DECISION MAKING IN BUSINESS SIMULATION DESIGN

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ABSTRACT

To develop effective business simulation exercises it is critical that developers and users understand the human decision-making process so that simulations achieve the desired learning objectives. Understanding how to present the situation and define the environment is central to creating a learning exercise where decision makers can improve their decision-making performance. It is an important pedagogical issue to know whether the business simulation is being designed to reinforce and build a decision maker's ability to respond in a normative reasoned fashion to a decision problem, or to experience the situation in its complexity and respond in a synthetic intuitive fashion. To comprehend the implications of these two viewpoints the debate between promoters of the normative view on decision making and the descriptive view on decision making are presented. A critical analysis of these different perspectives is shown to influence how decision making should be taught, how simulations should be designed, and how learning outcomes should be measured.

INTRODUCTION

Are business simulation developers creating normative exercises or descriptive environments? Are they creating tools to improve problem solving or decision making? Are they creating reality simulations or simulations of reality? Are they designing simulations to help decision makers think like experts or learn like experts? If simulation developers are to achieve measurable results for their business simulations they need to understand the objectives. Because decision making is a central element of all business simulations, it seems prudent to understand what the relevant literature says about the topic. This knowledge will lead to improved designs and a better understanding of what outcome measurements are appropriate for business simulation exercises.

"We can identify a range of approaches for developing expertise in judgment and decision making. The traditional approach to education is to identify normative models for decision making and teach these models. A second approach is to identify the heuristics that can interfere with normative strategies, and to teach the people to use these heuristics more carefully" (Klein, 1997, p. 350). A third approach is to view decision making as a type of expertise and teach people how to learn like experts. (Klein, 1997). This paper further develops these three approaches so that simulation developers can better understand how to design business simulations to achieve the desired objectives.

First the normative theory of decision making is presented, covering both the rational and satisficing views. Promoters of the normative theory value business simulations whose environment allows students to validate prescriptive theories and frameworks, showing, for example, how pursuing one of Porter's generic strategies will result in superior performance. The simulation would be designed to demonstrate that the users of the prescriptive theories are more effective than those who do not follow these theories explicitly. Thus, the outcome measure of success can be based on comparing the performance of individuals using prescriptive theories with those using some alternative method of decision making.

Following the presentation of the normative line of decision theory is the alternative descriptive perspective on decision making. The descriptive theories provide a methodology for describing and characterizing the decision-making process. Thus, promoters of descriptive models would like to see business simulations that are realistic, presenting the user with as much real-world complexity as possible. In these simulations, the normative theoretical models may not be optimal and thus may not produce results consistent with normative theory. Promoters of descriptive simulations recognize that many normative models do not perform exactly as prescribed in real-world situations, and thus could provide a false reality. The goal of these descriptive simulations is to sharpen intuition. As no particular decision model will produce the optimal result, outcomes might be measured abstractly as greater discernment capabilities by the participants.

Finally, a practitioner view of decision making is offered to bring the significance of the normative and descriptive views into perspective. The rationale for creating both normative and descriptive business simulations follows from this view. The paper concludes with a discussion of the implications of the normative and descriptive decision theory for simulation developers. How can simulation developers use the understanding of the alternative views of decision making to develop more effective simulations? When evaluating the learning outcomes of a particular simulation activity it is important to understand the perspective taken by the developer. Is decision making central to the design? Does the simulation assume that normative or descriptive perspectives will be taken by the participants? If the intention is to support prescriptive theories and problem-solving analysis, then it is important that the simulation is designed to provide a simulated reality

that guarantees confirming results. If the goal is to support descriptive theories and the decision process then it becomes more important to provide a reality simulation with genuine uncertainty. The business simulation developer, user, and sponsor (outcome assessor) must know the difference.

TRADITIONAL DECISION-MAKING (NORMATIVE)

Traditional decision-making literature follows Dewey's (1933) seminal work, *How We Think*. Dewey's theory purported that the human decision-making process follows an orderly sequence of stages. This theory provided a psychological confirmation of the widely debated socioeconomic belief that human decision making is rational. However, even regarding what rationality means in the human context can be debated, and there are educators and researchers on differing sides. The debate centers on the definition of what constitutes this human rationality and what demarcates those who hold the rational, deterministic/probabilistic perspective and those who identify with the satisficing perspective. Taking either normative perspective, a person's decision-making abilities can be improved through traditional educational means. In the normative view, there is a process that can be taught that will improve decision making. Those holding the normative view typically support traditional education systems and standard educational methodologies.

RATIONAL VIEW

Most researchers who identify the decision-making process with problem solving in the narrow sense tend to accept the mathematically convenient view that people follow rational processes. Dewey's (1933) stage-view is embraced and expounded upon in the rational decision-making literature, where the process typically takes on a symbolic representation. In this literature the decision-making process is described mathematically as a transition from state S_0 to state S_x through a number of intermediate states $S_1 \ldots S_{x-1}$. The process between states may be non-linear; however, the stages (phases or states) are typically traversed in sequence. A number of the common stage models for decision making are highlighted in Figure 1 (Bransford & Stein, 1984; Brim, Glass, Lavin, & Goodman, 1962; Dorner, 1997; Kast & Rosenzweig, 1979; Maier, 1964; Polya, 1957; Simon, 1945).

All of these stage models seem logically plausible. However, as Lipshitz & Bar-Ilan (1996) pointed out, "the number of studies directly testing either the descriptive or the prescriptive validity of phase (or stage) models is … small" (p. 48). They went on to cite the few studies that do attempt to empirically justify the stage models from both a descriptive and prescriptive perspective (Alexander, 1979;
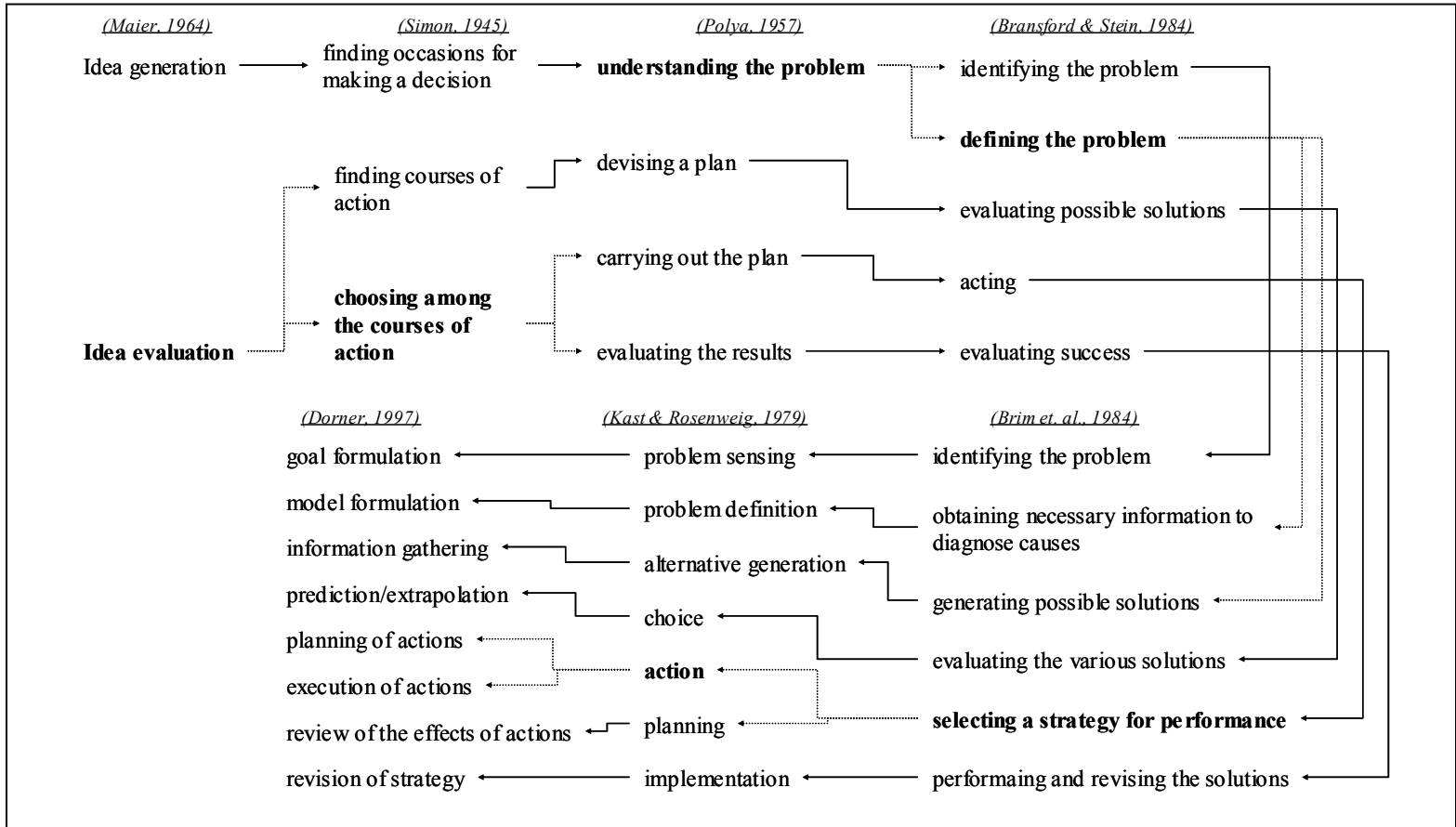
Lipshitz & Bar-Ilan, 1996; Mintzberg, Raisinghani, & Theoret, 1976; Nutt, 1984; Witte, 1972). Unfortunately, none of these studies provide statistically significant levels of support for any of the tested variations. Reviewing these results may lead some to conclude that these proposed stage theories are formulated on rational thought rather than actual behavioral observation and therefore are not useful for describing reality or making predictions (Isenberg, 1984; Klein, 1998; Mintzberg et al., 1976; Nutt, 1984).

The empirical justification of a normative model's descriptive capabilities is not a prerequisite for evaluating its prescriptive validity. A similar claim is made by business simulation developers—that descriptive realism is not necessary to achieve significant learning outcomes. Support is based on the understanding that the goal of prescriptive models is to provide a framework for how decisions should be made and not to describe how they are made. Thus, simulation development using a normative perspective should be evaluated on a similar basis. Even if the prescriptive model fails a descriptive validation effort, the important evaluative criteria is this: does the business simulation provide an environment in which a recipe for good decision making can be practiced?

Supporters of the rational perspective maintain that following the prescribed processes will result in predictably good outcomes and that the model's descriptive failures arise from a number of cognitive anomalies, such as anchoring, framing, or the status quo (Hammond, Keeney, & Raiffa, 1998; Kahneman & Tversky, 1974, 1979, 1992; McFadden, 1998). If these cognitive anomalies stem from errors in perception, much of the analysis using these rationally based prescriptive models remains justifiable (McFadden, 1998, p. 17). However, if the anomalies identified are not exceptions but the path that allows humans to make better innovative decisions, the prescriptive powers of these rational models become equally as suspect as their descriptive abilities. Thus, if good decisions come by following other processes, a simulation that follows normative theory may falsely give credibility to poor decision processes and choices.

The rational view remains the dominant paradigm in the harder sociological fields such as economics because it offers a logically relevant mathematical apparatus for formulating theoretical models. It also remains dominant in higher education where rational thought processes are easily assessed, extremely logical, and can be taught through traditional means. One common belief is that "all theoretical models should be deterministic in the sense that the statement of the phenomenon we wish to explain can be logically derived from the explanatory apparatus" (Machlup, 1978, p. 280). In other words, determinism is a feature of the model and not the phenomenon being examined. The importance of determinism is in the empirical application and testing of the model and not in the model building itself. Thus, education should focus on deterministic model building and leave empirical testing to students when they enter the real-world environment.

Figure 1: Stage Model Development

(Maier, 1964)	(Simon, 1945)	(Polya, 1957)	(Bransford & Stein, 1984)
Idea generation	finding occasions for making a decision	**understanding the problem**	identifying the problem
			defining the problem
	finding courses of action	devising a plan	evaluating possible solutions
		carrying out the plan	acting
Idea evaluation	**choosing among the courses of action**	evaluating the results	evaluating success

(Dorner, 1997)	(Kast & Rosenweig, 1979)	(Brim et. al., 1984)
goal formulation	problem sensing	identifying the problem
model formulation	problem definition	obtaining necessary information to diagnose causes
information gathering	alternative generation	
prediction/extrapolation	choice	generating possible solutions
planning of actions		evaluating the various solutions
execution of actions	**action**	
review of the effects of actions	planning	**selecting a strategy for performance**
revision of strategy	implementation	performaing and revising the solutions

Simulations developed from a normative perspective would have an identifiable deterministic basis. There is an optimal solution that can be found by all participants if only the rational rules are followed exactly. The rational paradigm allows simulation developers to create models with unambiguous definitions of units and clear assumptions. By imposing rigid mathematical structures on the decision problem, the methodologies employed are capable of finding a single best solution. This methodology exposes simulation learning outcomes to evidential proof and disproof, which tends to limit the learning to an artificial reality. "Typically the predictions (learning outcomes) arise from the commonsense intuitions of the modeler (simulation developers) … and follow a series of formal analytical steps, confirming commonsense beliefs" (Wilson, 1998, p. 203). Simulations based on the rational view are seldom tested using quantitative field data, or as metaphorically stated by Wilson (1998), "their appeal is in the chrome and roar of the engine, not the velocity or destination" (p. 203). Simulations become a simulated reality rather than a simulation of reality. These business simulations are designed to create a new reality and not to simulate the actual reality.

SATISFICING VIEW

To address some of the concerns with the rationally based models, Herbert Simon (1957) introduced the concept of satisficing, which can best be described as accepting the first satisfactory choice encountered from those that are perceived to be acceptably sufficient in the short term. This contrasts with the rational view, which typically holds that a search process is initiated to find the optimal choice. "By giving up optimization, a richer set of properties of the real world can be retained in the simulations. Stated otherwise, decision-makers can satisfice either by finding optimum solutions for a simplified world, or by finding satisfactory solutions for a more realistic world" (Simon, 1979, p. 498).

The concept of satisficing allows the normative formulations expressed in the rational view to be transferred to a more intuitive descriptive framework. Rather than requiring all choice alternatives to be measured in terms of a common utility function, Simon (1957) borrowed the multi-dimensional concept of aspiration level from psychology (Lewin, Dembo, & Sears, 1944). In addition to providing a prediction of the end result, the satisficing methodology describes the process used in achieving that end result.

The satisficing methodology is summarized concisely in Simon (1996/1998) as follows:

Aspirations have many dimensions: one can have aspirations for pleasant work, love, good food, travel, and many other things. For each dimension, expectations of the attainable define an aspiration level that is compared with the current level of achievement. If achievements exceed aspirations, satisfaction is recorded as positive; if aspirations exceed achievements, there is dissatisfaction. There is no simple mechanism for comparison between dimensions. In general a large gain along one dimension is required to compensate for a small loss along another—hence the system's net satisfactions are history-dependent, and it is difficult for people to balance compensatory offsets.

Aspiration levels provide a computational mechanism for satisficing. An alternative satisfices if it meets aspirations along all dimensions. If no such alternative is found, search is undertaken for new alternatives. Meanwhile, aspirations along one or more dimensions drift down gradually until a satisfactory new alternative is found or some existing alternative satisfices. (p. 30)

A simulation designer who uses the satisficing perspective must understand that participants will pursue strategies to achieve the participant's aspiration level and it will take some effort on the part of the facilitator to take the student beyond that aspiration level. This may explain why conflicting evidence has been found in the actual learning outcome of simulations. Gosenpud (1990) confirmed the difficulty of outcome measurement when student aspirations differ by concluding "how well students do on course exams is more closely related to their own motivation levels than to type of teaching methodology" (p. 323).

Simon (1996/1998) expanded on the concept of satisficing aspirations by arguing that a theory of decision making using these mechanisms "acknowledges the limits on human computation and fits our empirical observations of human decision making far better than the utility maximization theory" (p. 30). The intuitive validity of the satisficing perspective encouraged the work of a number of behavioral researchers such as Kahneman and Tversky (1974), who proposed that people follow heuristics, or rules of thumb, when making decisions. The heuristic methodologies reported by decision makers appear to meet the requirements necessary for satisficing behavior. Additional, empirically based investigations by Kahneman and Tversky (1979, 1992) identified many cognitive anomalies and subsequently convinced other researchers to accept the satisficing view of decision-making.

The research into satisficing behavior and aspiration levels represents a major departure from the rational view because it accepts the multidimensionality of decision making. In the rational stage model view, each stage involves the maximization of a common objective function called utility. With the introduction of satisficing behavior, there exist competing multidimensional objective functions with non-linear dynamic relationships and multiple non-deterministic maxima. The argument for a satisficing rational view is that the approximate solution found using a nearly realistic satisficing model is superior to an optimal solution generated from a highly constrained rational model (Simon, 1996/1998, p. 28). This claim is not supported by empirical data. Rather it is based on the logically reasoned belief that a superior descriptive model will offer superior prescriptive results, and therefore, the satisficing theories based on realistic assumptions are true while the rational theories based on contrived assumptions are false. Thus, a simulation developer who takes a satisficing view might design a more realistic simulation but there is no guarantee that decision makers will make better decisions in real-world situations.

Debate over a similar concept raged in the economics literature during the late 1930s and early 1940s when supporters of the marginalist economic theories (a rational view) and promoters of a behavioralist theory (a satisficing view) clashed. The argument centered on the question of "the legitimacy and usefulness of abstract theorizing on the basis of unrealistic assumptions" (Machlup, 1967, p. 2). Although the argument remains unresolved, Machlup (1967) attempted to close the debate by citing the conclusion of philosopher Karl Popper (1962), who stated that the objective in scientific discourse is not the classification of theories as true or false, but instead, making the distinction between those theories that can be rejected and those that are still open to criticism. Both the satisficing and rational views maintain prominence in the literature and thus can be classified as remaining open to criticism. On this basis, business simulation design using either normative view remains valid; however, empirical validation of improved decision making is likely to remain elusive.

NATURALISTIC DECISION MAKING (DESCRIPTIVE)

The future of decision-making education may become more descriptive as computing capabilities increase and the cost for computing power continues to decline. Thus, simulation developers may be tasked with understanding decision makers in real decision environments. The field of naturalistic decision making can aid in this understanding.

The study of Naturalistic Decision Making asks how experienced people, working as individuals or groups in dynamic, uncertain, and often fast-paced environments, identify and assess their situation, make decisions and take actions whose consequences are meaningful to them and to the larger organization in which they operate. (Zsambok, 1997, p. 5)

The process described by Zsambok (1997) was probably the first methodology used for studying human decision making; however, during the 1900s it fell out of favor with the academic research establishment as more rigorous methodologies were developed. During this time,

many researchers began to place their faith in the omniscience of science and the scientific methods. This led to the entrenchment of normative theorizing and the rational view of decision making. Some scientists were uncomfortable with the lack of descriptive intuition offered by these normative theoretical models and chose to incorporate a level of descriptiveness that could be constrained within the computational limits of science. Thus, the satisficing perspective emerged. Still others remained skeptical that real-world decision makers and innovators actually follow, and should follow, the methods described by these normative theories (Lindblom, 1959).

If decision makers should not follow the prescriptive guidance of normative models then what should they follow? Simulation exercises have the potential to improve decision making by allowing business leaders to learn how to learn, and make decisions in a complex dynamic environments. An example of the skepticism toward making decisions based on normative theory and the rationale for creating simulations based on naturalistic decision making can be found in Max Wertheimer's book *Productive Thinking*, first published in 1943. Wertheimer, a philosopher-psychologist-educator, was interested in what actually takes place in the thinking process.

> *"What happens if one really thinks, and thinks productively? What may be the decisive features and steps? How do they come about? Whence the flash, the spark? What are the conditions, the attitudes, favorable or unfavorable to such remarkable events? ... How to improve thinking? ... Could the basic operations themselves be enlarged and improved, and thus be made more productive?" (Wertheimer, 1959, p. 2)*

Wertheimer was disturbed that when great thinkers looked at current research and compared the proposed methodologies with their actual thinking process "they were troubled and deeply dissatisfied. They felt that what had been done had merits, but that in fact it had not touched the core of the problem at all" (1959, p. 3). Similar comments have been made regarding business education, where a distinction is made by Hammer and Champy (1993) that "training is about skills; education is about understanding broad knowledge." Rather than continuing to constrain the analysis of decision making to mathematically tractable formulations (skills), these researchers promote the need to understand the underlying phenomena (knowledge). Thus, they typically embark on an exploratory journey with the goal of developing a descriptive theory of decision making. Lindblom (1971) captured this reasoning, "for a complex problem it is never possible to be clear about all the values affected by a decision, including their relative weights, never possible in fact to ascertain all possible means of achieving the objective, never possible exhaustively to trace through the choice of consequences that are attached to each possible means of achieving the objective" (p. 6). Supporters of naturalistic decision making look to develop educational opportunities to improve knowledge in real decision making rather than skills in simply problem solving.

The main theoretical shift from the traditional analytic methods, used by the rational and satisficing researchers, comes from the recognition that a genuine uncertainty exists in real-world decision making. The standard methodology for coping with uncertainty in the behavioral decision theory literature is expressed by Lipshitz and Strauss (1997) as the "R.Q.P. heuristic: Reduce uncertainty by a thorough information search ... Quantify the residue that cannot be reduced ... Plug the result into some formal scheme that incorporates uncertainty as a factor in the selection of a preferred course of action" (p. 152). This process is not significantly different from the descriptions given under the auspices of traditional normative decision making, except perhaps for the substitution of qualitative judgment for quantitative analysis. The R.Q.P. heuristic is incomplete when applied to decision makers coping with uncertainty in natural settings because it lacks the adaptive feedback process that is available in most decision-making situations (Klein, 1998; Lipshitz & Strauss, 1997). Correcting for this failure is the objective of naturalistic decision-making theory.

The naturalistic decision-making approach is spearheaded by Gary Klein's case study field research describing how people use their knowledge and expertise to assess complex real-world situations and take action when faced with significant uncertainties. Based on a series of observational field studies and personal interviews, summarized in Klein (1998), the recognition-primed decision (RPD) model is developed. This descriptive model "fuses two processes: the way decision makers size up the situation to recognize which course of action makes sense, and the way they evaluate that course of action by imagining it" (p. 24). Unlike the normative models, the RPD model is characterized by feedback and adjustment

and structured case studies) focus on improving this type of decision making.

The second variation "takes the form 'if (???) … then,' with the decision maker deliberating about the nature of the situation" (Klein, 1998, p. 26). The distinction here is that additional information may have to be gathered before diagnosis and ultimately a decision can be made. Therefore, the decision is one of minimizing risk by assessing the statistical probabilities (Knight, 1921). Scenario-based problems, case studies, and many simulations provide causal relationships that can be analyzed using normative techniques.

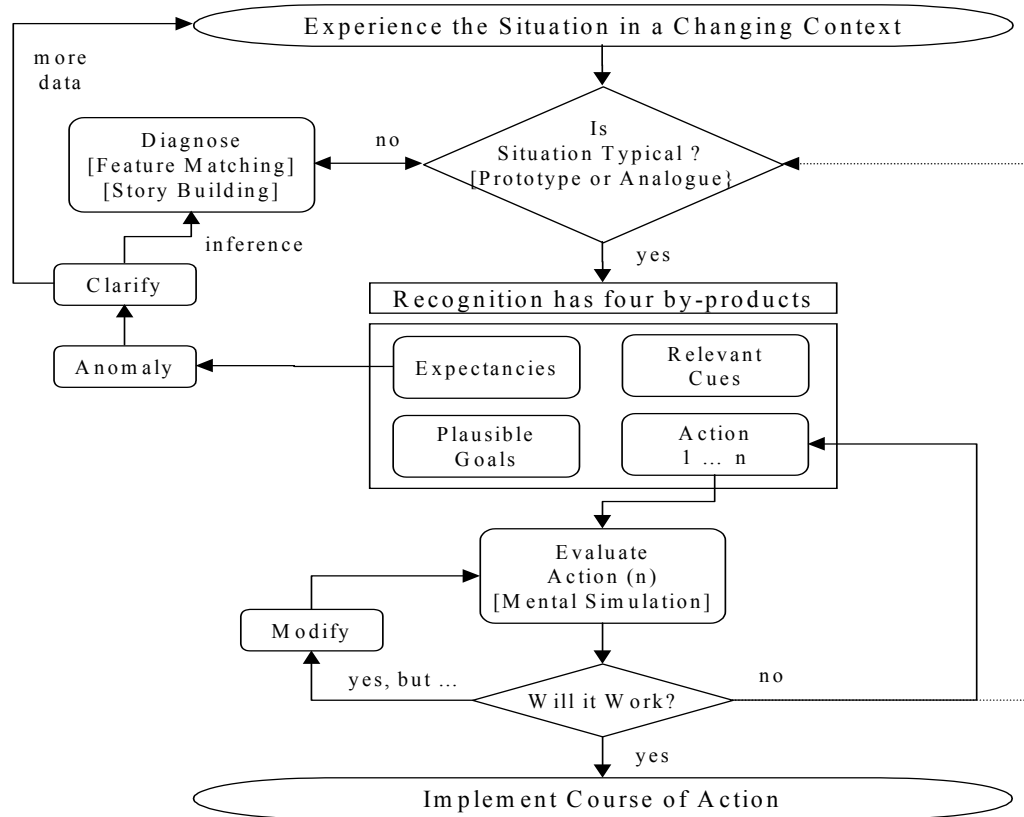The last variation identified by Klein (1998) assumes

Figure adapted from Klein (1998, Figure 3.2, p. 27)

FIGURE 2: RECOGNITION-PRIMED DECISION MODEL – KLEIN (1998)

processes. Klein's (1998) schematic of the RPD process can be seen in Figure 2.

Naturalistic decision processes allow decision makers to adapt to the resolution of uncertainties, through either the gathering of additional risk-reducing information or the uncertainty-reducing passage of time. Klein (1998) outlined the strategies of decision makers by highlighting three variations. The first variation is "basically an 'if … then" reaction, an antecedent followed by the rule-based response (p. 26). This variation can be mapped relatively well to the situation where decisions are being made in an environment of a priori probabilities (Knight, 1921). Most traditional structured learning activities (lectures, textbook problems,

"the form 'if … then (???)' as the decision-maker ponders the outcome of a reaction" (p. 26). In this variation, the decision maker evaluates a single option by mentally simulating or imagining how a course of action may play out. An environment rich in genuine uncertainty typifies this decision process. This is the type of decision making in which competitive simulations offer a potential opportunity. A fourth variation could certainly be conceptualized to take the form if (???) … then (???). However, Klein's (1998) field research seems to confirm the satisficing findings of Herbert Simon (1957) that when faced with genuine uncertainty, the decision makers will evaluate options

independently in the form "if … then (???)," choosing the first acceptable solution.

Another theory that has many of the same features as Klein's (1998) recognition-primed decision model is Beach's (1993) image theory. This conceptualization has been extensively tested as a valid model of individual decision making. Image theory is based on three types of knowledge structures or images that ultimately influence an individual's decision. The decision maker's beliefs and values create the first image. The second image is created by the decision maker's agenda of goals, and the last image is generated by activities already in progress toward achieving those goals. Image theory proposes that decision-makers will only consider options that are on their agenda of goals, do not seriously violate their beliefs and values, and appear complementary or superior to their existing goal achievement activities.

The major finding common to a majority of naturalistic decision-making research is that "the focus in the decision event is more front-loaded" than traditional descriptive or normative theories imply (Zsambok, 1997, p. 4). Thus, decision makers are more concerned about framing and evaluating the situation through feedback than they are at developing multiple options and comparing one to another. Naturalistic decision theorists also differ from the norm in their views on causes of poor decisions. "Those who favor analytical approaches to decision making believe poor decisions are caused by biases in the way we think. Naturalistic decision making researchers … reject the idea ... and try to show that poor decisions are caused by factors such as lack of experience" (Klein, 1998, p. 271). Business simulation experience can provide the opportunity to improve the chance of decision-making success.

A PRACTITIONER'S VIEW

Taking a practitioner focus, an interesting and influential work in decision making comes from a non-traditional source. Chester I. Barnard, a career practitioner of business decision making, attempted to develop a comprehensive theory of cooperative behavior within organizations in his 1938 book *The Functions of the Executive*. In the process, Barnard (1938) elucidated many of the seminal decision-making concepts captured by the later works of Chandler (1973), Cyert and March (1963), Drucker (1998), and Simon (1945). Although Barnard's (1938) theory lacks normative prescriptions, the work documents a practitioner's descriptive analysis of real world decision making and is extremely enlightening for simulation developers. The mental process described by Bernard encompasses the decision processes on which descriptive business simulations focus.

If there is no basis for calculation, it is more intelligent to guess than to manufacture data for false calculation ... the correctness of such decisions must, therefore, depend upon the effectiveness of the mental processes of the type that can handle contingencies,

uncertainties, and unknowables. (Barnard, 1938, pp. 311–312)

On the concept of competing decision goals, Barnard (1938) provided an important distinction between efficiency and effectiveness. "When a specific desired end is attained we shall say that the action is 'effective.'…. When the unsought consequences are unimportant or trivial, the action is 'efficient'" (p. 19). In typical decision-making situations, the two concepts are neither mutually exclusive nor mutually obtainable. Although it is desirable to make decisions that are both effective and efficient, the circumstances may prevent their simultaneous achievement. The resulting tradeoff between achieving a specific objective (effectiveness) and satisfying the motives of that objective (efficiency) appears to have been noticed by Simon (1945) in the development of the satisficing concept. It is also the reason that a simulation designed exclusively on normative bases may not capture the essence of decision making: the tradeoff between efficiency and effectiveness.

Seminal thoughts on bounded rationality can also be found in the writings of Barnard (1938). A central theme of Barnard's work focused on the constraint-imposing factors affecting the decision maker. "The narrow limitations within which choice is a possibility are those which are imposed jointly by physical, biological, and social factors" (p. 15). It is this recognition that multiple systems converge that led Barnard to conclude that decision making "transcends the capacity of the merely intellectual methods, and the techniques of discriminating the factors of the situation.… It is a matter of art rather than science, and is aesthetic rather than logical" (p. 235). This would imply that practice and experience are critical elements in improving decision making, a purported benefit of business simulations.

Barnard (1938) also recognized the concept of opportunism, commonly associated with the transaction cost economics of Williamson (1975). "The ideal process of decision is to discriminate the strategic factors and to redefine or change purpose on the basis of the estimate of future results of action in the existing situation, in the light of history, experience, knowledge of the past" (Barnard, 1938, p. 209). Opportunism is not a concept of self-interest, but rather, it is a realization that the decision-making process is dynamic and infinitely adaptable.

The multidimensionality of decision making described by Barnard (1938) cannot be easily placed in an analytical framework. "Analysis and abstraction we must and do make in the most everyday conduct of our affairs; but when we mistake the elements for the concrete we destroy the usefulness of the analysis" (p. 239). The thesis presented by Barnard suggests a two-step process: analysis and decision. Normative decision analysis is useful in the former step but inappropriate in the latter, because, for Barnard (1938), "decisions are preceded by analysis … but decision itself is synthetic" (p. 239). It is in the synthetic element that business simulation games offer significant learning advantages over traditional methods.

DISCUSSION AND IMPLICATIONS

To help promoters, developers, and users of experiential learning techniques it is important to understand the human decision-making process. Unfortunately there is no consensus on what the process is or what it should be. Why is the decision-making process important to simulation and experiential exercise developers? Because understanding how to present the situation and define the environment so that decision makers can improve their decision process and performance is the goal of these exercises. Thus, it is an important pedagogical issue to know whether the business simulation is being designed to reinforce and build a decision maker's ability to respond in a normative reasoned fashion to a decision problem, or to understand the situation in its complexity and respond in a synthetic intuitive fashion. To understand the implications of these viewpoints it is important to appreciate the differences between the normative view and the descriptive view on decision making. This understanding impacts how decision making is taught, how simulations are designed, and what a simulation's outcome expectation should be.

Additional motivation for understanding the different views on decision making comes from the users of business simulations and experiential exercises. How should simulation developers respond to the question: what are the learning benefits of a business-simulation exercise? Kolb (1984) identified learning as a process where the transformation of experience creates knowledge. Kolb's (1984) key conclusions are that learning is a process not an outcome; learning comes from experience; learning requires an individual to resolve opposing explanations; learning is integrative and applies to the big picture; learning requires interaction with the environment; and learning results in knowledge creation. The learning benefits described by Kolb (1984) are evident throughout the empirical and theoretical simulation literature (Fekula, 1994; Gopinath & Sawyer, 1999; Gosenpud, 1990; Reibstein & Chussil, 1997).

The claim that the learning benefits of business simulations result in improved decision making by the participants is verified in a number of empirical studies in simulation literature (Gosenpud, 1990; Hemmasi & Graf, 1991; Wolfe & Roberts, 1986). Given the evidence, simulation developers must ask whether the benefit of improved decision making is something valued by practitioners? According to Gary Klein (1997), "decision training is not routinely cited as a critical requirement for either management or technical positions" (p. 337). Perhaps this low priority is the reason why experiential learning and simulation exercises have not received greater acceptance by educational institutions and corporate training departments. Perhaps improved decision making is not measurable and therefore programs that promote improved decision making cannot be easily justified.

If the business simulation is not justifiable based on improved decision making as a benefit, why are business simulations used at all? "The use of simulations is based on the expectation that during the simulation a user will have an integrated experience of management; not possible with traditional subject-by-subject teaching" (Graham & Senge, 1990). The most prevalent application of business simulations in education is to create a realistic decision-making environment (Wolfe & Luethge, 2003). Thus, the integrated experience becomes the justification for business-simulation exercises and decision-making experience becomes the outcome.

As the focus shifts to decision-making experience as an outcome, simulation developers need to understand how to measure the benefits from the experiences they are creating to justify the education costs versus alternatives. Certainly improvements in problem-solving capacity can be measured; this is especially evident in normative simulations where specific decisions and strategies will always result in superior outcomes. Unfortunately, the improvement in real-world decision-making capacity of an individual may not be measurable, unless the superior decisions can be identified a priori. In most real-world situations the best decision may not be known until time passes and uncertainty is resolved. Even if the decision path chosen by the decision maker appears favorable, the results that would have been achieved by alternative decisions are left to speculation. Thus, measuring the improvements in decision-making performance from participation in descriptive simulations may produce ambiguous results.

Understanding the decision-making perspective taken by simulation developers is critical to understanding what measurements are appropriate for assessing the outcomes. If a normative decision perspective has been established by the simulation developer, outcomes such as superior financial performance are likely to provide valid proxies for the learning that has been induced. However, if a business simulation takes a descriptive perspective, superior financial performance may falsely indicate that learning has occurred.

A descriptive business simulation's value derives from making the uncertainty reduction process explicit for students, by teaching them to discern the information that they will need when faced with uncertainty. "Pattern recognition is essential to uncertainty reduction … we can teach our students to search for and discern patterns … an individual's ability to discern a pattern will be governed by the nature of the data and existing schemata.… In the face of certainty course content is both necessary and sufficient: however, when faced with uncertainty course content, though necessary, is insufficient" (Fekula, 1994, pp. 133–134). Descriptive business simulations supplement course content and meet the sufficiency condition. Unfortunately, the success of a descriptive business simulation's ability to teach greater pattern discernment capability is difficult to quantitatively measure and often supported by anecdotal evidence.

We return to the questions that began this paper: Are business simulation developers creating normative exercises or descriptive environments? Are they creating tools to improve problem solving or decision making? Are they

creating reality simulations or simulations of reality? Are they designing simulations to help decision makers think like experts or learn like experts? Simulation developers can look to the decision-making literature and the debate between normative and descriptive pundits for answers. Clearly, the view that is embraced by a business-simulation developer will impact the learning outcomes. Thus, measuring and evaluating the learning that has occurred with any business simulation must account for the significant differences the two decision-making perspectives promote. Care should be taken in interpreting the results of studies that use normative measures to assess descriptive simulations and descriptive measures to assess normative simulations. Perhaps the failure to see this important distinction is the reason for the lack of confidence in the superiority of simulations in business education.

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