

Engaging multiple perspectives: A value-based decision-making model

Dianne J. Hall ^{a,*}, Robert A. Davis ^{b,1}

^a Department of Management, Auburn University, 401 Lowder Business Building, Auburn, AL 36849-5241, United States

^b Department of Computer Information Systems, Texas State University-San Marcos, San Marcos, TX 78666-4616, United States

Available online 24 April 2006

Abstract

In some decision contexts, such as a crisis or when confronted by a new or novel set of circumstances, people may be forced to make decisions with limited information or time available for analysis. In such contexts, the set of alternative solutions developed may be greatly affected by the personal values and the perspective those values precipitate. Being able to view the decision environment from multiple perspectives enhances the decision-maker's ability to make better-informed choices. This article introduces the value-based decision-making model that suggests that multiple perspectives may be achieved by considering a foundation of individual values. Empirical testing indicates that this model provides a viable framework that decision-makers and researchers can use to better understand and facilitate multiple perspectives in decision-making.

© 2006 Elsevier B.V. All rights reserved.

Keywords: Decision support; Multiple perspective decision-making; Individual values

1. Introduction

Many authors suggest that a key component to effective problem formulation and solution is to expand the problem set with as many facts and assumptions as is reasonable (e.g., [51,53]). Discrepancies, however, are likely to occur in the interpretation of those facts, particularly in a complex domain where stakeholders may not come from similar backgrounds. Identification of those discrepancies is critical to developing an interpretation that is shared among the decision-makers. Hine et al. [28,29] schematically demonstrate the process of arriving at a shared interpretation, which then benefits

organizational decision-making. They suggest that a representation scheme that allows interpretations to be compared should be developed. This scheme must be able to standardize the perspectives evident in individual interpretations such that a common understanding of the *differences* (our emphasis) may happen. From this common understanding, conflict may be measured, addressed, and reduced. The authors suggest that an individual's beliefs form the building block of interpretations and therefore may be a potential measure for operationalizing and measuring equivocality.

Courtney [12] also demonstrates a process of reaching a shared interpretation (in his term, shared mental model) and considers individual beliefs as a basis of perspective in his paradigm for knowledge management, creation, and decision-making. Hine et al.'s [28,29] approach is to recognize the potential for differing interpretations and to find ways to mediate and synthesize those

* Corresponding author. Tel.: +1 334 844 6443.

E-mail addresses: dhall@auburn.edu (D.J. Hall), rd23@txstate.edu (R.A. Davis).

¹ Tel.: +1 512 245 8676.

differences, while Courtney [12] actively encourages a number of perspectives in the decision context prior to synthesis. He suggests expanding Mason and Mitroff's [42] Technical-Organizational-Personal model by adding aesthetic and ethical perspectives such that managers, stakeholders, system designers, and others have a foundation on which to search for and promote differences.

While these perspectives are relatively well-defined [10,12,42] and may begin the process of developing a representation scheme such as that called for by Hine et al. [28,29], our research goes a step further. In this study, we propose that all individuals develop perspectives based on their individual values and that a representation scheme for individual interpretation should be based on individual values as defined by Spranger [56]. Our research motivation is based on the need to understand decision-making behavior, the belief that individual values impact that behavior, and the desire to develop a process specifically to address value attunement in support of interpretive learning and subsequent decision-making. Our value-based decision-making model presented here provides an environment for encouraging multiple value-based perspectives and mediating value conflicts [29,28,62]. This will ultimately provide an organization with a value attunement process [60] that will support shared interpretation that is necessary to effectively solve problems. Such a model, and ultimately a system or system component based on that model, is a necessary step to extending decision support research.

We begin this study by discussing individual values and their place in organizational decision-making. Development of the value-based decision-making model is then discussed, followed by a test of a component based on the properties of the VBDM model. We end with the implications of the model to practice, theory, and research.

2. Individual values and decision-making

Values are discussed prominently in the literature although there is some disagreement regarding the definition and effect of these values. Meglino and Ravlin [44] define a value as an internalized belief regarding appropriate behavior; this impacts (among other things) how an individual interprets information. The authors conduct a comprehensive review of the literature and propose a framework for identifying and classifying existing values research, pointing out the iterative nature of values and the way that values can influence both perception and behavior. The authors also discuss the need for individuals to reach an understanding of each other's value systems (in Spranger's [56] words, value profiles)

in order to effectively coordinate action such as reaching a decision. This is the shared interpretation outcome of interpretive learning [28,29].

Shared interpretation requires a method by which individuals agree on a classification scheme for interpreting facts and variables in the decision context. Categorizing can lead decision-makers to consider and integrate context-specific information and make better decisions [6,27,50]. Categorization may be facilitated by cognitive mapping, a tool that allows individuals to organize their beliefs in a manner that increases understanding of their reasoning process. Individual values are frequently referred to as cognitive maps [7,17] making them a natural candidate not only for categorization, but also for operationalizing beliefs. Encouraging the application of values has a positive impact on organizational decision-making behavior (e.g., [48,52]).

Value-laden contexts present special problems for negotiating and decision-making, particularly when an individual's core values are prominent [62]. Providing a social environment in which these value conflicts may be surfaced and addressed may help alleviate biases associated with values and mediate affective responses from individual decision-makers. An organization that has the ability to surface and store multiple value-based perspectives will enhance its ability to solve problems [60]. The ability to surface the dissension created by differing values (and hence value-based perspectives) is necessary for interpretive learning [28,29]. Understanding individual values will serve to increase the number of value-based perspectives from which an organization may view, interpret, and act on newly acquired information and to create knowledge [20,21].

Individual values are an integral part of an individual's behavior, particularly early in the decision-making process because they form the foundation of an individual's perspective. We maintain that decision support processes and components can be developed that enhance the use of personal values and promote value attunement. However, there has been limited research in the area of personal values and decision support, despite research suggesting that individual and organizational values are evident in organizations and that conflict is a natural outcome of a diverse population [34,52]. When conflict is mediated, the process may lead to synthesized perspectives that serve to expand organizational memory and further enhance shared interpretation [20,21]. This expanded organizational memory also serves to promote understanding of another's perspective (perspective taking [8]) which in turn enhances comprehensible communication [38], another facilitator of shared communication and interpretation.

Researchers have called for additional investigation into the human side of decision-making and support. Stohr and Konsynski [58] suggest a framework for decision process research which acknowledges the importance of the complexity of people and their individual characteristics and suggest that those characteristics be studied. Meglino and Ravlin [44] indicate that we know too little about how values affect behavior and call for more attention to decision-making behavior rather than decision outcome.

Following the call for advancing decision support research by focusing on decision behavior and the characteristics that affect it, we propose that (1) individual values are an integral factor of decision behavior, (2) those values form the foundation of an individual's perspective during tasks associated with decision-making, (3) that little is truly known about their impact, and (4) that a decision model can be designed to support a value attunement process. Accordingly, we present the development of our value-based decision-making (VBDM) model and the initial empirical test results that validate the concept.

3. Developing the value-based decision-making model

Creating an environment that fosters a process both to recognize and to synthesize value profiles can be difficult. One barrier is the definition of individual values that should be considered when designing such an environment. A second barrier is finding a solid platform on which to base the design. We address the first barrier by identifying a value construct suitable for research use, and the second barrier by selecting an established theoretical foundation for our platform.

3.1. Defining the value construct

Because this study examines value-based perspectives, it is important that we adequately define what we mean by “value” and properly position this work in the larger context of the study of values. In this work, we follow the work of Eduard Spranger [56] who believed that individuals have a value profile that is based on theoretical, social, political, religious, aesthetic, and economic values. The theoretical value dimension is based on the discovery of truth and knowledge in a rational and scientific way. This dimension is very functional and works best when the situation or problem can be structured. The social value dimension incorporates an interpretive, philanthropic view—it seeks human interaction and considers the impact of action on the group or or-

ganization as a whole. The political value dimension is concerned with prestige and power, often at the expense of others, and incorporates a critical and power-oriented view. The religious value dimension aspires to make the world a better place, and is based on philosophical and interpretive views. The aesthetic value dimension views the world from an artistic, interpretive view and seeks to find form and harmony in a given scenario. The economic value dimension arises from a functional, practical view and seeks usability and material goods.

A person may exhibit one strong value such as religious, or exhibit a pattern of importance to multiple values. For instance, a typical masculine value profile is high on the economic, political, and theoretical dimensions and correspondingly low on the religious, social, and aesthetic ones [1,41]. This deeply ingrained value profile impacts the way that an individual views and interprets the world and seeks information; the perspective based on the profile is the value-based perspective that is the focus of this research. Such a deeply founded perspective affects decisions by imparting a value bias that is generally not recognized by the individual [18]. Value profiles have been shown to remain relatively static over time [41], making them an appropriate construct and supporting their use as a measurement tool. Values, however, are not exclusive to individuals.

Organizations exhibit the same types of value profiles, although the economic and theoretical dimensions are often predominant in business. In fact, it is interesting to note the similarities between the Spranger [56] value dimensions and the business value clusters advanced by Frederick [16]. Frederick defined five clusters of values necessary for business consideration: economical, environmental, political, technological, and that comprised of values within the individual. Using Spranger's [56] value dimensions together defines the fifth cluster, but one can also immediately see the similarities between the first four business clusters and the individual dimensions of the Spranger value profile.

3.2. Defining the theoretical foundation

Courtney [12] discusses a decision-making paradigm for use in complex, dynamic environments. He suggests the use of an inquiring organizational structure to implement such a paradigm, and maintains that, at the center of the paradigm, is a structure known as a mental model. This model is guided by an individual's experience and value profile that defines the value-based perspective that an individual uses to make sense of a new problem scenario and to generate potential solutions. However, to be effective, a process must be in place that allows

individuals to expand their mental models in a way that allows alternative perspectives to be evaluated. This research defines a support system designed to evaluate the effectiveness of using individual value profiles as the basis of perspective development. There must be a point at which most perspectives have been acknowledged, as one cannot expect all possible perspectives to be represented in every mental model, whether it is individual or collective. It may be prudent, therefore, to begin the process of perspective examination by defining major perspectives from which individuals may approach a decision-making scenario, and include those in the model.

We believe that to truly support the humanness of organizations as Courtney suggests, we must begin at the foundation of an individual's beliefs and perspectives; that is, their individual values on which beliefs are founded and perspectives are framed. This is also in keeping with our second theoretical foundation, the contention of Hine et al. [28,29] that an individual's beliefs provide the foundation for their interpretative learning process. We argue that when perspective development takes place on a deeper level, an organization is more likely to consistently surface and mediate value conflict. We also believe that perspective development and perspective synthesis are both necessary and are, in fact, engaged in a reciprocal relationship for any given context. These beliefs are the foundation for our value-based decision-making (VBDM) model.

4. The value-based decision-making model

Given the above discussion, it is easy to see that understanding the framework an individual develops to

view and thus interpret their surroundings is important to understanding decision-making behavior and may allow us to predict behavior in a specific context. Thus, it is not only important that we strive to understand how value-based perspectives affect decision-making, but also that we encourage organizations to incorporate as many value-based perspectives into a specific context as possible. Mitroff and Linstone [46] suggest a minimum of three perspectives (technical, social, and personal); Courtney [12] suggests adding ethical and aesthetic. This view is also represented by others who maintain that organizations should promote ethical behavior and social responsibility (e.g., [55,60]). We maintain that an individual's interpretation of events and their subsequent actions are founded on their perspective that is defined by their value profile. Thus, the pertinent perspectives to address must be all of those that make up an individual's value profile (theoretical, social, political, religious, aesthetic, and economic).

To achieve the benefits of multiple perspectives, all perspectives based on individuals' value profiles should be represented in a decision-making scenario. We maintain that our foundation of individual values enables an organization to focus on a defined set of perspectives. Rather than being different from those perspectives of Courtney's model, value-based perspectives are enhancements to them by formally defining each perspective. In fact, there are obvious parallels between Mitroff and Linstone's technical, organizational, and personal perspectives and Spranger's value dimensions. For instance, like their technical perspective, the theoretical perspective is rational and functional. Likewise, there are parallels between Courtney's ethical and aesthetic perspectives and the corresponding value dimensions

Table 1
Extending Mitroff and Linstone's TOP model and Courtney's paradigm with Spranger's values

Perspectives in the value-based decision-making model						
Spranger [56]	Theoretical	Social	Political	Religious	Aesthetic	Economic
Mitroff and Linstone [46]	Technical	Organizational	Personal			
Courtney [12]	Technical	Organizational	Personal	Ethical	Aesthetic	
Worldview	Scientific, rational	Collective, philanthropic	Individual, power	Philosophical, moral	Artistic	Practical
Goal	Problem solving, product	Action, stability, process	Power, influence, prestige	Equitability, elevation of mankind	Harmony, artistry	Usability, pragmatism
Mode of inquiry	Functional	Interpretive	Critical	Interpretive	Interpretive	Functional
General characteristics	Empirical, rational, seeks the "truth"	Altruistic, philanthropic, seeks human interaction	Competitive, ego-centric, seeks power	Moral, ethical, seeks unity with the universe	Diverse, appreciates beauty, seeks form and harmony	Utilitarian, wealth-oriented, seeks tangible goods
Decision criteria	Best fit to data	Societal gain	Individual gain	Highest level of understanding	Highest level of harmony and design	Highest cost/benefit ratio

discussed previously (religious and aesthetic, respectively). Each of the value dimensions as suggested by Spranger [56] can form the basis of decision-making perspectives and together are the foundation of the VBDM model conceptualized herein. Table 1 compares the perspectives advanced by Mitroff and Linstone [46] and Courtney [12] to our perspectives that are based on Spranger's [56] value typology.

Mitroff and Linstone [46] examine several facets of the technical, organizational, and personal perspectives, such as each perspective's goals and worldview, as well its mode of inquiry and decision criteria. Both of Courtney's perspectives (ethical and aesthetic) and the additional perspective from Spranger's [56] work (economic) can be examined in the same way. The worldview of the ethical (Spranger's religious) perspective is philosophical and morally based. The aesthetic perspective views the world from an artistic lens, while the economic perspective is highly pragmatic. Each of these perspectives has specific goals that match its worldview.

The mode of inquiry as discussed by Mitroff and Linstone is the way that the perspective views a problem and formulates the solution. A functional mode of inquiry supports the idea that organizations use inquiry to support or achieve organizational objectives, relying on known processes and information to facilitate organizational goals and minimally increase organizational knowledge.

Such a mode is adequate in situations where there are known variables, the problem is at worst moderately unstructured, and a solution is likely to be attained. The interpretive mode of inquiry applies a social theory to information, stressing communication and interpretation in the system. Socially oriented knowledge is the outcome of this perspective which closely parallels interpretive learning [28,29]. The third mode of inquiry is the critical mode; this mode is concerned with examining the status quo for flaws, conflicts, or contradictions and bringing those shortcomings to light. Both the interpretive and critical modes of inquiry management are socially oriented and therefore support the human aspect of a system. On the other hand, current approaches to learning and decision-making are decidedly functional, with a potential toward some element of the interpretive perspective (for instance, group decision support systems).

Because value-based perspectives form the basis of an individual's behavior, they must be acknowledged in organizations that wish to surface as many perspectives as possible in a decision-making context [20,21]. To accomplish this goal, organizations must encourage interpretive relationships among individuals and celebrate the differences of those individuals. To reduce conflict between organizational members, these relationships must exist in an environment where each perspective is recognized; this environment must also

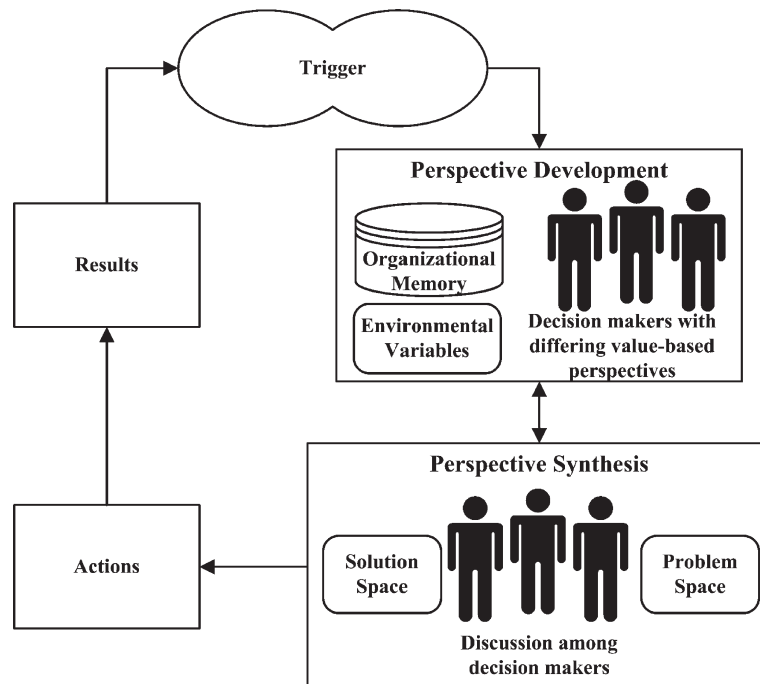


Fig. 1. The value-based decision-making model.

allow for continuous updating of the collective mental model. Accordingly, Fig. 1 presents the framework of the VBDM model.

A traditional problem-solving or decision-making approach is to react to problem recognition (the trigger in Fig. 1) by formulating alternative solutions quickly from generally known information (that is, foregoing investigation and knowledge creation) and choosing a solution to implement. Two problems are associated with this method. The first is that failure to investigate all perspectives may lead to incorrect or incomplete problem definition or a lack of appropriate alternative solutions. The second is that, very often, the process of decision-making ends with implementation; this lack of feedback may prevent outcome-based learning. Courtney's [12] model and our extension address both problems by advocating the use of perspectives and by providing for a continuously updated mental model.

Courtney discusses this process in terms of a Singerian "sweeping in" process that gathers information from an ever-widening set of stakeholders. In this process, the breadth of perspectives involved in the decision-making processes increases simply by increasing the amount of input; such breadth may contribute to more informed decisions, but not necessarily to shared interpretation that is fostered by socially constructed information and understanding.

Our extension addresses the social construction of information and interpretation by promoting an iterative relationship between organizational memory, environ-

mental variables, and the decision-makers. Facts may be interpreted in a multitude of ways depending on the perspective of the interpreter; shared interpretation can only occur when the basis behind the interpretation is discussed or when the individuals involved have already achieved an understanding of each others' perspectives. Each fact to be considered during a particular context is discussed, and any conflicts of interpretation must be resolved with additional information gathered from group members, organizational memory, and/or the environment. Ideally, this iterative process (analyze, gather, analyze...) continues until the group reaches not only a shared interpretation of that fact, but also a deeper understanding of the social environment in which the group is operating. The perspective development (PD) process is detailed in Fig. 2.

An individual's beliefs are based on their value profile and parallel the concept of a mental model [12]. The underlying foundation of our model (an individual's value profile) remains relatively stable, yet beliefs based on those values (i.e., mental model) may be modified as PD takes place. This involves updating beliefs based on newly acquired information, considering available options, developing new intentions from the set of available options, and acting on those new intentions. This, in turn, modifies the mental model, and contributes to a shared interpretation of the events.

Acquiring information with which to analyze changes or triggers is dependent in part on the ability to access organizational memory. In the VBDM model,

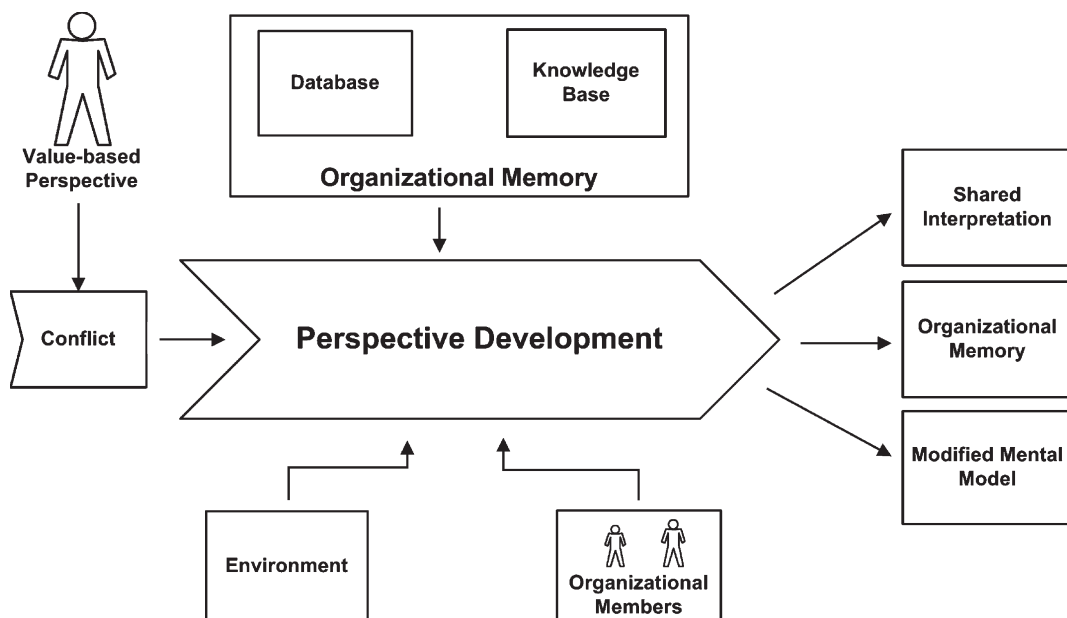


Fig. 2. Perspective development.

organizational memory is represented by two storage areas, the database, and the knowledge base. Facts are stored in the database that represents explicit knowledge in organizational memory. Shared interpretations are ultimately stored in the knowledge base which, over time, expands organizational memory to include information from multiple value-based perspectives and interpretations. Although one decision context will likely only develop information relevant to that context, over time that information may be synthesized to form relevant information for other contexts. Ultimately, each decision-maker believes that he or she has developed a shared interpretation of the events, and the process moves toward perspective synthesis.

The perspective synthesis process has two aspects—the problem space in which the problem is structured and potential alternative solutions are discussed, and the solution space where approved alternative solutions are placed. It is from this set that the eventual solution will be chosen and action will be taken. In the synthesis process, surfacing of unseen conflict is critical and both consensus and conflict sets [28,29] are necessary. Fig. 3 shows the details of the perspective synthesis process.

Although each decision-maker believes he or she understands the perspective of the others, he or she may still not fully appreciate the conflict that each perspective may produce when alternative solutions are suggested. Alternative solutions are divided into two categories—those that the group agrees are feasible solutions (consensus set), and those on which there is no consensus (conflict set). Discussion regarding items in the conflict set is necessary to either (1) mediate the conflict, or (2) remove the item from consideration. It is during this time that interactivity between perspective development and synthesis is most noticeable. When items are in question, it is most natural to secure additional information on that item. This returns the decision-making group to the PD process, where additional information is

acquired and acted on. This may change the shared interpretation of the group and allow synthesis. It is also possible that the item will not reach consensus despite additional development. Regardless, additional knowledge has been gained and is reflected in organizational memory.

We believe that such a model, and a component based thereon, is a natural extension of a decision support system as described by Bonczek et al. [9]. For instance, the PD component may be placed between the user and the model or between the user and the data. Either way, exposing the user to additional perspectives will broaden their information-gathering and decision-making scope, allowing for analysis that is more complete. The perspective synthesis component is a natural fit as part of the model component; drawing in information based on multiple perspectives and analyzing it together in a way that allows the best alternatives with more stakeholder consideration to be considered.

Although interpretive learning and expanding organizational mental models are group-oriented processes, initial research into an area as individual as value profiles is best performed at the individual level. Therefore, in order to show that our chosen value-profile basis can be used to manipulate the actions of individuals, we tested a perspective development component based on our model for its ability to change a decision-maker's behavior.

5. Testing the perspective development component

In this research, a component has been implemented as a user interface that queries motivation behind both chosen and unchosen actions in an attempt to develop that individual's knowledge of alternative perspectives that are often based on differing assumptions, some of which may be conflicting. Recognizing and considering other perspectives exposes any different assumptions that may be influencing stakeholders, allowing the

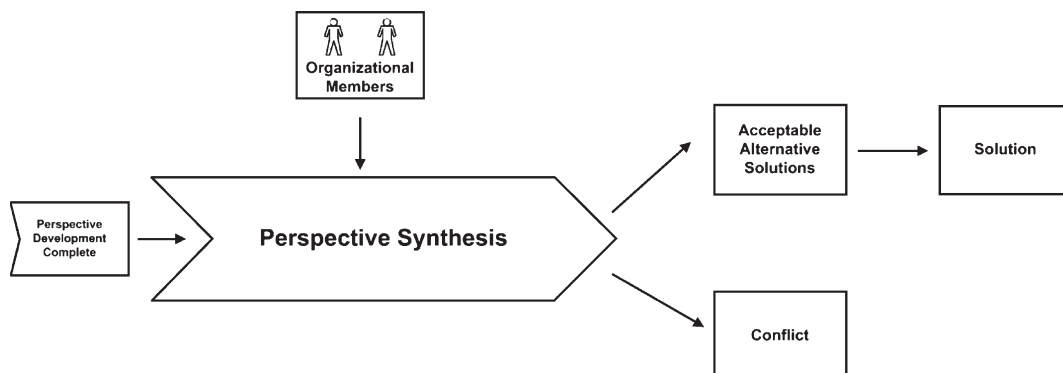


Fig. 3. Perspective synthesis.

decision-maker(s) to determine which assumptions are accurate and consequently to attain a better understanding of the problem at hand. Better understanding typically leads to better decision-making (e.g., [2,15,29]). However, decision-makers often engage in the information gathering and choice processes from a perspective biased by their value profile, and are often unaware that they are being affected by them [18].

In some decision contexts, such as a crisis or when confronted by a new or novel set of circumstances, people may be forced to make decisions with limited information or time available for analysis. In such contexts, the set of alternatives developed, and ultimately the alternative chosen, may be greatly affected by the personal values and the perspective those values precipitate. Because an individual's perspective affects and biases their response in decision situations, we must build systems to help an individual consider multiple perspectives so that the assumptions of others are surfaced and analyzed, which in turn may promote shared mental models and a broadened organizational perspective.

A shared mental model is critical to organizational learning and effective group decision-making, but in order to arrive at that state, the individuals involved must first broaden the scope of their thinking to understand the thinking of those around them (e.g., [29]). Further, the broader the range of perspectives and alternatives considered, the more informed the eventual choice (e.g., [33,61]). More informed choices are better and result in more satisfying decisions, all other things being equal (e.g., [45]). One way to broaden the number of perspectives used in a decision context may be accomplished by having each participant complete a series of questions regarding the current decision domain from a number of other perspectives, perhaps by being asked to articulate both good and bad points of a given problem or alternative, thus forcing the issue (e.g., problem or alternative) to be considered from two sides (e.g., [32,49]). This is the approach taken in this research.

Because the area of values is complex and broad, and values are the foundation of many personal decisions and actions, it is important to define how we measure values in the context of our research. This research accepts the notion of values as espoused by Spranger, and operationalizes those values by using the Allport–Vernon–Lindzey (AVL) Study of Values [1]. We consider the value profile to be the pattern of relative importance of each of Spranger's values (theoretical, social, political, religious, aesthetic, and economic) to an individual, as constructed from the results of the AVL instrument. A value-based perspective is the worldview that an individual develops as a result of his or her underlying value

profile; thus, we are able to estimate their value-based perspective. For example, if an individual scores highly on economic and political values (i.e., their profile exhibits stronger concern for these dimensions), we can assume that their value-based perspective will be one that focuses on the "bottom line" and on power/political issues over, for instance, the social value of a program. Value-based judgments are actions taken implicitly or explicitly that are based on an individual's value profile.

System performance must be defined within the context of its use. For instance, one reasonable performance test for a functional system (for instance, a payroll system) may be the accuracy of its output. For an expert support system, performance may be less well defined and be assessed in terms of the organizational performance based on decision-making facilitated by the system. For a component used within a complex decision-making scenario, the definition of performance is even more ill defined. In this research, the performance of the perspective development system will be compared to that of a control system, and the measure of performance is the system's ability to affect the value profile applied in a specific decision context. It is posited that decisions made by users of a system containing a PD component will exhibit a change in the value profile applied not evident in the behavior of users of a system without such a component (the control group). Thus, hypothesis one is:

H1. Use of a perspective development component will alter the value profile applied by an individual on a subsequent similar task.

Changing the value profile applied to a task may be accomplished without specifically deviating from one's stated values. It would be possible, for instance, for a decision-maker to modify their action in response to a treatment without deviating from their underlying value profile. As previous research has suggested, PD should allow the decision-maker to envision a wider range of perspectives and, at least temporarily, think "outside the box." Therefore, it is posited that being asked to challenge the status quo by considering multiple perspectives of an issue increases the "breadth of concern" ([32], p. 202) and results in perspective development. Thus, hypothesis two is:

H2. Use of a perspective development component will result in an applied value profile that differs from that individual's stated value profile.

The subjects used in this study were undergraduate students at a major Southwestern university. These subjects are appropriate for a judgmental task pertaining to

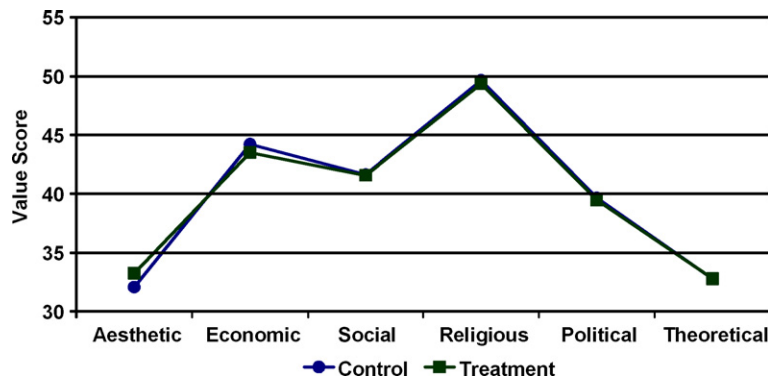


Fig. 4. Value profile (AVL).

values because they are not likely to have experience with the requirements of the task, and thus are more likely to react instinctively (i.e., follow their value-based perspective) and less likely to consider social norms in their responses. This is the scenario presented earlier when individuals have no information on which to act, are in a new situation, and therefore must rely on their value-based perspective. Also, because the task requires no specific knowledge or training, response bias is unlikely. Studies of various value instruments indicate that values can be assessed early in an individual's development and that value-based instruments are reliable for individuals at the high school level or above and do not discriminate based on age (e.g., [1,54]). Therefore, it is reasonable to believe that the results of this study will generalize to other populations. Subjects ranged in age from 19 to 22 and were distributed across all classifications (freshman to senior). Business students comprised 61% of the sample; 39% of the sample was male.

An individual's value profile was determined using the Allport–Vernon–Lindzey (AVL) Study of Values [1] that measures the relative strength of each of an indi-

vidual's value dimensions (theoretical, social, political, religious, aesthetic, and economic). This instrument has withstood time, three revisions by the authors, and one recent revision by other researchers [37], who did not find significant differences in responses between their instrument and the original one. The task involved the disbursement of funds among six community-based programs, each of which corresponds to a value-based perspective as determined by Spranger [56]. This task was developed by the GDSS research project at the University of Minnesota [14], was extensively tested, and was specifically designed to work with the AVL. The task/AVL combination has been validated in previous research (e.g., [63]). In this task, subjects must allocate \$500,000 among the six programs. All the funds must be allocated; each subject may choose whether to allocate all the funds to one program, or split the funds among two or more programs. Our results indicate that both the instrument and the task functioned as expected in our sample population.

Two systems were developed that presented the subject with a program that administered a short

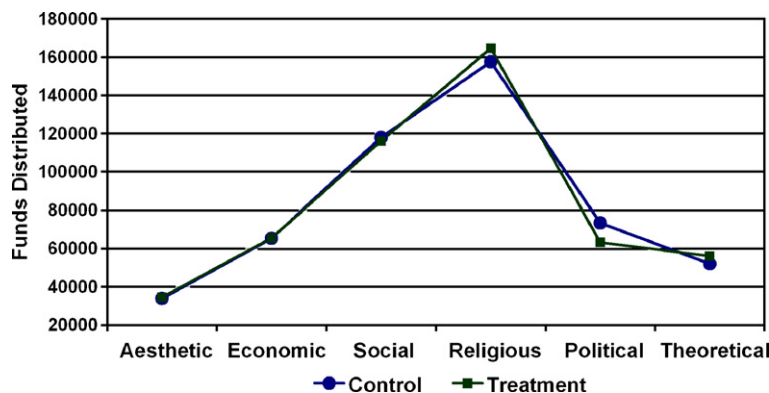


Fig. 5. Distribution profile (Task 1).

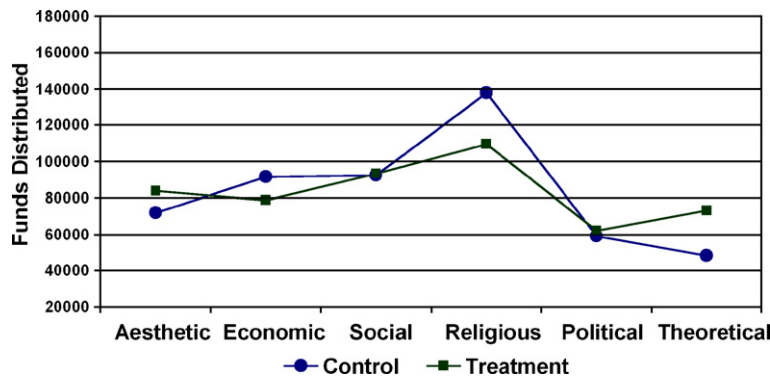


Fig. 6. Distribution profile (Task 2).

demographic survey, the value-based perspective study (i.e., the AVL Study of Values which is administered in two sections), and two funds disbursement tasks. The perspective development system (i.e., the treatment condition) was different from the control system in only one aspect. It contained an alternative perspective consideration component designed to encourage the subject to consider all sides of a given problem. The treatment was activated following the first funds distribution task; the control group received an intervening break between the two tasks that consisted of a page from the “Foundation” thanking them for their “good work” in the first funding task and asking that they continue their job as “trustee” through one more round of funding.

Tasks 1 and 2 were similar in style (six programs to which to distribute \$500,000, each aligned to one of Spranger’s values), but the programs outlined in Task 2 were distinctly different from those in Task 1. Thus, the second task was a similar decision domain, as opposed to a re-examination of a previous decision (because of space limitations, specific funding request projects and their corresponding values are available from the authors). The results of the second funds distribution task provide evidence of whether the manipulation succeeded in changing the subject’s response to funding requests. Results from the AVL and the funds tasks were used to build profiles for analysis. These profiles provide the basis for comparison between treatment and control group responses.

6. Results

Preliminary data analysis was performed to ensure data integrity and to make adjustments as necessary for removing outliers and establishing covariates. Because of the size of the sample ($n=388$), evenness of the distribution ($n_t=193$; $n_c=195$), and lack of missing data, no violation of assumptions was expected nor found; no impact of covariates or outliers was detected. This preliminary analysis confirmed that study requirements and that assumptions critical to statistical analysis were not violated.

The primary method of analysis used in this study is profile analysis, a multivariate form of repeated measures ANOVA. The intent is to discern patterns of responses over groups, rather than look at the individual measures. This type of analysis is common in the social sciences where groups of related characteristics are of interest (e.g., [36,43]), and is particularly useful in situations where the measures have a complex relationship such as the data analyzed here.

Because all of the subjects are from the same general population and were randomly assigned to the control or treatment group, no difference in their profiles was expected for the administration of the AVL or the first execution of the funds distribution task. However, these assumptions required testing before hypothesis testing began. As expected, no significant differences in profiles were found for the AVL ($F=0.57$, $p=0.72$, $\eta_p^2=0.007$). This indicates the control and treatment groups exhibited

Table 2

Significance level when comparing treatment and control group mean differences for the first and second funds distributions

	Aesthetic	Economic	Social	Religious	Political	Theoretical
Task 1	$p=0.85$	0.98	0.81	0.47	0.13	0.33
Task 2	$p<0.05^*$	0.08	0.89	$<0.01^*$	0.68	$<0.01^*$

*Significant at $\alpha=0.05$.

Table 3

Correlation between the value profile and the distribution profile (Task 2) for each group [correlation (*p*-value)]

	Aesthetic	Economic	Social	Religious	Political	Theoretical
<i>Pre-treatment (all correlations significant)</i>						
Control	0.28 (<0.0001)	0.25 (0.0003)	0.15 (0.0404)	0.30 (<0.0001)	0.33 (<0.0001)	0.15 (0.0331)
Treatment	0.22 (0.0019)	0.20 (0.0067)	0.14 (0.0481)	0.33 (<0.0001)	0.35 (<0.0001)	0.18 (0.0113)
<i>Post-treatment</i>						
Control	0.25 (0.0005)	0.31 (<0.0001)	0.18 (0.0099)	0.58 (<0.0001)	0.16 (0.0298)	0.25 (0.0005)
Treatment	0.20 (0.0045)	−0.01 (0.8583)**	0 (0.9954)**	0.38 (<0.0001)	0.18 (0.0130)	0.10 (0.1822)**

**Not significant.

similar value profiles. These same results were evident in the profiles of the first funds distribution task ($F=0.73$, $p=0.60$, $\eta_p^2=0.009$), indicating that both groups allocated funds similarly between each program. Further, the means of the responses differed significantly over each of the six programs indicating the groups had preferred dimensions. Fig. 4 clearly shows that the profiles are almost indistinguishable for value responses, and Fig. 5 shows the same for the first funds distribution task. These results indicate that any post-treatment differences between the groups can reasonably be attributed to the treatment.

7. Hypothesis analysis

As previously stated, hypothesis 1 examines whether subjects in the treatment group allocated funds differently in the second funds distribution task as compared to the first, indicating they placed different emphases on each value-based perspective after the treatment. As expected, analysis results show evidence to reject similarity between groups in the second task indicating that there are significant differences in the way the two groups distributed funds ($F=5.1$, $p<0.01$, $\eta_p^2=0.063$). This supports our hypothesis that behavior on a similar task will differ following exposure to a PD component. Fig. 6 shows the profiles for each group for the second funds distribution task.

There were no significant differences in the amount of funds distributed to each program in Task 1 between the two groups, as would be expected between groups with similar profiles. However, while the distribution profiles of the groups differed significantly in Task 2, results of pairwise comparisons, adjusted for multiple comparisons, indicate that not all dimensions differed equally (see Table 2). Specifically, the groups distributed similar amounts of funds to the political and social programs, a different amount to the economic program, and significantly different amounts to the aesthetic, theoretical, and religious programs.

The second previously stated hypothesis investigates whether an individual will be able to deviate from his or her stated value profile; each group's stated value profile was compared to their second funds distribution task profile. For purposes of this research, a subject exhibits perspective development if their post-treatment distribution profile (i.e., the results of Task 2) and their value profile (i.e., as determined by the AVL) are different. Statistically this could be evidenced by a lack of correlation between the professed importance of a value and the amount of funds given to a corresponding program.

As expected, the control group's allocation of funds in the second funds distribution task is consistent with its response to the values study, statistically supported by Pearson Correlations shown in Table 3 (correlations all significant at $p \leq 0.05$). The pattern of the value profile generally matched the pattern of the funds distribution profile for the second task. Note that we are not focusing on the relative difference between funds distribution for any one program, but rather the pattern of consistent correlation. For instance, the religious value received high responses; the religious program received the most funding. The theoretical value received low responses; correspondingly, the theoretically based program received low funding (see Fig. 6). This pattern is consistent across the task.

Such was not the case with the treatment group, however. Correlation analysis indicates that the treatment group changed their scores on the economic, social, and theoretical dimensions, which suggests the treatment group exhibited a perspective development effect. For instance, although the aesthetic value was the fifth ranked value in the sample, it received the third highest proportion of funding. It received more, in fact, than the economic program although the economic value was ranked considerably higher. The subjects who received the treatment exhibited an applied value profile that is different from their stated value profile, thus supporting the second hypothesis that the treatment condition would

result in a behavior pattern (applied value profile) that differed from their stated values.

8. Discussion

This study has examined whether a component designed to support an individual's use of multiple perspectives during a decision-making task can be conceptually developed and empirically tested. Specifically, the results are evidence of the consideration of multiple value-based perspectives and of reduced value bias. One might argue that the change in the treatment subjects' behaviors can be explained by increased creativity or innovativeness or just simple alignment with conscious thoughts of one's values. Alternatively, perhaps the treatment subjects adapted their behavior in some sense to produce the behavior they believed was desired by the researcher. We note that only the treatment group, the group encouraged to consider other perspectives, behaved in this way. We noted earlier the benefits of considering a decision domain from a wide perspective: increased creativity, innovation, and adaptability [11,32]. Thus, even if the treatment group's behaviors can be described as creative, innovative, or adaptive, we believe the controlled nature of the laboratory experiment supports our conclusion that perspective development *led to* this behavior because the control group did not behave in the same way. Creativity, innovation, adaptability, and so forth are different effects.

There is clear precedent for our conclusion on this point. Parker and Axtell [49] cite research from the study of human development that it is the ability to take the perspective of others that leads to greater empathy [4], higher levels of cognitive complexity [26], moral development [35], and managerial effectiveness [64]. For example, for empathy to occur, an individual must first recognize that something is happening to someone else and have some understanding of how the other person is feeling. In all of these cases, the driver of the behavior change is consideration of other perspectives.

The primary finding of this research is that an individual's decision-making behavior can be changed in value-based situations. Previous research has suggested that the individual differences caused in part by value profiles may be too complex to be managed effectively in system design [30], but must be acknowledged as antecedents for the outcome of technological endeavors such as MIS acceptance and success [13,65]. This research, however, suggests that it is possible, through a system component such as that developed here, to change the behavior of decision-makers in a specific decision domain.

Supporting a decision-maker's consideration of multiple perspectives can, at least temporarily, alter the decision-maker's applied value profile during that decision task so that a wider range of values are given due consideration. Broadened perspective bases have practical benefits to an organization. For instance, the other effects mentioned above (innovation, creativity, and adaptability) become crucial in decision domains of complex problems, particularly socially oriented ones. An organization can utilize support systems designed to broaden perspectives, especially value-based perspectives, to create, accumulate, and manage knowledge critical to its core competencies.

As an individual's perspective base expands, so does that individual's ability to see a bigger picture. When a group of individuals are brought together in this way, the problem space developed by that group becomes bigger, allowing for a wider range of alternatives to be generated and more informed choices to be made [29,33,61]. Consideration of multiple perspectives also allows an individual to perceive and process information that may not have been considered useful under a different lens, which is an antecedent to organizational learning. An increased amount of information useful in a particular domain has been shown to increase decision quality [57]. The value-based component tested in this research encouraged individuals to consider and use multiple perspectives during a decision task. When information based on these perspectives is incorporated into organizational memory, it becomes available for other decision domains.

It is interesting to note which value-based dimensions were mediated. It should come as little surprise that the individuals could not be persuaded to deviate from funding the religious program as this value was the strongest among the subjects. The characteristics of the religious value include faith, acceptance, and a respect for the rights of people [19]. Individuals with a high religious value profile tend to be empathetic, concerned with social welfare, and idealistic; such faith-based, idealistic values are less likely to respond to manipulation [3]. Theoretical programs may have had appeal given the student population of the study; aesthetic support may have come from a feeling of community that is common on campuses.

However, the ability to manipulate the economic, theoretical, and social value-based perspectives is a valuable finding. Numerous studies have indicated that the economic and theoretical dimensions are the strongest of the dimensions in individuals representing managerial positions (e.g., [1,39]). Mitigating the effect of these values should allow organizations to move away from the technical perspective of decision-making and toward

the organizational and personal perspectives as suggested by Mitroff and Linstone [46].

Indeed, a decision support environment that integrates the multiple perspective support as we have described and tested here moves organizations toward what Mitroff and Linstone [46] describe as the “third way of knowing”, that is, multiple realities. They state, “...the assumption is that on problems of any significance, the analyst, decision-maker, or policy-maker needs to explicitly see a *range* of different representations of the problem so that he or she can *participate actively* in the problem solving process...” (p. 63, their emphasis). The hope that they put forth is that exposure to a range of perspectives (i.e., representations) will allow the decision-maker to produce a new, stronger perspective that synthesizes the ones reviewed. The social value-based perspective may also enable these organizations to be more cognizant of their social responsibilities and the impact of their actions on their communities.

9. Implications

The VBDM model discussed above provides organizations with the means to surface, consider, and encourage multiple perspectives based on values. Because an individual's values provide the foundation for his or her beliefs, perspectives, and ultimately his or her decisions, investigation into this area is important for an understanding of decision-making behavior in organizations as well as the complementary area of organizational learning; there are implications for practice and theory.

9.1. Practical implications

A practical implication of the VBDM model is that it provides the basis for engaging an organization in active consideration of values. In an era when an organization's social responsibility is more prominent, such a consideration may not only be advisable, but may be unavoidable in certain areas, such as policy formulation and other ideologically based issues. Wade-Benzoni et al. [62] discuss barriers to ideologically based negotiations wherein they define those contexts to be societal issues. These issues may be difficult to resolve because individual values limit how an individual interprets the information, especially when a particular issue is closely related to a value held with deep conviction. Research shows that, when an individual is presented with a problem that evokes strong sentiment (either positive or negative), he or she is more likely to focus narrowly than to embrace other information or ideas (e.g., [62]). The VBDM model

specifically strives to mediate this unifocus by first acknowledging that all members of the group have closely held beliefs, and encouraging communication between the members such that the beliefs and their related assumptions are surfaced and discussed. This moves the organization toward value-attuned responsiveness—the understanding that complex (primarily social) decision contexts such as policy formulation are inseparable from individual values [60].

Formulating and ultimately solving ill-structured problems may also benefit from a model such as ours. Organizations often rely on their members to make decisions in a changing and unpredictable environment that produces these types of problems. Intuitive decision-making is routinely used in these situations where a manager interprets the environment and reacts to a “gut feeling.” Further, research shows that information that is used in these situations is socially constructed [40]. Intuitive action enables an individual to come to understand a situation without explicit analysis [31]. Effective intuition requires not only the individual's ability to judge the problem at hand, but also the environment in which the problem is situated. Although these mental models are rarely, if ever, complete, they guide subsequent decision-making behavior [47]. As managers routinely engage in active interpretation during the VBDM model process, their mental models expand, perhaps moving the models toward a more complete state, and thus eliminating some element of uncertainty about the judgment.

9.2. Theoretical implications

On a theoretical level, the VBDM model, with its focus on a small set of core personal values extends individual value usage within the organization. Swanson [60] encourages research to develop a theory of values that may provide the attunement process with some level of explanatory power, and that may help to focus understanding of individual values and their impact on individual (and particularly executive) behavior. By providing a defined set of values that may be measured by established instruments (e.g., the Study of Values [1]), a theory of individual values may be constructed and tested.

Using a model such as the VBDM model may not only enhance an organization's understanding of the values that its members hold, but it may also help the individuals better understand themselves. Self-perception theory indicates that individuals may not be fully aware of what their value profile is or even that one exists. Instead, individuals, if aware of values, may

deduce what those values are based on their actions in different situations just as an observer may deduce an individual's values based on that person's actions [5]. The VBDM model allows an organization to disseminate concrete information to its members regarding the value profile, thus allowing individuals to become aware of the values they hold. In turn, this awareness of one's own values will enhance understanding of another's values, which should promote fewer value-based conflicts.

Lastly, the VBDM model conceptualized here may provide the basis for the individual representation scheme necessary for successful interpretive organizational learning [28]. First, the use of the value set chosen allows organizations (or researchers) to focus on and perhaps test two foundations of interpretive organizational learning (IOL). The first is an understanding of the contextual interpretation of a given individual, and the second is the ability to understand potential alignment and/or interaction of those interpretations. By acknowledging a discrete set of values, and understanding how alliances or conflict may arise within that set, an organization should be able to provide the surfacing of conflict necessary to IOL. Hine et al. [28] also suggest requirements for an individual representation scheme, such as flexibility, scope restriction, and standardization of terminology such that effective communication may occur. Using values to represent this scheme provides those requirements and contributes a way to measure equivocality. A given value profile is likely to result in multiple interpretations depending on the complexity of the context. Further, Hine et al. [28] suggest that an organization must strive to understand belief variety, which is the number of beliefs in a given interpretation. By using a discrete value set presented as a value profile unique to an individual, the VBDM model defines not only belief variety but also the characteristics associated with each belief.

9.3. Research implications

The VBDM model discussed here begets avenues for future research. Further testing of the applicability of the values in the workplace is possible; testing the development and synthesis processes in a group setting is another possibility. Further refining of the PD component and development of the perspective synthesis component should also be considered.

It is possible that the VBDM model may be a potential implementation of an interpretive organizational learning system (one such system is that of Hine and Goul [29]). The VBDM model has been conceptualized in the image of a decision-support system, although

usage of a system built on its foundation is not limited to that. A design as flexible as the VBDM model can be used for decision-support, learning support, or as a component of a knowledge management system. Enhanced perspective development will naturally increase an individual's (or organization's) mental model and therefore affect decision-making and other information intensive processes such as knowledge generation. Recent research in negotiation support [59] indicates that synthesizing decision-makers' mental models not only increases the level of consensus with the group, but improves the social climate in which the groups operate. Such cohesiveness can enhance the decision-making process by reducing conflict, which is a goal of the VBDM model. All decision-making, information gathering, and knowledge generation scenarios require some negotiation to reduce the conflict inherent in acceptable information and solutions.

To achieve the goal of multiple perspectives, organizations should encourage individuals to think more broadly about problems, and to consider the viewpoints of others. When an individual strongly favors one or more of the six value-based perspectives, encouraging this growth may be difficult. Recent research [22–24] indicates that systems designed to facilitate the development of multiple perspectives may be beneficial in encouraging individuals to overcome their innate mental models during specific problem-solving contexts. It may be necessary to rely on specially developed technology to aid this process, particularly to provide the ability to update the mental models of organizational members and ultimately the collective mental model of an organization.

Recent advances in technology may enable organizations to facilitate the process of populating organizational memory with multiple perspectives, thus enabling organizational members to refer to those perspectives and the knowledge produced as needed. This will effectively update and expand both individual and collective mental models. Courtney [12] suggests several Web-based technological avenues whereby this may be possible—for instance, chats, email, applets, and knowledge repositories. A system based on the VBDM model may incorporate any (or many) of these technologies. Agent technology is also a promising avenue for implementation of complex systems [24,25].

Another avenue for research is further development of the behavioral aspects of the system. Do individuals using a system such as the VBDM model generate more alternative solutions than individuals without such support? Can such a system, over time, mediate potential bias effects of strongly held values of an individual?

Does use of the system promote faster, more efficient, or better decisions? Is there enough variety of value profiles in a given group of decision-makers to achieve the objective of synthesizing multiple perspectives?

10. Conclusion

As organizations continue to strive for sustainable gains in productivity and excellence, the importance of effective decision-making and organizational learning continues to increase. The environment faced by organizations today is often complex and very dynamic. It is critical that organizations consider the contribution that multiple perspectives make to decision-making and learning. In a particular decision context such as a novel situation, crisis, or contexts that evoke emotion, a decision-maker with a set of personal values on which their perspective is based may not be able to identify all sides of the issue under consideration. Yet, being able to view the decision environment from multiple perspectives enhances the decision-maker's ability to make better-informed choices. The value-based decision-making model described in this paper provides a framework that organizations and researchers can use to better understand and facilitate the use of multiple perspectives in decision-making and organizational learning.

The foundations of the VBDM model are Courtney's [12] decision-making and knowledge management paradigm and the conflict/consensus process of interpretive organizational learning [28,29]. The Courtney paradigm has been enhanced by the addition of six value-based perspectives which form the foundation of the individual representation scheme of interpretive organizational learning. Understanding these values is integral to understanding value-based decision behavior. Effective decision-making and learning require consideration of multiple perspectives; this model will enhance the understanding of individual values and their place in organizational learning and decision-making.

References

- [1] G.W. Allport, P.E. Vernon, C. Lindzey, *A Study of Values*, Riverside, Chicago, IL, 1970.
- [2] C. Argyris, D.A. Schön, *Organizational Learning II*, Addison-Wesley Publishing Company, Reading, MA, 1996.
- [3] J. Barnett, K. Bass, G. Brown, Religiosity, ethical ideology, and intentions to report a peer's wrongdoing, *Journal of Business Ethics* 15 (November 1996) 1161–1174.
- [4] J.M. Bartunek, J.R. Gordon, R.P. Weathersby, Developing 'complicated' understanding in administrators, *Academy of Management Review* 8 (2) (1983) 273–284.
- [5] D.J. Bem, Self-perception: an alternative interpretation of cognitive dissonance phenomena, *Psychological Review* 74 (2) (1967) 183–200.
- [6] I. Benbasat, L.-H. Lim, The effects of group, task, content, and technology variables on the usefulness of group support systems: a meta-analysis of experimental studies, *Small Group Research* 24 (4) (1993) 430–462.
- [7] K.L. Betttenhausen, K.J. Murnighan, The emergence of norms in competitive decision making groups, *Administrative Science Quarterly* 30 (1985) 350–372.
- [8] R.J. Boland Jr., R.V. Tenkasi, Perspective making and perspective taking in communities of knowledge, *Organization Science* 6 (4) (1995) 350–372.
- [9] R.H. Bonczek, C.W. Holsapple, A.B. Winston, *Foundations of Decision Support Systems*, Academic Press, New York, 1981.
- [10] C.W. Churchman, *The Design of Inquiring Systems: Basic Concepts of Systems and Organizations*, Basic Books, Inc., New York, NY, 1971.
- [11] J.D. Couger, L.F. Higgins, S.C. McIntyre, (Un)Structured creativity in information systems organizations, *MIS Quarterly* 17 (4) (1993) 375–397.
- [12] J.F. Courtney, Decision making and knowledge management in inquiring organizations: a new decision-making paradigm for DSS, *Decision Support Systems Special Issue on Knowledge Management* 31 (1) (2001) 17–38.
- [13] F.D. Davis, Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly* 13 (1989) 318–340.
- [14] G. DeSanctis, M.S. Poole, M. Limayem, D. Luitjens, "The GDSS Research Project: Experimental Task Materials," MISRC-WP-92-07, Management Information Systems Research Center, Curtis L. Carlson School of Management, University of Minnesota (1992).
- [15] A.J. DiBella, E.C. Nevis, *How Organizations Learn: An Integrated Strategy for Building Learning Capability*, Jossey-Bass Inc., San Francisco, 1998.
- [16] W.C. Frederick, Anchoring values in nature: toward a theory of business values, *Business Ethics Quarterly* 2 (1) (1992) 283–302.
- [17] D. Giola, P.P. Poole, Scripts in organizational behavior, *Academy of Management Review* 9 (1984) 449–459.
- [18] W.D. Guth, R. Tagiuri, Personal values and corporate strategy, *Harvard Business Review* 43 (5) (1965) 123–132.
- [19] B. Hall, O. Harari, B. Ledig, M. Tondow, *Manual for the Hall-Tonna Inventory of Values*, Paulist Press, New Jersey, 1986.
- [20] D.J. Hall, *Testing Performance and Perspective in an Integrated Knowledge Management System*, College Station, 2002.
- [21] D.J. Hall, D. Paradice, Do you do as you value? Investigating value-based decision bias and mediation, *Communications of the ACM* (in press).
- [22] D.J. Hall, D.B. Paradice, Philosophical foundations for a learning-oriented knowledge management system for decision support, *Decision Support Systems* 39 (3) (2005) 445–461.
- [23] D.J. Hall, D.B. Paradice, J.F. Courtney, Building a theoretical foundation for a learning-oriented knowledge management system, *Journal of Information Technology Theory and Application (JITTA)* 5 (2) (2003) 63–89.
- [24] D.J. Hall, Y. Guo, R.A. Davis, C. Cegielski, Extending unbounded systems thinking with agent-oriented modeling: conceptualizing a multiple-perspective decision-making system, *Decision Support Systems* 41 (1) (2005) 279–295.
- [25] D.J. Hall, Y. Guo, R.A. Davis, C. Cegielski, Technological support for a learning-oriented knowledge management system,

- Proceedings of the Americas Conference on Information Systems, Omaha, NE, 2005.
- [26] O.J. Harvey, D.E. Hunt, H.M. Shroder, *Conceptual Systems and Personality Organization*, Wiley, New York, NY, 1961.
 - [27] K.M. Hilmer, A.R. Dennis, Stimulating thinking: cultivating better decisions with groupware through categorization, *Journal of Management Information Systems* 17 (3) (2001) 93–114.
 - [28] M.J. Hine, J.B. Gasen, M. Goul, Emerging issues in interpretive organizational learning, *The DATA BASE for Advances in Information Systems* 27 (3) (1996) 49–62.
 - [29] M. Hine, M. Goul, The design, development, and validation of a knowledge-based organizational learning support system, *Journal of Management Information Systems* 15 (2) (1998) 119–152.
 - [30] G. Huber, Cognitive style as a basis for MIS design: much ado about nothing? *Management Science* 29 (5) (1983) 567–597.
 - [31] T.S. Isaack, Intuition: an ignored dimension of management, *Academy of Management Review* 3 (4) (1978) 917–921.
 - [32] R. Keeney, *Value-Focused Thinking*, Harvard University Press, Cambridge, MA, 1992.
 - [33] R. Keeney, Foundations for making smart decisions, *IIE Solutions* 31 (5) (1999) 24–30.
 - [34] D.E. Kiranne, Managing values: a systematic approach to business ethics, *Training and Development Journal* November (1990) 53–60.
 - [35] L. Kohlberg, Stage and sequence: the cognitive developmental approach to socialization, in: D.A. Goslin (Ed.), *Handbook of Socialization Theory and Research*, Academic Press, San Diego, CA, 1969, pp. 347–480.
 - [36] T.R. Konold, J.J. Glutting, P.A. McDermott, J.C. Kush, M.M. Watkins, Structure and diagnostic benefits of a normative subtest taxonomy developed from the WISC-III standardization sample, *Journal of School Psychology* 37 (1999) 29–48.
 - [37] R.E. Kopelman, J.L. Rovenpor, M. Guan, The study of values: construction of the fourth edition, *Journal of Vocational Behavior* 62 (2) (2003) 203–220.
 - [38] R.M. Krauss, S.R. Fussell, Perspective taking in communication: representations of others' knowledge in reference, *Social Cognition* 9 (1) (1991) 2–24.
 - [39] K. Kumar, M. Thibodeaux, Differences in values systems of Anglo-American and Far Eastern students: effects of American business education, *Journal of Business Ethics* 17 (1998) 253–262.
 - [40] F.-Y. Kuo, Managerial intuition and the development of executive support systems, *Decision Support Systems* 24 (2) (1998) 89–103.
 - [41] D. Lubinski, D. Schmidt, C. Persson Benbow, A 20-year stability analysis of the study of values for intellectually gifted individuals from adolescence to adulthood, *Journal of Applied Psychology* 81 (4) (1996) 443–451.
 - [42] R.O. Mason, I. Mitroff, A program for research on management information systems, *Management Science* 19 (5) (1973) 475–487.
 - [43] P.A. McDermott, J.W. Fantuzzo, J.J. Glutting, M.W. Watkins, A.R. Baggeley, Illustrations of meaning in the ipsative assessment of children's ability, *Journal of Special Education* 25 (1992) 504–526.
 - [44] B.M. Meglino, E.C. Ravlin, Individual values in organizations: concepts, Controversies and Research, *Management* 24 (3) (1998) 351–389.
 - [45] B.E. Mennecke, J. Valacich, Information is what you make of it: the influence of group history and computer support on information sharing, decision quality, and member perceptions, *Journal of Management Information Systems* 15 (2) (1998) 173–197.
 - [46] I.I. Mitroff, H.A. Linstead, *The Unbounded Mind: Breaking the Chains of Traditional Business Thinking*, Oxford University Press, New York, 1993.
 - [47] D.A. Norman, User centered system design, in: D.A. Norman, S. Draper (Eds.), *Cognitive Engineering*, Lawrence Erlbaum Associates, Hillsdale, NJ, 1986, pp. 31–61.
 - [48] C.A. O'Reilly III, J.A. Chatman, D.F. Caldwell, People and organizational culture: a profile comparison approach to assessing person-organization fit, *Academy of Management* 34 (3) (1991) 487–516.
 - [49] S.K. Parker, C.M. Axtell, Seeing another viewpoint: antecedents and outcomes of employee perspective taking, *Academy of Management Journal* 44 (6) (2001) 1085–1100.
 - [50] A. Pinsonneault, K. Kraemer, The impact of technological support on groups: an assessment of empirical research, *Decision Support Systems* 5 (2) (1989) 197–216.
 - [51] W.F. Pounds, The process of problem finding, *Industrial Management Review* 11 (1969) 1–19.
 - [52] E.H. Schein, *Organizational Culture and Leadership*, Jossey Bass, San Francisco, CA, 1992.
 - [53] H.A. Simon, The structure of ill-structured problems, *Artificial Intelligence* 4 (1973) 181–201.
 - [54] G.F. Smith, Defining managerial problems: a framework for prescriptive theorizing, *Management Science* 35 (8) (1989) 963–981.
 - [55] E. Soule, Managerial moral strategies—in search of a few good principles, *Academy of Management Review* 27 (1) (2002) 114–124.
 - [56] E. Spranger, *Types of men; the Psychology and Ethics of Personality*, Johnson Reprints, New York, NY, 1928/1966.
 - [57] G. Stasser, D. Stewart, Discovery of hidden profiles by decision-making groups: solving a problem versus making a judgment, *Journal of Personality and Social Psychology* 63 (1) (1992) 426–434.
 - [58] E.A. Stohr, B.R. Konsynski, *Information Systems and Decision Processes: Charting New Directions for DSS Research: A Multi-Disciplinary Approach*, IEEE Computer Society Press, Los Alamitos, CA, 1992.
 - [59] R.I. Swaab, T. Postmes, P. Neijens, M.H. Kiers, A.C.M. Dumay, Multiparty negotiation support: the role of visualization's influence on the development of shared mental models, *Journal of Management Information Systems* 19 (1) (2002) 129–150.
 - [60] D.L. Swanson, Toward an integrative theory of business and society: a research strategy for corporate social performance, *Academy of Management Review* 24 (3) (1999) 506–521.
 - [61] R. Vahidov, R. Elrod, Incorporating critique and argumentation in DSS, *Decision Support Systems* 26 (3) (1999) 249–258.
 - [62] K.A. Wade-Benzoni, A.J. Hoffman, L.L. Thompson, D.A. Moore, J.J. Gillespie, M.H. Bazerman, Barriers to resolution in ideologically based negotiations: the role of values and institutions, *Academy of Management Review* 27 (1) (2002) 41–57.
 - [63] R.T. Watson, G. DeSanctis, M.S. Poole, Using a GDSS to facilitate group consensus: some intended and unintended consequences, *MIS Quarterly* 12 (3) (1988) 463–480.
 - [64] K.E. Weick, *The Social Psychology of Organizing*, Random House, New York, 1979.
 - [65] R.W. Zmud, Individual differences and MIS success: a review of the empirical literature, *Management Science* 25 (10) (1979) 966–979.



Dianne J. Hall is an Assistant Professor of Management Information Systems at Auburn University. She received her doctorate at Texas A&M University where she also taught for several years. She has also worked as a consultant. Her work has appeared in both academic and practitioner journals such as *Communications of the ACM*, *Decision Support Systems*, *Journal of Financial Services Marketing*, *OR Insight*, *the International Journal of Knowledge Management*,

Journal of Information Technology Theory and Application, and *Knowledge and Innovation* and in several books. Her current research interests include applications of information technologies in support of knowledge management as well as multiple-perspective and value-based decision-making.



Robert A. Davis is an Associate Professor in the Computer Information Systems and Quantitative Methods Department of the McCoy College of Business Administration at Texas State University-San Marcos. He earned his MBA and Ph.D. degrees from the University of South Carolina. He is the co-author of *Operations Management: Concepts in Manufacturing and Services*. He has published many articles dealing with the effective and efficient utilization of resources for operations and supply chain management.

His articles have appeared in academic journals such as *Management Science*, *Decision Support Systems*, *Engineering Costs and Production Economics*, *Journal of Marketing*, *National Productivity Review*, *International Journal of Production Research*, *Competitiveness Review*, *Journal of Business Research*, and *Production and Inventory Management Journal*. He has served as Co-Principal Investigator on several research projects with industrial clients dealing operations and supply chain issues.