of creativity continue to be emphasized by researchers today (Petocz, Reid & Taylor 2009). An excellent overview of Gruber’s research may be found in Lavery (1993).

In summary, the key points identified by creativity researchers suggest that creative problem solving is an incremental process (Basadur 1987) that is most successfully implemented by intelligent and insightful individuals (Kirton 1987; Tardif & Sternberg 1988; Weisberg, 1988) with the skills and experience necessary for creation who may have produced successful creations in the past (Basadur 1987; Gruber & Barrett 1981; Weisburg 1988) A conceptual framework for strategic decision making within the context of the field of creativity is provided in Figure A.

Figure A

Creativity Context of Strategic Decision Making



Psychological Perspectives on Strategic Decision Making

Both cognitive and behavioral psychologists have studied decision making for many years. The multidimensional nature of the decision making process has been emphasized in the psychology literature, which has defined human decision behavior as a “highly contingent form of information processing” (Payne, Bettman & Johnson 1993).

Vlek & Keren (1992) identified three models for decision making under risk. They identified (1) a maximizing decision analysis for strategic choices, (2) a satisficing rule for moderately important choices or tactical alternatives, and (3) a rewarding choice rule for less important decisions (1992). They described a maximizing decision analysis as a lengthy and costly process designed to find an optimal alternative. Satisficing, first recognized by Simon (1945) and recently described by Payne, Bettman, & Johnson (1993) involves the concept that “individuals decide how to decide by considering both the cognitive effort and the accuracy of various strategies. Individuals try to find strategies that will yield high degrees of accuracy for reasonable amounts of effort in any given decision task. Often, however, individuals must make trade-offs between accuracy and effort.” Rewarding choice rules, also known as heuristic decision rules, are easily implemented guidelines for making relatively small decisions. The model described by Vlek & Keren demonstrates that different types of decisions may require

different decision rules and suggests that risk aversion may reflect a desire for security, whereas risk seeking may demonstrate a desire for potential benefit.

Behavioral decision theorists have identified several external influences on the human decision making process. External influences may include (1) task factors, which are factors that involve information specific to a decision and (2) context factors, which involve the environment surrounding a decision. Payne, Bettman, & Johnson (1993) observed that decision behavior is sensitive to such task factors as the number of decision alternatives and attributes, time pressure to make the decision, required mode of response, and format of the information. Important context factors include the similarity of the options under consideration, the quality of the choice set, certain reference points, and the frame of reference for the decision, which also influence the decision making process.

Einhorn & Hogarth (1981) observed that “the context in which the decision problem is presented, the salience of alternatives, the number of cues, the concreteness of the information, the order of presentation, the similarity of cue to alternative, the nature of the decomposition, the form of the measures, and so on, seem to affect the decisions that subjects make.” Thus, the study of decision making inevitably leads to an evaluation of the process of judgment and the act of choice. Judgment involves a deliberate comparison of alternative decisions. Einhorn & Hogarth (1981) indicate “while judgment is generally an aid to choice, it is neither necessary nor sufficient for choice.” Choice, the act of deciding, involves settling the matter. As described in the opening quote of this paper, “inner division is resolved...wavering yields to firm purpose...disruption is settled and clarity is achieved...” (Cochran 1991). In an insightful comment on choice, Einhorn & Hogarth noted:

Whereas the existence of alternatives implies freedom to choose, the action of choice restricts that very freedom...Thus, conflict is inherent in choice as an attribute of the choice situation. Unlike judgments, actions are intimately tied to notions of regret and responsibility...Moreover, taking action engenders its own sources of conflict so that judgment may only take one so far; indeed, at the choice point, judgment can be ignored (1981).

These observations suggest that human judgment leading up to choice may be rational but the selection of the ultimate choice may not be rational.

Decision makers are sensitive to the order in which alternatives are presented (Einhorn & Hogarth 1981) and to the descriptive words that are used to “frame” the decision (Bateman & Zeithaml 1989). These studies show that human judgment and choice are affected by relatively minor context factor changes. Levin, Chapman, & Johnson (1988) found that when a decision maker was required to make inferences because of omitted information, the person's confidence in that decision was increased, even to the extent of overconfidence.

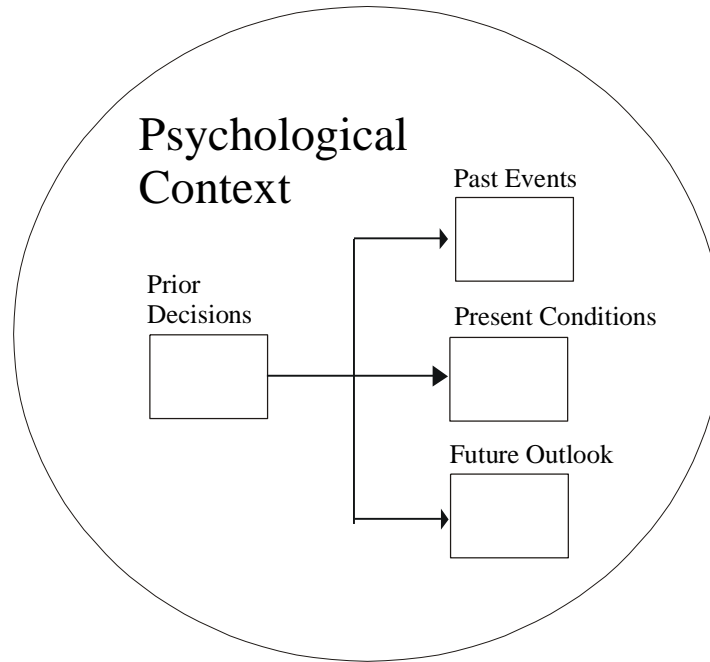
Kahneman & Tversky (1979) developed the concept of prospect theory that suggests that the outcome of a risky decision is viewed by the risk-taker as a gain or a loss relative to a neutral reference point. Their work was in contrast to the prevailing view of expected utility theory of decision making under risk where the final state, rather than the magnitude of gains or losses,

was considered when evaluating a decision. Further, prospect theory suggests that the possibility of losses “loom larger” than the possibility of gains. Einhorn & Hogarth (1981) successfully tested this theory when they empirically demonstrated that the pain of losing is greater than the pleasure of winning. However, Beach (1990) observed that it may not be appropriate to study decision making through an assessment of gambling decisions, reasoning that most real decision makers exert some degree of control over future events, unlike a test involving a laboratory gamble.

Bateman & Zeithaml (1989) developed a theoretical model of the psychological context of strategic decisions. The model was supported through empirical testing and suggests that the psychological context of a strategic decision is influenced by prior decisions and is dependent upon present conditions, past events, and the future outlook of the decision maker. A version of their model is reproduced in Figure B and represents the psychology portion of the conceptual framework for strategic decision making.

Figure B

Psychological Context of Strategic Decision Making



Managerial Perspectives on Strategic Decision Making

The field of strategic management has long been concerned with the process of strategic decision making. Chester Barnard, considered by many to be the founder of the field of strategic management, devoted an entire chapter of his 1938 book entitled *The Functions of the Executive* to “The environment of decision.” In an insightful description Barnard observed:

(W)hen I decide I want to go from A to B my idea of terrain is vague. But as soon as I have decided, the terrain becomes less vague; I immediately see paths, rocks, obstacles that are significant; and this finer discrimination results in detailed and smaller purposes. I not only want to go from A to B, but I want to go this way, that way, etc. This constant refinement of purpose is the effect of repeated decisions, in finer and finer detail, until eventually detailed purpose is contemporaneous accomplishment....This discrimination divides the world into two parts; the facts that are immaterial, irrelevant, mere background; and the part that contains the facts that apparently aid or prevent the accomplishment of purpose. As soon as that discrimination takes place, decision is in

bud. (1938)

In this quote Barnard demonstrated his intuitive sense that decision making is an iterative and incremental process, aided by distinguishing between relevant and irrelevant facts, and occurring at a specific time. The observations of this early management researcher provided an early prediction of what creativity and psychology researchers would later conclude.

In a historical summary of management research on strategic decision making, Joyner (1992) noted four distinct viewpoints. These four viewpoints are the classical model, information processing model, normative model, and descriptive model. The classical model of decision making assumed that rationality was the force behind all decision making. Barnard's interpretation was the embodiment of the classical model when he termed "decision" as "(t)he acts of individuals...which are the result of deliberation, calculation, (and) thought" (1938). The classical model was largely discarded in favor of the information processing model with the publication of the March & Simon (1958) information processing study. The concepts of limits to human rationality (bounded rationality), limited search and sub-optimal solutions (satisficing) were considered to be more realistic approaches to understanding decision making. Other researchers considered incremental decision involving only small changes, such as those which occur in the case of "muddling through" using rules of thumb that have been developed by the decision maker (Braybrooke & Lindblom 1963).

A normative model of decision making which described how the decision making process should occur was developed by Hofer & Schendel (1978). Normative models tend to provide the appearance of a linear problem solving approach so that the problem is (1) identified, (2) the situation is thoroughly analyzed via environmental, resource, and gap analyses, (3) numerous strategic alternatives are generated and evaluated, and (4) a choice is made. Although the appearance of a sequential, quantifiable process is indicated by this presentation, Hofer & Schendel (1978) note "both practice and theory indicate that no exact calculus yet exists by which strategic decisions can be made. Instead, effective strategy making relies on the creativity, judgment, and insights of the strategic decision maker." Further, "the creative and risk-taking aspects of these processes...are the unstructured, insight-generating aspects of the strategy formulation process that makes strategic decision making more of an art than a science" (1978).

In noting the complexity of the decision making process, Hofer & Schendel concede "One of the complicating factors in strategic decision making in practice is the fact that the intellectual-analytical aspects of the process are often intertwined with ongoing social-political processes" (1978). Such concerns appear to be the basis for the descriptive models of strategic decision making.

Descriptive models of strategic decision making such as those developed by Cohen, March, & Olson (1972), Eisenhardt & Bourgeois (1988), and Mintzberg, Raisinghani & Theoret (1976) provide very different perspectives from either the classical or normative models, many of which reject previous models. In the garbage can model of organizational choice, Cohen, March, & Olsen (1972) suggest "although it may be convenient to imagine that choice opportunities lead first to the generation of decision alternatives, then to an examination of their consequences, then to an evaluation of those consequences in terms of objectives, and finally to a decision, this type

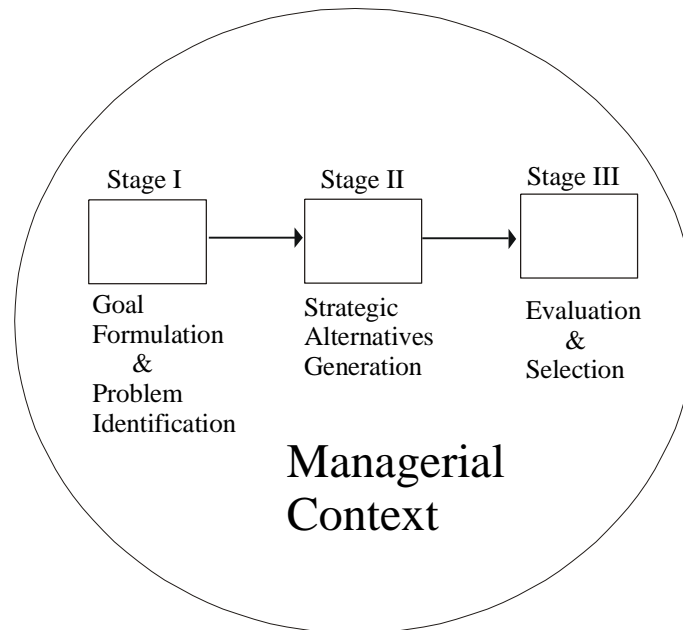
of model is often a poor description of what actually happens...Organizations can be viewed...as collections of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for issues to which they might be an answer, and decision makers looking for work.” Mintzberg, Raisinghani, & Theoret observed similar features of the decision process when they noted:

(A) strategic decision process is characterized by novelty, complexity, and open-endedness, by the fact that the organization usually begins with little understanding of the decision situation it faces or the route to its solution, and only a vague idea of what that solution might be and how it will be evaluated when it is developed. Only by groping through a recursive, discontinuous process involving many difficult steps and a host of dynamic factors over a considerable period of time is a final choice made. This is not the decision making under *uncertainty* of the textbook...but decision making under *ambiguity*, where almost nothing is given or easily determined (1976).

Following an extensive review of the decision making literature in the field of management, Schwenk derived a model of strategic decision making (1984). The model, which is divided into three stages, identifies Stage I as goal formulation and problem identification, Stage II as strategic alternatives generation, and Stage III as evaluation and selection. Schwenk noted the difficulty inherent in strategic decision making in that “Strategic decisions occur relatively infrequently and involve ambiguous data and possible disagreement about which data are relevant. Further, the feedback about the success of the strategy is often ambiguous, since there may be multiple evaluation criteria, and evaluation data may not be available for years after implementation” (1984). A schematic model based on Schwenk's derived model of the strategic decision making process is provided in Figure C and represents the management portion of the conceptual framework for strategic decision making.

Figure C

Managerial Context of Strategic Decision Making

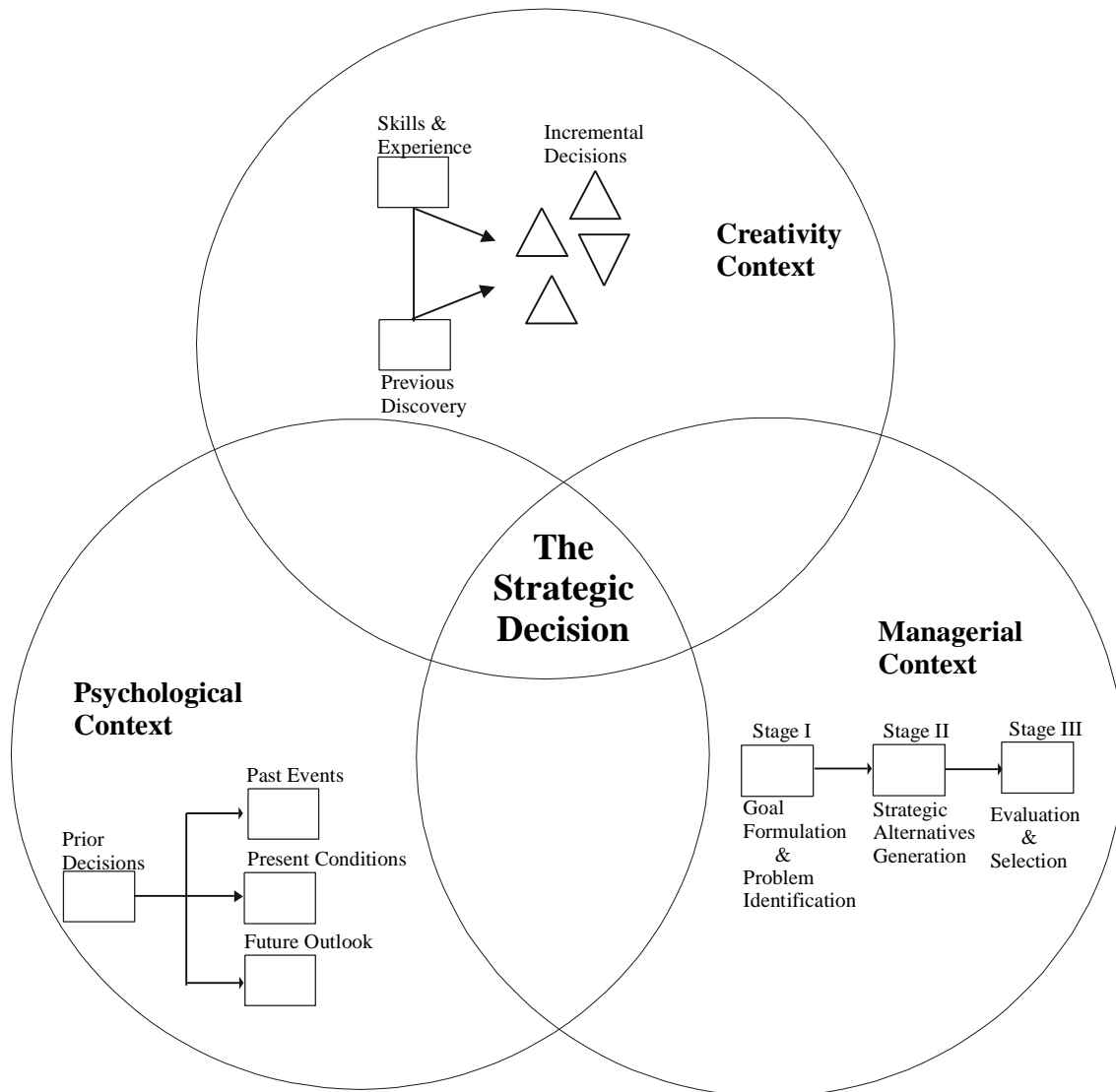


A Conceptual Framework for Strategic Decision Making under Uncertainty

While individual studies in creativity, psychology, and management provide insight into strategic decision making under uncertainty, none provide a complete picture of the decision making process. However, by considering studies across disciplines a more complete framework for strategic decision making under uncertainty may begin to emerge, and, in this review a conceptual framework that brings together concepts from seemingly disparate fields provides a synthesis of the research in strategic decision making. The conceptual framework (please see Figure D) is made up of three overlapping circles, with each circle containing the framework for decision making that was developed from each of the three previously described areas of study. Each segment of the conceptual framework was presented in a previous section of this paper and the following section of this paper provides an overall description of the conceptual framework.

Figure D

A Conceptual Framework for Strategic Decision Making under Uncertainty



The perimeter of the conceptual framework represents the limit of human bounded rationality. March & Simon (1958) originally described the concept of “bounded rationality” as the limit to an individual's ability to be fully “rational.” Therefore, human bounded rationality limits the strategic decision making process because of the cognitive constraints on the information processing ability of humans. In other words, despite the complexity of the strategic decision

making process and the valiant attempts by decision makers to thoroughly examine all aspects of the strategic problem, the decision making process remains limited by the ability of the decision makers to accurately identify the problem(s) and to create effective solutions for the problem(s).

Unfortunately, when making a strategic decision under uncertain conditions, no source of ultimate truth exists to which decision makers may go to compare the results of their decision making process with an “ultimate, best” decision. By definition, there are no written guidelines by which to evaluate strategic decisions under uncertainty. Although guidelines exist which may assist the decision makers in the process, there are no IRS rulings, no federal laws, and no ethical principles that will provide the “ultimate, best” answer. Rather, the decision makers must evaluate highly ambiguous situations in the attempt to influence and control future events. Mintzberg, Raisinghani, & Theoret (1976) understood this absence of ultimate truth when they spoke of “decision making under *ambiguity*, where almost nothing is given or easily determined,” as previously quoted in this paper. Thus, a conceptual framework for decision making under uncertainty can only be represented within the limits of human bounded rationality.

The creativity segment of the conceptual framework was designed to suggest that creative problem solving is an incremental process which is most often implemented by intelligent and insightful individuals, who possess the skills and experience necessary for creation, and may have produced successful creations in the past. Thus, this segment of the conceptual framework indicates that decision making under uncertainty is influenced by the skills and experiences of the creator(s) and also previous discoveries and work in the field of interest. This framework suggests that both “skills and experience” and “previous discovery” are necessary to support the decision-making process. Further, the framework suggests that the decision making process is likely to be incremental, i.e., it may consist of many smaller decisions which establish a decision path, rather than consisting of only one decision.

The psychological segment of the conceptual framework consists of the model that was developed by Bateman & Zeithaml through empirical testing (1989). Their model indicated the importance of “prior decisions” and “past events” to the decision making process, both of which are consistent with the “previous discovery” and “incremental” nature of decision as indicated in the creativity model. The Bateman & Zeithaml model also incorporates “present conditions” and “future outlook” which emphasizes the temporal dimension of the strategic decision making process. Thus, their model provides a useful time continuum for the decision making process which begins with prior decisions and past events, considers the conditions of the present, and also addresses the outlook for the future. A comparison of the temporal dimension across the three decision making frameworks will be provided in a following section of this paper.

The managerial segment of the conceptual framework for strategic decision making under uncertainty consists of a schematic model based on Schwenk's (1984) derived model of strategic decision making based on his written, rather than graphic, representation. Schwenk effectively provided a synthesis of both normative and descriptive decision making models which represent strategic decision making as a process of identifying the goal and problem to be solved, generating strategic alternatives, and then evaluating the alternatives and selecting a solution. Schwenk's model represents a rational and linear approach to strategic decision making which is

consistent with the management literature.

Although individually these frameworks provide insight from their field, further insight may be gained by considering a conceptual framework that combines the three. Through this new conceptual framework a more complete view of strategic decision making under uncertainty may begin to emerge. A contribution from the creativity literature is the acknowledgment that prior discoveries and the skills and experience of the decision makers impact the decision making process. Further, the creativity literature suggests that the decision making process--when examined closely--is likely to consist of an amalgamation of smaller, incremental decisions which led to the strategic decision. The psychology segment of the conceptual framework acknowledges of the importance of prior decisions and events, present conditions, and future outlook, thus implicitly acknowledging the dimension of time. The management segment of the conceptual framework suggests that decision making may best be accomplished through a multi-stage process which begins with identifying a problem and/or determining a goal, generating an array of alternatives, and finally evaluating and making a decision.

When all three models are considered in an overall conceptual framework a more complete understanding of the strategic decision making process under uncertainty may begin to emerge. As a result of considering research across the areas of creativity, psychology, and management, our understanding of strategic decision making under uncertainty may be expanded. This understanding may be further enhanced through an examination of the temporal dimension of strategic decision making under uncertainty.

The Temporal Dimension of Strategic Decision Making Under Uncertainty

Only the psychology and creativity segments of the conceptual framework for strategic decision making under uncertainty address the temporal, or time, dimension of strategic decision making. The temporal dimension is most explicit in the psychological segment through the focus on prior decisions, past events, present conditions, and future outlook. However, it may also be observed in the creativity segment through the focus on previous discovery.

The psychological segment of the conceptual framework provides useful categories for examining the temporal dimension of strategic decision making under uncertainty. The model developed within the psychology literature (Bateman & Zeithaml 1986) was divided into the categories of Prior Decisions, Past Events, Present Conditions, and Future Outlook, and each of these categories provides the basis for our examination across the segments of the new conceptual framework. Table 1 provides a graphical comparison of the temporal dimension, and also includes category headings which have been identified as Time -2 (Prior Decisions), Time -1 (Past Events), Time 0 (Present Conditions), and Time 1 (Future Outlook).

Table 1

Temporal Dimension of Strategic Decision Making under Uncertainty

TEMPORAL DIMENSION	TIME: -2	TIME: -1	TIME: 0	TIME: 1
STRATEGIC DECISION MAKING MODEL				
PSYCHOLOGICAL	<i>Prior Decisions</i>	<i>Past Events</i>	<i>Present Conditions</i>	<i>Future Outlook</i>
CREATIVITY	Skills and Experience			
		Previous Discovery		
	Incremental Decisions		Incremental Decisions	
MANAGERIAL			Goal Formulation & Problem Identification	
			Strategic Alternatives Generation	
			Evaluation and Selection	

By using the previously described categories of time which correspond to the psychological segment of strategic decision making, each of the components of the other creativity and managerial segments of the conceptual framework may be placed within an appropriate temporal dimension. For the creativity segment, the element of “skills and experience” encompasses T-2 (prior decisions), T-1 (past events), and T0 (present conditions). However, the element of “previous discovery” would only be classified as T-1 (past events) from a temporal perspective. “Incremental decisions” that were made in the past would be classified on a temporal scale at T-2 (prior decisions), and those made in the present would most likely be classified at T0 (present conditions). Therefore, the creativity segment alone appears to be incomplete since it does not focus on the future.

For the management segment of the conceptual framework, the activities identified as “goal formulation and problem identification,” “strategic alternatives generation,” and “evaluation and selection” all involve an examination of T0 (present conditions) for the purpose of influencing T1 (future outlook). Interestingly, from a temporal perspective, although the management segment appears to be appropriately focused on the present and the future, it does not encompass historical decisions or events. Thus, it appears that the management strategic decision making model, when considered individually, is also incomplete.

Through a comparison of the temporal dimension of each of the segments of the conceptual framework for strategic decision making under uncertainty, several observations may be made. Initially, the psychological segment appears to provide the most comprehensive view of strategic decision making under uncertainty because of its emphasis on the past, present, and future. While the psychological segment may appear to be complete from a temporal perspective, closer examination reveals that this approach does not provide sufficient depth for understanding the strategic decision making process. Although it is similar in the temporal dimension to the psychological approach, the creativity segment considers strategic decision making over the period T-2 through T0, but does not address T1, the future outlook for the organization.

However, the creativity segment further contributes to our understanding of decision making under uncertainty through the identification of the influence of previous discovery (T-1), skills and experience (T-2 through T0), and the suggestion that the decision making process is incremental (T-2 and T0).

From a temporal perspective, the management segment of strategic decision making is focused very differently since it exists entirely in the present condition (T0) and future outlook (T1). Thus, the influences of prior decisions (T-2) and past events (T-1) are excluded in the managerial model of decision making under uncertainty. However, the managerial model makes a contribution to our understanding of the decision making process through the explicit focus on goals, alternatives, and final evaluation and selection.

While the psychological segment may appear to provide the greatest breadth of coverage from a temporal perspective, the creativity and management segments provide additional insight about strategic decision making. Thus, consistent with the new conceptual framework, we propose that strategic decisions are influenced by the creativity, psychological, and managerial contexts of the decision makers that encompass the time dimensions of past, present, and future, all of which exist within the limits of human bounded rationality.

Contributions of this Research

Prior to this review, the fields of creativity, psychology, and management from a strategic decision making perspective had not been simultaneously considered. This cross-disciplinary review has allowed the researcher to highlight relevant historical perspectives across each discipline. For example, the creative genius of Edison, Picasso, and Watson and Crick is not often considered alongside psychological perspectives such as prospect theory or strategic choice, or when taking into consideration the insight of Chester Barnard, an early management theorist, about the environment of decision. Related goals of this research are to offer an expanded cross-disciplinary paradigm for understanding strategic decision making under uncertainty, particularly if prior views have been discipline-specific, and to encourage other researchers to look both to history and to other fields when conducting scholarly reviews.

As this paper has shown, the field of creativity has emphasized understanding creative individuals and evaluating and classifying the experiences that have led to their creativity, which is reflected in the creativity context of the conceptual framework. The psychology field has focused on prior decisions and the environment of decision, as indicated in the psychological context of the conceptual framework. Management researchers have often viewed strategic decision making in a rational, linear manner which is reflected in the managerial context of the conceptual framework. When these views are synthesized into an overall conceptual framework a more complete view of strategic decision making under uncertainty emerges.

When the temporal perspective is considered common threads across fields emerge. The creativity and psychology perspectives include emphasis on prior decisions and events, and the psychological and managerial research both include an emphasis on present conditions and the future outlook. Interestingly, between management and creativity research there were few common threads, with the exception of the overlap at “Present Conditions,” or Time 0. Thus,

this review serves to illuminate these differing perspectives and to demonstrate how the perspectives may inform each other. This review suggests that strategic decision making under uncertainty is both broader in terms of time and deeper in terms of content than has been suggested individually by prior models.

Thus, the development of a conceptual framework to represent the complexity inherent in strategic decision making under uncertainty is contribution of this study. While the conceptual framework combined existing research models in the areas of psychology and management, an explicit representation of the creativity segment of the decision making process had not previously been developed. This overall conceptual framework may be useful through its inclusion of research across disciplines which may serve to expand and inform prior individual theories. Further, the explicit examination of the temporal dimension provides an additional lens from which to view the complex topic of strategic decision making under uncertainty.

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