KNOWLEDGE REPRESENTATIONS AND KNOWLEDGE TRANSFER

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Cognitive and learning theories were used to develop a framework in which different knowledge representations prime recipients with different schemata and thereby differentially affect their decision making. We evaluated interpretive, general, and particular knowledge representations in a laboratory experiment with managers. The hypotheses received mixed support, with significant results indicating the importance of particular knowledge representations in managerial decision making and an intriguing role for interpretive knowledge representations.

It is a widespread perception that knowledge created by scholars is not used in practice. This perception exists in the social sciences and humanities (Easton, 1991), psychology (Fowler, 1990; Hoshmand & Polkinghorne, 1992; McGuire, 1983; Peterson, 1991) and education (Hallinan, 1986; Johnson, Malone, & Hightower, 1997) as well as in the management disciplines (Beyer, 1982; Choit, 1991; Hambrick, 1984; Myers, Massey, & Creyser, 1986; Porter & McKibbin, 1988). Management researchers have proposed to reduce this perceived gap by arguing for their preferred approaches to knowledge creation and transfer. Many of them call for creating management knowledge by identifying unambiguous basic principles and demonstrating how they transcend specific contexts. Thompson (1967) advocated this approach over 40 years ago, and more recently Hitt (1998) emphasized the development of theoretical knowledge as the primary objective of the discipline.

Other management researchers have responded to the perceived gap between knowledge and practice by generating applied knowledge. Thomas and Tymon (1982), for example, proposed that the producer of knowledge should enhance its relevance by obtaining information about specific problems and situations encountered by knowledge users. Likewise, Piore (1983) advocated unstructured early-stage observations and interviews with system participants to learn the unique ways in which they understand their own system. Srivastava (1987) called for researchers in strategic management to adopt variables that easily relate to organizational goals, to test research results in specific organizational settings, to use rigorous qualitative methodologies to incorporate practical insights, and documenting contextual conditions within which research becomes useful.

Reviewing the results of 27 empirical studies about the use of social science research, Beyer and Trice (1982) described a complex process that depends on many contextual factors, such as how organizations process information, how affect between clients and researchers is established, how strategy is formulated and controlled, and how action is generated. Other management scholars have also recognized the importance of users’ contexts and processes, hypothesizing that knowledge use is influenced by such factors as task complexity and communication flows (Monon & Varadarajan, 1992) and cognitive team processes (Madhavan & Grover, 1998).

In this article, we take a step back from those diverse claims about the specific forms, contexts, or
processes by which knowledge from scholarly research should be made available to managers. Instead, we draw upon theories of cognition and learning to suggest a framework for classifying forms of knowledge representation and to propose that the form of representation influences its processing and subsequent utilization. In our framework, knowledge representations vary on two dimensions: the literal to the figurative, and the abstract to the concrete. Using these dimensions, we hypothesize the potential role of particular, general, and interpretive forms of representation in managerial decision making and report on an initial empirical study of their influence on decision outcomes.

By focusing on forms of knowledge representation and their differing effects, we tie our work to two foundations in cognitive research. First, we recognize the importance of schemata in human cognition (Rumelhart, 1984). The core idea of schemata, which can be traced back to Kant and were initially proposed in psychology by Bartlett (1932), is that of "generic knowledge structures that guide the comprehender's interpretations, inferences, expectations and attention" (Craesser & Nakamura, 1982: 60). We propose that different forms of knowledge representation induce different schemata through a process of "priming" (Hansen, 1995) and thereby influence subsequent decision making. By priming, we refer to the activation of schema types that persist after the initial stimulus and affect subsequent cognition (Berkowitz & Rogers, 1986). Second, our work responds to Walsh's (1995) call for research on the effects of the content of managerial knowledge structures. The present research contributes to the field of knowledge transfer by moving beyond descriptive studies to evaluate the impact of knowledge structures on managerial decision making. Like Rosch (1973), we use priming to explore the what, not the how, of knowledge transfer. The focal question is whether different forms of knowledge representation affect decision outcomes, not what the underlying processes that might explain this effect are. We rely on the notion of schemata, but here we are not concerned with the mechanism by which schemata operate, but its activation, spread of energy, "tagging," or evaluation of paths (Rosch, 1975: 194). Thus, we respond to the call for empirical research on the transfer of knowledge between academics and practitioners by providing initial insights into these questions: Do different ways of representing knowledge matter in managerial decision making? Does this effect vary for different types of decisional outcomes? We hope that our initial insights will provide an impetus for the study of knowledge transfer processes by academics and practitioners alike.

THEORETICAL FOUNDATIONS

We propose a framework, displayed in Figure 1, that distinguishes between abstract and concrete cognitive functions, and between figurative and literal language systems. Drawing on these two distinctions, we propose three forms of knowledge representation. Below, we discuss each distinction and test the influence of the three knowledge representations on decision-making outcomes with experienced managers. We recognize that a managerial decision has several different dimensions, including the depth and breadth of the ideas and analysis used and the perceived decision satisfaction. Although it is likely that the effect of knowledge representations varies for different decision outcomes, few, if any, conceptual or empirical studies posit specific hypotheses for each decision outcome. For this reason, we proposed nonspecific hypotheses for knowledge representation effects but included multiple decisional dimensions in our empirical study in order to explore possible differential effects.

Abstract and Concrete Cognitive Structures

The long-standing distinction between abstract and concrete cognitive functioning has been renewed and extended by recent developments in the cognitive sciences. Rosch and colleagues have demonstrated that categories of concepts vary in their level of abstraction or inclusiveness and that the basic level is particularly informative (Rosch & Mervis, 1975; Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). In a hierarchy of categories, the basic level is defined as a level of specificity associated with a large number of attributes. The category "furniture," for instance, does not have nearly as many attributes associated with it as the...
category “sofa.” A more detailed category, such as “curved sofa,” will not yield significantly more attributes, so in this example, “sofa” would be a basic-level category. Rosch (1975) argued that the basic level is highly informative because it is the level at which patterns of similarity and discontinuity are most salient and is the highest level of abstraction at which a distinct mental image can be formed. Tversky and Hemenway (1984) argued that the attributes of basic-level categories are particularly salient because they often serve both as a part of the basic-level category (“sofa” includes “cushion” and “legs”) and as a functional element of the basic-level category (“cushion” and “legs” are associated with the functions of sitting and supporting). They propose that it is the dual nature of aspects of the basic level that helps make it an especially informative level for organizing understanding of the world.

Levels of abstraction in categorization are in turn related to levels of abstraction in conceptual thinking. Murphy and Lassaline (1997), for example, expanded on the notion of a basic-level category and discussed a universal hierarchy of naturally occurring concepts found in many languages and across many cultures. Murphy and Lassaline argued that the basic or intermediate level of classification is the most natural and preferred level of conceptual thinking, since it balances the breadth of superordinate-level classification with the predictive ability of the subordinate categories. In a series of experiments, Whittlesea (1997) demonstrated that people skillfully draw upon this memory level of particulars to abstract general knowledge on demand. In this manner, the particularity of the basic level is preserved in memory and more general knowledge is abstracted when needed, as in understanding whether an event is idiosyncratic or not.

Although Murphy and Lassaline deferred with regard to nonobject domains, such as actions and emotions, Vallacher and Wegner (1987) found that the abstract/concrete distinction is also relevant to how people think about their actions. Following William James, they put forth their “action-identity theory,” which describes how individuals consciously understand, conceptualize, and communicate about their actions with mental representations that constitute a hierarchical identity structure. Thus, a single action can be represented and articulated abstractly (“I am visiting a friend”), at a lower level (“I am ringing the doorbell”), or quite concretely (“I am lifting my finger”). Vallacher and Wegner (1987) derived three theoretical principles from this line of research: (1) action is maintained with respect to its “prepotent” identity (what one has in mind to do serves as a frame of reference for conducting action), (2) the higher-level identity tends to become prepotent when both a higher and a lower level of act identity are available, and (3) a lower-level identity becomes prepotent when an action cannot be maintained at a higher level of identity (because, for instance, of difficulties in the environment). This framework suggests that people operate at multiple levels of abstraction, not just in regard to conceptual categories, but also in regard to understanding their own actions. It further suggests that higher-order levels of abstraction are prepotent, shaping understanding as it unfolds. Barsalou (1983, 1985) demonstrated that actors construct categories ad hoc and are not constrained to the “natural” basic categories discussed by Rosch and others. These ad hoc categories in turn include graded structures of what constitutes a better or worse example of the category that are shaped by the actor’s ideals and goals. This argument suggests a personal and action-based process of category development.

Bringing these themes back to the level of personal development, Karmiloff-Smith and her colleagues (Clark & Karmiloff-Smith, 1993; Karmiloff-Smith, 1984, 1988; Karmiloff-Smith & Clark, 1993; Karmiloff-Smith & Inhelder, 1974: 75) have presented a plausible theory about the development of abstract cognitive structures and their role in a process of personal theorizing that is essential to human competence. Karmiloff-Smith’s experiments reveal that children hold an internally represented theory, a “theory-in-action,” that constrains overt behavior. Consistent with a Kuhnian process (Kuhn, 1962) of coherence and change in scientific thought children’s interactions with the physical world can be described as hypothesis testing, attributing negative feedback to procedural error, rejecting anomalous data, and even inventing confirmatory data. Children eventually revise their theories to make more unified and coherent sense of disparate experiences, just as scientific thought often shifts to a more encompassing paradigm. Kolb’s (1984) theory of experiential learning shows how this theory-building and theory-testing developmental process continues throughout adult life.

Thus, we viewed the process of cognitive development as consisting of endogenously redescribing knowledge structures or schemata, going from a basic level to a more abstract and encompassing form. This hierarchical development allows a person to interact more successfully with the extant world. Whether this development results from innate predisposition (Clark & Karmiloff-Smith, 1993) or from the intermediation of external symbolic systems such as language (Bechtel, 1993; Dennett, 1993) or external demands (Whittlesea, 1997),
representational redescription constitutes personal theorizing.

Several observations from these areas of research are important for the present study. First, various branches of cognitive psychology use an abstract/concrete distinction to explain cognitive structures and processes. Human interaction with the world relies upon the ability to move between abstract and concrete mental structures. Second, humans are theoreticians, not simply pragmatists. Systematic abstractions, or theory, play a vital and inevitable role in managerial action. Third, human performance is a function of the breadth and generality of an actor’s “espoused” theories. Performance of more complex tasks relies on a hierarchy of abstract constructs, not isolated or unconnected actions.

The cognitive theories reviewed above suggest that knowledge representations based on abstract concepts should offer more flexible and encompassing ways of understanding problems. Karmiloff-Smith’s claim that individuals create theories upon which they rely for guidance and Vallacher and Wagner’s (1987) proposition that the higher-level identity becomes prepotent point to the primacy of general, abstract knowledge over concrete, particular knowledge. Knowledge representations based on abstract concepts are expected to prime abstract schemata and the processes of abstracting from basic-level categories (Whittlesea, 1997). Thus, we posit that:

**Hypothesis 1.** The levels of managerial decision-making outcomes on complex tasks will be higher after managers’ exposure to abstract knowledge than after their exposure to concrete and contextualized knowledge.

**Knowledge as a Function of Figurative Learning**

In the literature reviewed, knowledge representations, whether abstract or concrete, are assumed to be literal; that is, words are used in their usual way and the intended meaning is the primary, customary one. In contrast, Bruner’s (1990, 1996) psychocultural approach to education and Lakoff and Johnson’s (1980) work on the importance of metaphor and embodiment in the functioning of language suggest the importance of the figurative in knowledge representation. Boje (1991), for instance, identifies storytelling as a preferred mode for managers’ “sense-making” activity (Weick, 1995). In such figurative knowledge, intended meanings are ambiguous, and knowledge content is left to a reader’s interpretation. In a narrative or allegorical process, mind operates with evocative representations of reality, in which members of a community define technical and social life through culturally specific practices of language use. Individuals learn the practices of a community by participating in its language games and forms of life (Wittgenstein, 1953). They learn those practices by moving through a progression of experiences and by moving from being peripheral participants to full community members (Lave & Wenger, 1991). Evocative and narrative representations permit the assignment of different meanings to the same thing on different occasions and allow those in a community to know what is appropriate and what is not in that community. Culture both shapes the human mind and is shaped by it through narrative language.

According to Bruner (1990), reality is imputed and constructed through the way people “narrativize” their ongoing experiences. Meaning is a function of cultural tradition and culturally specific ways of thinking that are learned through the stories we tell that construct “not simply how things are but how things should be” (Bruner, 1990: 39–40). He suggested that education should focus on helping people become skilled in constructing meaning through narratives of internal dialogue and social interaction. Shank (1995) went as far as to attribute all memory and intelligence to humans’ narrative capacity. The meaning of any fact or information depends on the narrative frame of reference or perspective from which it is seen and the rules of evidence within that perspective.

Lakoff (1987), drawing on Putnam (1981), argued that a strongly objectivist or realist view of knowledge requires a unique perspective in which individuals can step out of themselves and achieve an externalist, God’s-eye view of the world. Recognizing the difficulties in adopting such a view, Lakoff concurred with Johnson (1987) in emphasizing the inherently embodied nature of image schemata. Experience as embodied beings structures people’s perspectives and limits their capacity to achieve a view from outside their situation. People use the experience of their bodies as containers and the experience of their bodies moving through space as sources of root metaphors in everyday cognition. Individuals bring multiple perspectives to the ambiguous and incomplete stimuli in their environments from which they construct personal narratives or stories that define themselves in the world. On a cultural level, these narratives provide models of identity and agency to members of cultures. Learning about oneself and the world occurs through a process of self-narrativizing that is inherently interpretive (Boland & Torkzadeh, 1995). Self-narrativizations bring coherence to the blooming, buzzing confusion of the ongoing stream of experiences and serve as an evolving theory of the world.
and one’s place in it. This view is consistent with Freire’s (1970) problem-posing approach to learning, in which learners open themselves to an exploration of possible meanings in interpreting a text. It also agrees with Berthoff’s (1981) theory of composition, in which thinking, composing, and acting are simultaneous processes for structuring experience wherein ambiguities play a vital role.

Accordingly, we argue that learning and narrativizing may be facilitated by figurative rather than literal knowledge products. Ambiguous and implicit forms of knowledge can encourage active learner participation in the interpretative process and enhance learning through greater engagement. Even though figurative knowledge products may result in inaccurate learning, this risk is more than compensated for by greater interest, motivation, and attention on the part of the learner. A traditional view of knowledge as object, on the other hand, implies that knowledge is objective, universal, and complete (Tenkasi & Mohrman, 1995). In this “banking” view, knowledge products are like bricks, and learning is a process for constructing knowledge by stacking the bricks in particular ways in the mind of the learner (Freire, 1970). Others have labeled the traditional view a “conduit metaphor,” in which one assumes that knowledge communication can be error-free, as if the knowledge had been transferred through a conduit (Reddy, 1979). According to such an approach, knowledge products can be either concrete or abstract, as noted above, but, most importantly they minimize ambiguity and subjectivity—they express a readily apparent message.

Empirical support for the power of ambiguous over manifest knowledge objects comes from an evaluative study of an innovative experiment in accounting called Project Discovery (Stone & Shelley, 1997). One group of undergraduate accounting students was exposed to traditional accounting education stressing objectified (declarative) knowledge. Another group of students participated in an instructional program based on ideas of cognitive development that were consistent with those of Bruner. The latter focused on complex, ill-structured, ambiguous problems and cases and on using active learning approaches to developing intellectual skills as well as a positive social environment for learning and innovation. Within the design limitation of the study, the authors concluded that “Project Discovery graduates were no worse than traditional program graduates in their traditional accounting declarative knowledge, and had better problem-solving skills and attitudes toward accounting instruction compared with traditional program graduates” (Stone & Shelley, 1997: 36).

What, then, is the import of Bruner’s and other interpretivists’ work for managers’ use of knowledge? First, let us compare figurative knowledge with the previous categorizations of literal knowledge objects, either abstract or concrete. Figure 1 shows how the dimensions of abstract/concrete and figurative/literal knowledge give rise to interpretive, general, and particular knowledge representations. Concrete knowledge representations provide particularities of context, and abstract representations provide generalities. For example, a description of child-parent interactions and conflicts in a particular family would be concrete knowledge, whereas a description of Freud’s Oedipus complex theory about the libidinal feelings of a child toward the opposite-sex parent and hostile feelings toward the same-sex parent would be abstract knowledge. Interpretive knowledge requires an interpretive activity of meaning creation. In order to allow for interpretation, figurative knowledge is often represented in a narrative or a story that is both concrete and abstract—concrete from the presence of specific actors and actions, and abstract with respect to the larger significance of the action. The Greek myth of Oedipus, the narrative whose central figure is the namesake for Freud’s theory, is an example of figurative knowledge. Thus, interpretive knowledge representations simultaneously capture the power of both abstract and concrete representations. This power should allow managers to solve complex problems more creatively. Hence, we propose that:

**Hypothesis 2.** The levels of managerial decision-making outcomes on complex tasks will be higher after managers’ exposure to figurative knowledge objects than after their exposure to literal knowledge objects.

**Applying Knowledge Representations to Tasks**

We rely on the notion of schemata as the mechanisms by which the experience of a particular kind of knowledge representation affects performance on a subsequent managerial task. A schema can be seen as a theory about the representation of knowledge and how that representation facilitates the use of the knowledge (Rumelhart & Ortony, 1977), and it can be understood to be a knowledge structure (Brewer & Nakamura, 1984) or an interpretive process (D’Andrade, 1992). Much psychological research has shown that individuals have
available a repertoire of schemata upon which they can draw to interpret events (Rumelhart, 1984). A change in schema is a change of perspective and affects attention and recall (Anderson & Pritchert, 1978). Reading a piece of literature can place people in a particular perspective and selectively activate schemata. When individuals read a story, they have the ability to abstract a lesson from the story and apply that schema to a different situation (Gick & Holyoak, 1983).

The impact of a schema is far reaching. As Brewer and Nakamura noted, “Schemas have been shown to affect memory through attention processes, through acting as a framework to preserve episodic information, through integration of old and new knowledge, through a retrieval process, and through an output editing process” (1984: 152). In a given setting, at a given time, a schema may be activated into working memory, with other schemata receding into the background (McClelland & Rumelhart, 1981). Activation can occur through individuals being exposed to a particular set of stimuli, a process that produces cognitive priming (cf. Berkowitz & Rogers, 1986). Most interestingly, priming can activate a schema that influences subsequent performance even without the person being directed to apply the prior learning, a process labeled “implicit memory” (Roediger & McDermott, 1993). For example, an initial reading that is out of the context of a subsequent reading can produce a memory effect. Implicit memory can involve either categorizing or conceptual tasks; it occurs in immediate temporal sequencing and when the time between priming and performance is on the order of days (cf. Rappold & Hashtroudi, 1991). Priming for implicit memory effects is heightened when individuals are engaged in generating and elaborating materials rather than simply reading them (Roediger & McDermott, 1993).

Through a temporal linking, then, priming of schemata can influence attention and subsequent schema activation (Anderson, 1996; McClelland & Rumelhart, 1985). For instance, a recent study reported that music education helps some people organize the way that they think and work when engaged in mathematics and spatial reasoning (Black, 1997), and a substantial set of studies has established that watching particular types of popular music videos can affect later social judgments (Hansen, 1995). Research on reading has found that particular characteristics of texts, such as genre (story versus expository passage versus poem) and use of personification, influence grade school students’ mental imagery and interest (Long, Winograd, & Bridge, 1989) when topic is held constant. Similarly, in two different readings on one topic, such characteristics as authors’ provision of unexpected information and use of comparisons and analogies differentially stimulated undergraduate students’ interest (Wade, Buxton, & Kelly, 1999).

Following these lines, we can anticipate that priming, in the form of working with a particular knowledge representation, can activate a schema that influences the subsequent interpretation of a managerial decision task.

Priming provided us with a means to investigate empirically the effects of various types of knowledge representations on managerial decision making. In this research, groups of managers were primed by reading differing knowledge representations, and their performance on a subsequent decision-making task was evaluated. As is depicted in Figure 2, the cognitive and learning theories reviewed above led to our expectation that interpretive knowledge representations would be associated with high performance and particular knowledge representations with lower performance. Further, in accord with Hypothesis 1, exposure to general knowledge representations would result in better decision outcomes than exposure to particular knowledge. Hypothesis 2 proposes that exposure to interpretive knowledge will yield higher decision outcomes than exposure to either general or particular representations. Taken together, Hypotheses 1 and 2 are reflected in the hypothesized line in Figure 2.

METHODS

Sample Selection and Experimental Assignment

We used a randomized allocation procedure for our three-group, two-phase (that is, before and after) experimental design. A before and after design was thought to be appropriate because it controlled for individual factors, including learning styles, educational background, and ability, allowing us to

FIGURE 2

Hypothesized Relationship between Knowledge Representation and Decision Outcomes

<table>
<thead>
<tr>
<th>Knowledge Representations</th>
<th>Interpretive</th>
<th>General</th>
<th>Particular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Outcomes</td>
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<td></td>
<td></td>
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</table>
focus on individual change due to exposure to treatment (that is, different knowledge representations). We sought the cooperation of participants enrolled in graduate-level management degree programs for executives at a major private university by asking them to complete consent forms. The enrollees in this part-time program are active managers who either have master in business administration (M.B.A.) degrees or are working toward them. Of 82 potential participants, 53 agreed to participate, a 65 percent consent rate. In the before phase of the research, we asked each individual to read the decision task, make a decision, and respond to questions; the decision task and measures are described below. To reduce interviewer bias, we collected all materials and responses using a computer program specially designed for this study. The questions were presented interactively to the respondents, who clicked the appropriate box on the computer screen. We informed respondents about a follow-up study but not about its nature, in order to reduce interactive testing effects. In addition, in order to reduce premeasurement and testing effects, responses were collected anonymously. Each person selected an eight-digit code that was used to match the before and after responses but preserved his or her identity.

Three weeks later, respondents were asked to complete the second part of the experiment. Each was randomly assigned to one of three treatment groups—interpretive, general, or particular (see below). They were blind to the assignment procedure. All respondents received identical-looking computer disks and booklets. Each booklet, however, contained only one treatment. After they had read the materials in the booklet, respondents were asked to write a brief note to themselves on the computer, saying (1) what was going on in the text they had just read, (2) what were the key ideas it contained, and (3) what lessons could be learned from it. This open-ended instruction was intended to engage each respondent in processing the treatment material with the activated schema, thereby reinforcing the priming effect of the treatments’ knowledge representations. Following exposure to their respective treatments, respondents were asked to complete a decision task. They were told that some of them might receive the same task as earlier; in actuality, they all received the identical decision task. We reasoned that this “explanation” combined with anonymity would likely depress demand artifact tendencies that come from the desire to appear consistent when identity is transparent. Finally, we asked the respondents to approach the decision task from a fresh perspective but did not explicitly say they should use the specific knowledge representation that they had read. All data were collected on the computer disks provided. Although the content of the treatments did not relate directly to the decision task case scenario, we expected that the different knowledge representations would cognitively prime the respondents differently and that the priming would have spillover effects on the somewhat independent decision task. In this sense, our experiment provides a conservative test of the underlying hypotheses.

Of the 53 respondents who provided complete data for the first part of the experiment, 40 completed the second phase (a 75 percent completion rate). However, only 34 responses were usable and complete, so the final usable proportion was 65 percent. Table 1 profiles the respondents whose answers were usable. Sample attrition of this magnitude is common in longitudinal research. The small sample required that we balance Type I and Type II error rates in statistical testing. At a traditional .05 percent confidence level, the power is only .20 (Cohen, 1977), given an average cell size of 12. Stevens (1996: 172) recommended a more “lenient” alpha level as a way to improve power. We chose an 80 percent confidence level to ensure at least a power of .50. Thus, we set the Type I error rate at 20 percent.

**Treatment Materials**

Because the distinct forms of knowledge representations tested here had not previously been empirically examined in the management literature, all treatment materials were developed specifically for this study. We designed the treatments to involve relatively short (half page or less) texts that describe a managerially relevant situation and the reaction of involved actors that was either literally or figuratively guided by one or more theoretical principles (the knowledge content). Selection of treatment themes was guided by our knowledge of (1) a figurative statement relevant to a managerial issue and (2) a corresponding theoretical statement within the managerial or social sciences and (3) an actual or plausible concrete case illustration in a business setting. Several desiderata guided our development and testing of treatment materials, including theoretical consistency, readability, balance across representations, and external validity. To achieve theoretical consistency, we presented the knowledge content in the texts in accord with the conceptualizations of interpretive, general, and particular knowledge representations. As such, the interpretive narratives were expected to present the knowledge more figuratively than general and par-
TABLE 1
Demographic Profile of Respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage of Final Respondents</th>
</tr>
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<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>25–35 years</td>
<td>26.80</td>
</tr>
<tr>
<td>36–45</td>
<td>48.20</td>
</tr>
<tr>
<td>46–55</td>
<td>19.60</td>
</tr>
<tr>
<td>&gt; 56</td>
<td>5.40</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>88.50</td>
</tr>
<tr>
<td>Female</td>
<td>13.50</td>
</tr>
<tr>
<td>Managerial experience</td>
<td></td>
</tr>
<tr>
<td>&lt; 1 year</td>
<td>1.80</td>
</tr>
<tr>
<td>2–3</td>
<td>5.30</td>
</tr>
<tr>
<td>4–5</td>
<td>14.00</td>
</tr>
<tr>
<td>6–7</td>
<td>7.00</td>
</tr>
<tr>
<td>&gt; 7</td>
<td>71.90</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>African American</td>
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<tr>
<td>Asian</td>
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<tr>
<td>Hispanic/Latino</td>
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</tr>
<tr>
<td>Other</td>
<td>3.60</td>
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<tr>
<td>Educational status</td>
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<td>High school</td>
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<td>Undergraduate</td>
<td>44.40</td>
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<td>Graduate</td>
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<td>Doctorate</td>
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<td>Income</td>
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<tr>
<td>$50,000–99,999</td>
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<td>$100,000–124,999</td>
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<td>$125,000–149,999</td>
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<td>10.70</td>
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<tr>
<td>Primary business</td>
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<tr>
<td>Manufacturing</td>
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<td>Sales and marketing</td>
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<tr>
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<td>Philanthropy</td>
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<td>Sales turnover*</td>
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<td>&lt; 1,000</td>
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<tr>
<td>1,000–10,000</td>
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<tr>
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</tr>
</tbody>
</table>

* Annual sales in thousands of dollars.

no longer than 45–60 minutes, we limited the texts to no more than 300 words (about half a page). To achieve balance, the texts were made structurally invariant across the three treatment groups, differing only in knowledge representation. We sought to ensure that each had about the same number of words and perceived complexity. In addition, all had a common theme (see below). Finally, to achieve external validity, we used themes and content from the academic and professional management literatures.

We developed six treatments, two for each form of knowledge representation. The use of multiple treatments was based on Cick and Holyoak’s (1983) finding that multiple analogies stimulate schema activation and on Cross’s (1999) suggestion, which was based on a study by Thornbyke and Hayes-Roth (1979), that schemata can be strengthened by “repeated activation.” Exposure to two forms of each treatment involving a given knowledge representation was thus thought to strengthen activation and differential priming. We reasoned that this reinforcement was particularly useful because our experimental design was conservative, with little direct overlap between treatment content and subsequent decision task case scenario. Each set of treatments had a basic theme. One was the relationship of technology to human and social endeavors, and the other was group cohesion and the effect of discovering the inauthenticity of a central member. Appendix A gives the texts of the scenarios. Table 2 contains a description of and rationale for each treatment.

Manipulation Checks

Several procedures were used to test the treatments. First, to achieve face validity, we selected and refined the interpretive treatments to ensure that they represented knowledge figuratively by containing both abstract and concrete ideas. In contrast, the particular treatments presented highly contextualized ideas in a literal manner with higher concreteness. The general treatments emphasized abstract knowledge that was less contextualized but presented the ideas literally. Second, we asked five judges to evaluate the three treatments along the figurative/literal dimension by rating each treatment on three scales. For instance, the judges rated whether the knowledge content of the treatment was “expressly identified for all readers” or “left to the interpretation of the reader” on a seven-point scale. The mean judgments for the interpretive, general, and particular treatments were 4.4, 4.4, and 5.0, respectively; higher numbers indicate more literal knowledge. The ratings suggest
<table>
<thead>
<tr>
<th>Theme</th>
<th>Type of Knowledge Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interrelationships of technology and human behavior</td>
<td>Technology and the self. This parable was published in Dirk Hanson's book The New Alchemists (1982). The case is used by the author as a counterpoint to his argument, indicating that most of &quot;us,&quot; unlike the gardener near the Han River basin, want to take advantage of the benefits of technology. Technology and social change. This material is adapted from ideas discussed in the chapter, &quot;The Shape of Truth to Come: New Media and Knowledge,&quot; by Chris Carlsson, in James Brock's and Iain A. Boal's Resisting the Virtual Life: The Culture and Politics of Information (1995). Technology and work. This treatment particularizes the finding from Jeffrey Arthur's 1994 study, &quot;Effects of Human Resource Systems on Manufacturing Performance and Turnover,&quot; that high-commitment managerial approaches are associated with higher productivity. In keeping with the ideas in David Whetten's and Kim Cameron's Developing Management Skills (1990) and Ed Lawler's The Ultimate Advantage: Creating the High-Involvement Organization (1992), the need for time to properly coach and counsel subordinates is portrayed. Leadership and corporate morale. This story seeks to particularize the general issues presented in the interpretive and general forms of knowledge representation pertaining to this set of materials. In specific terms, the story was based upon a case study, &quot;Crisis in Conscience at Quasar,&quot; by John Fendrock (1968a), in the Harvard Business Review. The case was widely disseminated and was the focus of a reader survey. The survey, which garnered over 3,660 responses about the ethical issues involved, was also published in the Harvard Business Review as &quot;Sequel to Quasar Stellar&quot; (Fendrock, 1968b).</td>
</tr>
<tr>
<td>2. Group cohesion and violation of authenticity</td>
<td>Reactions to communications on the Net. This story is something of a legend among people participating in the virtual world, and it has a number of variations. The specific material used for this study was adapted from The War of Desir and Technology at the Close of the Mechanical Age, by Allan Garros and Rosario Stone (1995). The case is also discussed at length and put into a psychological context in Life on the Screen: Identity in the Age of the Internet (1995), by Sherry Turkle. Member relationships and group cohesion. This statement is based on a quotation from Anselm Strauss's G. H. Mead on Social Psychology (1960). The quote was presented in A. R. Stone's theoretical discussion of issues of identity and the self in The War of Desire and Technology (983: 87). This discussion closely follows upon and was intended to establish a theoretical context for the story presented as &quot;Reactions to Misrepresentation on the Net&quot; also drawn from Stone's book.</td>
</tr>
</tbody>
</table>

that, although the particular treatments were clearly more literal, it was hard for the judges to discriminate between interpretive and general treatments. This difficulty occurs in part because, as abstract knowledge, general treatments tend to be perceived as implicit and relatively less literal material. However, as is evident from the Appendix, the interpretive treatment is presented differently from the general treatment. Third, in order to supplement these judgments, we obtained self-report measures from participants of abstract (two-item scale, with high numbers indicating more abstract knowledge) and concrete (two-item scale, with high numbers indicating more concrete knowledge) dimensions. The mean values obtained for the interpretive, general, and particular treatments were 3.90, 4.90, and 4.0 on the abstract dimension and 4.6, 3.6, and 4.42 on the concrete dimension. This pattern suggests that the general treatments were perceived as significantly more abstract than either the interpretive or particular treatments ($F = 3.28, p < .05$) and that the particular treatments were perceived as significantly more concrete than the general treatments ($F =$
2.34, \( p < .10 \). However, the particular and interpretive treatments were not significantly different on concreteness. We recognize that these treatments could be further refined to increase the contrast among knowledge representations. For our initial study, the current treatments appeared reasonable, as greater contrast would only serve to make our experiment conservative. Thus, if meaningful results were obtained in our initial study, they would be highly encouraging for future research.

**Decision Task Case Scenario**

The decision task involved a case study followed by several questions designed to capture a respondent’s decision-making rationale and collect our dependent variables. In choosing the case scenario, we were guided by three criteria: (1) specificity, whereby a particular problem requiring managerial decision making had to be presented; (2) ecological validity, whereby the case study had to be perceived as realistic and valid, and (3) empirical viability, whereby the case scenario had to allow for variability in decision making across participants to facilitate empirical testing of its determinants. After a careful review of the literature, we chose the case scenario developed recently by Sparks and Hunt (1998). Appendix B gives this scenario, which involves a problem facing an analyst named Bob Smith, an employee of L&H Marketing Research Company. Bob is required to complete a report for an important client interested in introducing a new line of products. The case raises several issues that are typical of contemporary client-supplier relationships, including financial (budgeting), technical (research design and sampling), relational (dealing with vendors, maintaining long-term relationships), and implementation (executing projects, dealing with uncertainties) issues. Moreover, Sparks and Hunt (1998) embedded three ethical issues within their case scenario that involved research integrity, fair treatment of vendors, and research confidentiality. Thus, the case required respondents to develop a managerial decision involving multiple, conflicting factors. Sparks and Hunt provided considerable evidence regarding the ecological validity of the case scenario. In particular, they reported evidence from (1) four pretests with different samples (students, faculty members, and practitioners), (2) a pilot test with 125 marketing research practitioners who were members of the American Marketing Association, (3) a follow-up test with an independent sample of 188 marketing research practitioners, and (4) tests with two separate samples of marketing students (\( n's = 142 \) and 178). Because Sparks and Hunt revised and refined the case using the pretest and pilot study inputs, the final version has a high degree of relevance and validity for the target population. Finally, their empirical results indicate that the case is empirically viable, as it captures variability across participants. Although our focus is more comprehensive than that of Sparks and Hunt, whose intention was to capture managers’ ethical sensitivity (see the measures, below), their data indicate the empirical viability of the case. Using a weighted measure of ethical sensitivity, Sparks and Hunt reported mean values of 2.7 and 7.7 for students and practitioners, with standard deviations of 3.4 and 5.8, respectively. This suggests that the case scenario is sensitive to variability in the respective samples.

**Measures**

Both quantitative and qualitative measures were collected as a part of the experiment. Each quantitative measure involved multiple self-report items. We collected qualitative data using open-ended questions and had the data analyzed by multiple coders. (The analytical strategy for both qualitative and quantitative data is discussed later in the Methods section).

In all, we used three open-ended questions to specify the managerial decision arrived at by each respondent. First, the respondents were asked to identify the critical issues in the decision situation and to rate their importance on a ten-point scale ranging from 1, “somewhat important,” to 10, “extremely important.” They could list as many issues as they wanted, although ten lines were provided. Second, they developed their decision recommendations for Bob Smith following these directions:

Now, imagine you are the “outsider” that Bob turns to for guidance in dealing with his dilemmas. Indicate all of the steps that you feel Bob should consider and how you would advise him in this situation. Be sure to explain your reasoning or rationale for your advice as fully as possible.

Third, they developed a decision recommendations for the company, following these directions:

Also, continuing your role as an outsider, please tell us any additional lessons the L&H Company could learn from this case to avoid similar situations in the future. What specific actions should the L&H Company take today because of these lessons and why?

We reasoned that using the open-ended format and asking participants to develop decision recommendations for both the individual involved and the company would provide rich data for assessing the different aspects of decision outcomes. In the
absence of an agreed-upon standard for judging a correct answer to the decision task, as exists for exercises such as Desert Survival (Lafferty & Pond, 1987) and Lost at Sea (Nomiroff & Fasmore, 1975), we evaluated decision outcomes on multiple dimensions. We reasoned that it would be useful to (1) focus on multiple dimensions of decision outcomes, (2) examine the influence of treatments on these multiple decision outcomes, and (3) interpret the differential effects in light of the treatments. We describe the procedures followed to obtain these multiple dimensions more fully under Analysis Strategy. Here, we merely outline our approach and highlight measures: First, we coded and categorized each respondent’s open-ended data to identify the idea units. Then, we evaluated decision outcomes by analyzing the idea units for appropriateness, breadth, and depth. A judgment of appropriateness was made by screening idea units against a list of decision elements that would constitute a meaningful answer to the case. Breadth was evaluated on the basis of the number of major categories included in a respondent’s task response. Depth was measured as the maximum number of appropriate idea units in a major category. We adopted these measures of breadth and depth from Boland, Greenberg, Park, and Han’s (1990) technique for mapping responses in an ill-structured decision task.

Several self-report measures of decision outcomes were also obtained: decision satisfaction, decision diversity, decision richness, and decision task realism. The decision satisfaction measure asked the respondents to rate their feelings about their decisions on three 7-point semantic differentials with endpoint pairs of “very satisfied/not satisfied at all,” “very confident/not confident at all,” and “very pleased/not pleased at all.” The Cronbach alpha reliability of this measure was .88. The decision diversity measure was intended to capture the diversity of ideas represented in respondents’ decision recommendations. In all, three 7-point semantic differentials were used, with the endpoint pairs “many concepts/few concepts,” “multiple perspectives/few focused perspectives,” and “complex ideas/simple ideas” (α = .77). The measure of decision richness required the respondents to provide a self-evaluation of the decision recommendation they had developed using three 7-point semantic differential scales. They were asked to evaluate if, in developing their decision recommendations, they tended to worry about “interrelated issues” or “unrelated issues,” to consider “trade-offs among different issues” or to seek the “best solution for each issue,” and to take into account “consequences of separate issues.” We reasoned that, within the limitations of a self-report measure, a rich decision would be characterized by interrelated issues that required trade-offs and consideration of the interational consequences (α = .75).

Finally, the decision task realism measure assessed if the respondents saw the decision task as realistic. The measure involved three 7-point scales anchored by “realistic/contrived,” “believable/unbelievable,” and “plausible/impossible” (α = .95).

Control Variables

Because decision making is subject to individual variability, we included several control variables to enhance the power of the experiment. In view of past research, we considered two personality variables—tolerance for ambiguity and need for cognition—and three demographic variables: education, age, and experience (see Table 1). The need for cognition measure assessed the tendency for individuals to engage in and enjoy thinking and is drawn from a 34-item scale developed by Cacioppo and Petty (1982). We employed a short form of this measure with 16 items (α = .85). The tolerance of ambiguity measure was based on the work of Webster and Kruglanski (1994), who defined the construct as the desire for a firm answer to a question and an aversion toward ambiguity. This measure involved four items (1, “strongly disagree,” to 5, “strongly agree”; α = .69). Past research has shown that it is useful to control for personality and demographic variables in order to enhance the internal validity of experiments (Stone & Shelley, 1997).

Analysis Strategy

We followed different analytical procedures for the qualitative and quantitative data to conform to acceptable scientific standards (Pedhazur & Schmelkin, 1991; Smith, Feld, & Franz, 1992). The open-ended qualitative data from the before and after decision tasks were subjected to a thematic analysis in which the idea units contained in the written recommendations were identified and categorized through a multistage, multicoder process. First, one of the authors randomized the responses, assigning each a numeric code that could not be traced to the treatment condition or phase of the response. Second, two different authors jointly read 16 of the responses and made an initial inventory of the idea units they contained. They worked phrase-by-phrase, sentence-by-sentence, to depict the essential ideas contained in each response. Examples of idea units include: “Determine reasons for data inadequacies”; “Bob should consider leav-
ing the company”; and “Set project management guidelines.” Third, the two authors then worked separately to read and identify idea units in the remaining responses. Thereafter, they met to reconcile their lists and to organize them in clusters of similar topics.

Fourth, the list of idea units and complexity factors was used in a training session with two doctoral students who were experienced in thematic coding. In the presence of the two authors, the coders used the list to separately code and then jointly discuss eight responses that were not being used in the data analysis. After this training session and a discussion with the coders, the list was further refined and organized by topic area. At this point, one of the authors developed a list of eight key issues embedded in the case that, if addressed by respondents, would contribute to an appropriate decision. Another author then reviewed the eight issues, suggesting changes. Thereafter, both coded six responses to assure that respondents’ idea units did map onto the eight key issues and, on the basis of further changes, a final list was developed. This final list included required communication between Bob and his superiors on (1) expectations, (2) weaknesses in the study, (3) causes for incomplete surveys, and (4) the upcoming client meeting, as well as (5) company-wide issues of interpersonal manipulation, (6) inadequate planning and control of projects, and (7) unethical conduct. The final issue was (8) recognition of Bob’s need to resolve tensions between company and personal values. We then screened the idea units using those eight key issues as a test for appropriateness. Three idea units could not be matched to one of these categories and were eliminated. The final coding instrument contained 50 items in four major categories: work process, professionalism in the organization, individual and personal concerns, and potential actions. Appendix C gives the coding categories and the corresponding idea units.

Fifth, each coder independently coded a set of numerically ordered responses. We calculated their percentage of agreement by dividing the total number of matched idea units by the total idea units coded by both coders. Agreement rates were 75, 72, 82, and 68 percent for the four major categories (work process, professionalism, concerns, and actions). Coders met to compare their codings and discuss discrepancies until they came to agreement. Their final consensual codings were the data we used for our qualitative analysis.

The quantitative data were analyzed with analysis of covariance. The dependent variable was the difference between the before and after measurements for each variable. Using a difference score controls for individual variability and allows a more reasonable and conservative test of a treatment effect (Pedhazur & Schmelkin, 1991). Four dependent variables were considered separately, including ethical sensitivity, decision diversity, decision richness, and decision satisfaction. The ethical sensitivity variable was defined as per Sparks and Hunt (1988) and required developing a weighted composite score derived from the importance weights given to ethical issues. Recall that there were three ethical issues embedded in the design. As noted under Measures, respondents were asked to list the issues they considered important in the decision case scenario presented. The ethical sensitivity score is a product of the number of ethical issues listed (0 to 3) and their corresponding importance weights (1 to 10).

We used both multivariate and univariate procedures with covariates to estimate the effect of treatments. Initially, a multivariate analysis of variance (MANOVA) with all of the four dependent variables taken together, knowledge representation as the independent treatment, and five covariates (age, education, experience, tolerance of ambiguity, and need for cognition) provided control over “experiment-wise” Type I error. The significant MANOVA was followed by univariate tests with individual dependent variables and the covariates retained as control variables. To clearly display the treatment effects, we relied on graphical procedures supported by statistical significance data.

RESULTS

Results are from the analyses of both qualitative and quantitative data. Recall that we used a confidence level of 80 percent for our test of statistical significance in order to balance the Type I and Type II error rates. Also, we initially factor-analyzed all the measures to ensure their convergent and discriminant validity. In most cases, measures loaded cleanly on their respective factors with significant loadings (> .60) and marginal cross-loadings (< .20). In two cases, the decision realism and tolerance for ambiguity measures, one or more offending items were identified. Upon their deletion, clean factor loadings were obtained. Together with the reliability data, the factor analysis suggested the variables were reasonable for the purposes of examining the effect of knowledge representations.

Tests of Hypotheses: Qualitative Data

As the list of idea units in Table 2 indicates, the decision task produced a wide range of responses.
Before analyzing the frequency counts in each of the four major categories, we adjusted the counts to control for individual and group variability. This adjustment required three steps: (1) normalize the before and after counts to account for different group sizes (14, 10, and 10 for the interpretive, general, and particular groups, respectively), (2) compute a chi-square statistic for testing the null hypothesis of no differences across treatment groups by using the normalized after counts as the observed frequency and the before counts as the expected frequency, and (3) compute difference scores between before and after counts for graphically displaying the treatment effect. In addition, we added a constant (13) to all scores to obtain round positive numbers. Readers will note that adding a constant does not influence the pattern of results, and basing a chi-square on actual normalized counts ensures that the statistic is unaffected by adding constants. We followed the preceding procedures for the breadth and depth measures as well. Finally, because we were interested in hypothesized focused comparisons, we also computed chi-square statistics associated with focused contrasts. Table 3 presents results, and Figure 3 displays the corresponding graphs.

An examination of Table 3 reveals that the potential actions category yielded significant differences, with the particular representations producing the highest number of idea units relating to action responses, followed by the interpretive and then the general categories (overall $\chi^2 = 8.85, p < .05$). Specifically, the a priori contrast between interpretive and general is significant, indicating that the former treatment produced more potential actions than the latter treatment ($\chi^2 = 2.09, p < .20$). Likewise, the a priori contrast for general versus particular is also significant ($\chi^2 = 8.75, p < .01$); however, the effect is in the direction opposite to our hypothesis. The particular treatment produced more potential actions than the general treatment. In addition, a borderline effect was obtained for the depth measure. The a priori contrasts for interpretive versus general in Figure 3 reveal that the interpretive treatment led to greater depth than the general treatment, in accord with our hypothesis ($\chi^2 = 1.67, p < .25$). Although the differences for the other decision outcomes were not significant, some common patterns can be discerned. Specifically, the general pattern across all the major categories was for the number of idea units following the interpretive treatments to exceed or equal those following the general treatments. With the sole exception of the professionalism responses, the particular treatments similarly produced more idea units than did the general treatments.

Hypothesis 1, which posits better outcomes for general than for particular knowledge representations, received support only on the professionalism outcome measure. All the other results contradict the hypothesis. Hypothesis 2, positing higher outcomes for interpretive than for general and particular knowledge representations, received mixed support. It is supported by the pattern for the professionalism responses and with regard to the superiority of interpretive over general representations in the other statistically significant cases. However, Hypothesis 2 is not supported for the comparison of interpretive to particular representations in any outcome measure except for professionalism.

Test of Hypotheses: Quantitative Data

The MANOVA for the four self-report measures produced a Wilks’s lambda of .30 ($F = 3.66, p < .01$), a statistically significant effect. We thus conducted individual analyses of covariance (ANCOVAs). Table 4 and Figure 4 summarize the results obtained. Two of the four decision variables—ethical sensitivity and satisfaction—showed significant differences across treatments ($F$s = 7.67 and 4.54, respectively; $p < .05$). For the decision satisfaction variable, both a priori contrasts produced significant results, with the interpretive treatment producing higher scores than the general treatment ($\chi^2 = 2.42, p < .20$), and the general treatment yielding higher scores than the particular treatment ($\chi^2 = 2.41, p < .20$). These findings accord with the hypothesized pattern of overall results depicted in Figure 2 and support both Hypothesis 1 and Hypothesis 2. Ethical sensitivity also produced significant results in a priori contrasts, but the pattern of findings is somewhat different. In accord with Hypothesis 1, the ethical sensitivity scores for the interpretive treatment exceeded those for the general treatment ($\chi^2 = 14.57, p < .01$). Likewise, the a priori contrast for general versus particular is also significant ($\chi^2 = 6.53, p < .05$); however, the results contradict Hypothesis 2, with the particular treatment producing higher scores than the general treatment. Finally, the a priori contrast for interpretive versus general for the diversity measure also produced a significant effect ($\chi^2 = 2.11, p < .20$). The results contradict Hypothesis 1, as the interpretive treatment produced lower scores than the general treatment. All three representations produced nearly equal decision richness values, yielding nonsignificant effects.

Alternative Explanations

Although we have hypothesized that the effect of knowledge representations occurs because of dif-
FIGURE 3
Results Obtained from the Analysis of Qualitative Data for the Influence of Knowledge Representation

*All numbers are adjusted observed frequencies.

TABLE 3
Influence of Knowledge Representations on Decision Outcomes: Analysis of Qualitative Data

<table>
<thead>
<tr>
<th>Decision Outcome Categories</th>
<th>Knowledge Representation</th>
<th>Interpretive</th>
<th>General</th>
<th>Particular</th>
<th>$\chi^2$</th>
<th>$p$</th>
<th>Interpretive vs. General</th>
<th>General vs. Particular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work process</td>
<td></td>
<td>10</td>
<td>4</td>
<td>11</td>
<td>1.34</td>
<td>0.51</td>
<td>1.12 (0.29)</td>
<td>1.02 (0.31)</td>
</tr>
<tr>
<td>Professionalism in the organization</td>
<td></td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>1.51</td>
<td>0.47</td>
<td>0.97 (0.32)</td>
<td>0.60 (0.44)</td>
</tr>
<tr>
<td>Individual and personal concerns</td>
<td></td>
<td>14</td>
<td>12</td>
<td>16</td>
<td>0.60</td>
<td>0.67</td>
<td>0.40 (0.53)</td>
<td>0.80 (0.37)</td>
</tr>
<tr>
<td>Potential actions</td>
<td></td>
<td>11</td>
<td>6</td>
<td>19</td>
<td>8.85</td>
<td>0.01</td>
<td>2.09 (0.15)</td>
<td>6.75 (0.00)</td>
</tr>
<tr>
<td>Depth</td>
<td></td>
<td>10</td>
<td>1</td>
<td>9</td>
<td>1.78</td>
<td>0.41</td>
<td>1.67 (0.20)</td>
<td>1.18 (0.28)</td>
</tr>
<tr>
<td>Breadth</td>
<td></td>
<td>8</td>
<td>8</td>
<td>14</td>
<td>0.87</td>
<td>0.65</td>
<td>0.28 (0.60)</td>
<td>0.75 (0.39)</td>
</tr>
</tbody>
</table>

*Numbers in each category are based on difference scores for normalized before and after counts. A constant was added to obtain round positive numbers.
TABLE 4
Influence of Knowledge Representations on Decision Outcomes: Analysis of Quantitative Data

<table>
<thead>
<tr>
<th>Knowledge Representation*</th>
<th>Interpretive</th>
<th>General</th>
<th>Particular</th>
<th>F</th>
<th>p</th>
<th>Interpretive vs. General</th>
<th>General vs. Particular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical sensitivity</td>
<td>0.59</td>
<td>-0.94</td>
<td>0.11</td>
<td>7.67</td>
<td>0.00</td>
<td>14.57 (0.00)</td>
<td>6.53 (0.02)</td>
</tr>
<tr>
<td>Diversity</td>
<td>-0.45</td>
<td>0.33</td>
<td>0.31</td>
<td>1.31</td>
<td>0.29</td>
<td>2.11 (0.15)</td>
<td>0.00 (0.96)</td>
</tr>
<tr>
<td>Richness</td>
<td>0.17</td>
<td>-0.01</td>
<td>-0.22</td>
<td>0.24</td>
<td>0.79</td>
<td>0.11 (0.74)</td>
<td>0.14 (0.71)</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>0.48</td>
<td>-0.06</td>
<td>-0.62</td>
<td>4.54</td>
<td>0.02</td>
<td>2.42 (0.12)</td>
<td>2.41 (0.13)</td>
</tr>
</tbody>
</table>

*Numbers represent marginal means after covariates were controlled for.

FIGURE 4
Results Obtained from the Analysis of Quantitative Data for the Influence of Knowledge Representation

Differences in priming of schemata, an alternative explanation is a writing mimicry effect. That is, participants simply mimicked the representational style of treatments in responding to the decision task. In this sense, the treatment materials may have been processed superficially, making the priming effect unlikely. In planning to test this alternative hypothesis, we reasoned that such a mimicry effect would likely be evident in the styles respondents used in their decision task analyses. If style varied systematically across the three treatments, this alternative hypothesis might have some merit. 2

We tested for such variation as follows: First, we mixed up the respondents' decision task reports, giving them unique identifiers that were unrelated to treatment assignment. We asked the two judges, who were blind to the treatments, to review each... 2 We thank an anonymous reviewer for outlining this test.
report and evaluate it on writing style only, paying little attention to content. Four items scored on a five-point scale assessed the style in terms of implicit, abstract, and concrete dimensions. These measures corresponded to the self-report measures used to assess the treatment tasks. The interrater reliability estimates before discussion between judges were .94, .88, and .90 for the implicit, abstract, and concrete dimensions, respectively. The judges then discussed and resolved discrepancies, and their consensus judgments were used for analysis. Like our other analysis, the entire process was implemented for both the before and after data, and the two scores were subtracted and subjected to analysis of variance.

The ANOVA results indicated that none of the writing style dimensions varied significantly across the three treatment groups (Fs = .11–.92, p > .4). This lack of significance suggests that mimicry is not a tenable explanation for the pattern of results obtained and reported.

**DISCUSSION**

This study was designed as an initial experiment to study the influence of disparate knowledge representations on outcomes from an unrelated managerial decision-making task. Although past research has consistently emphasized the significance of understanding this knowledge transfer process, little empirical research actually exists. We consider our study an initial step toward filling this gap in the literature. As an initial study, our work has several limitations that should be considered in evaluating its contribution. First, our results are based on a non-random sample of students enrolled in executive programs at a midwestern university. Although student samples have been considered appropriate where the focus is on internal validity, we recognize the trade-offs involved and the threats to the generalizability of our findings. Our intention to focus mainly on the students enrolled in executive programs was likely useful in selecting a sample relevant to the purposes of this study. Second, and as a result of our focus on executive programs, our sample was relatively small. The small sample, however, is likely to have reduced power, and it renders our experimental results conservative at best. Although we attempted to balance the error rates by a judicious choice of confidence level, we recognize that we might have failed to detect other significant effects. Third, although we put significant effort into developing different knowledge representations that were consistent with our theoretical framework and were drawn from published sources, we recognize that more work is needed to further refine and develop such materials for future research. Developing conceptually and empirically valid treatments remains a challenging task not unlike that required in developing psychometrically sound scales. Fourth, we utilized a single decision task and cannot know if the results obtained were affected by the idiosyncratic aspects of this task. Replication studies with other decision-making tasks are necessary to overcome this limitation. Fifth and finally, uncontrolled individual differences could have biased the results obtained. Although we used a random assignment procedure and included several control variables, it is possible that some individual differences occurred systematically across the three treatment groups. Because of experimental mortality, it is difficult to rule out this alternative explanation.

Despite these limitations, an interpretable and meaningful pattern of results was obtained. Two aspects of our results are especially noteworthy: (1) the priming and (2) the differential effect of knowledge representations. We discuss each in turn and close with conclusions and directions for future research.

**Priming with Knowledge Representations**

Since this was an initial empirical study of the effects of knowledge representations on managerial decision-making outcomes, our finding that priming managers with differing representations had differential effects on decision outcomes is an important one. Despite a conservative design in which the content of the priming knowledge objects had little overlap with the content of the decision task, statistically significant differences were produced in a variety of outcome measures. These results have two primary implications. First, priming on more directly content-related material can be expected to produce at least as much, if not more, impact on managerial decisions as the implicit priming used here. Second, priming with differing knowledge representations involves something more than content transfer and something more than the conduit or stacking bricks metaphors lead one to anticipate. Instead, the respondents were apparently primed to activate different schemata when we varied the forms of knowledge representations.

This study demonstrates that representations variously constructed to emphasize particular, general, or interpretive knowledge can have differential impacts on managerial idea generation. Our findings therefore highlight the relevance of activation theory to the topic of managerial knowledge dissemination and use. Consistent with the ideas of McClelland and Rumelhart (1981), the results sug-
suggest that different schemata were activated by the disparate knowledge representations. Since there was no instruction to the managers to apply the treatment readings to the decision task, it appears that reading and elaborating on different knowledge treatments heightened the priming for implicit memory, much as was found in a different context by Roediger and McDermott (1993). Both studies suggest that the work of Bruner (1966), Freire, (1976), and D'Andrade (1992) concerning the extraction of meaning from narratives is relevant to issues of managerial knowledge utilization.

Types of Knowledge Representations

This study’s specific findings, which are more complex than indicated by the hypotheses, point to the need for more insightful theorizing and definitive measurement. Findings from this study concerning the superiority of one form of knowledge representation over another were mixed, and examining these preliminary results may provide guidance for theory and measurement.

Particular knowledge representations—those presenting concrete and unambiguous knowledge—were more effective in producing decision responses than were general knowledge representations. Our results suggest that such concrete representations stimulate decisional thinking, especially in terms of potential actions and ethical sensitivity. These results require that we revisit earlier theorizing. Clark and Karmiloff-Smith’s (1993) concept of representational redescription may apply more to particular representations than to general ones. The latter provide knowledge at an abstract level, but particular representations require the inductive theorizing that Clark and Karmiloff-Smith portray as natural. Hence, the presentation of concrete and literal knowledge, such as that found in the particular treatment, “Technology and Work,” may stimulate more induction and testing against the reader’s prior beliefs than do general knowledge objects (see Appendix A). Such would be consistent with humans’ ability to store particularized knowledge and abstract from it upon demand, as Whittles (1997) argued. Identifying the disparate types of cognitive activity stimulated by particular and general representations is speculative at this point. The issue, however, does show how little is known about the mechanisms that operate and the interpretations that result when managers read different knowledge representations in the management literature.

General representations lie closest to the forms of knowledge that many management scholars strive to produce. Knowledge is presented at a level of abstraction that transcends context to provide potential guidance in a wide range of situations. The preliminary indications from this study are that general representations produce comparatively fewer favorable decision outcomes than do other representations. However, this does not mean that such knowledge is not legitimate or that fewer efforts should be directed toward its generation. Rather, our conclusions suggest that scholars might consider portraying abstract knowledge in figurative as well as literal forms in order to enhance the knowledge transfer process.

In this sense, the performance of the interpretive knowledge representations in this study is intriguing. Interpretive representations, per Figure 1, provide a means of combining abstract and concrete knowledge. Interpretive forms of knowledge appear to stimulate decisional thinking, given the respondents’ performance on decision outcomes following interpretive priming (see Figure 3 and Table 3). In all the comparisons of this study, only once (for self-reported diversity) did interpretive representations produce fewer responses than general representations, although this effect was not significant. In comparison to the particular representation, the interpretive representation produced significantly lower decision outcomes only for the potential actions category, although nonsignificant effects in the same direction were obtained for breadth and diversity as well. Overall, both the open-ended and the self-reported measures indicated the potency of interpretive representations. They produced significantly higher self-reports of satisfaction with decision task performance and significantly greater levels of ethical sensitivity (see Figure 4 and Table 4). Likewise, exposure to interpretive treatment materials appeared to enhance respondents’ depth of ideas and indicated a higher level of performance on the professionalism and work process dimensions of decision outcomes. This pattern of findings suggests that more figurative, ambiguous, and concrete representations can be potent in communicating knowledge. As such, our findings about interpretive representations open another avenue for scholars to consider when seeking to effectively transfer abstract knowledge. Future research may benefit from identifying the conditions that favor nonliteral representations of abstract knowledge in producing greater knowledge transfer than traditional literal representations.

Taken together, our findings appear to provide sufficient evidence to indicate that different knowledge representations hold the potential to differentially prime the schemata of managers and materially influence their creative thinking processes when they tackle managerial problems. To achieve
internal validity, we used relatively pure knowledge representations, but we recognize that different combinations of knowledge representations are plausible. For instance, a single article might simultaneously contain a theoretical model of a complex phenomenon (a general representation), analogies and metaphors that illuminate the conceptual ideas (an interpretive representation), and managerial recommendations based on empirical results (a particular representation). Indeed, different materials may differ in terms of their knowledge configuration mix—that is, the relative amounts of interpretive, general, and particular representations embodied in the material. In this sense, our treatment materials are special instances of such configurations, with a single type of representation dominating. However, in view of our results, we can surmise that the influence of different configurations of knowledge representation on creative thinking processes and decision making would be nontrivial. In other words, the mix is likely to matter. Future researchers might find this search for the right mix an intriguing avenue to pursue and use to help guide efforts to balance knowledge generation with effective transfer.

CONCLUSIONS

In this article, we have drawn upon cognitive and educational psychology to support the notion that managers may be theorists as well as pragmatists and that they are constructors of their own knowledge as well as users of knowledge created by others. Following these ideas led to the design of treatment materials reflecting interpretive, general, and particular knowledge representation and to an assessment of their impact on managerial decision making.

The methodological and theoretical issues of this research suggest that the current study has only begun to identify a number of interrelated questions whose answers might illuminate knowledge use in management. A number of avenues for further research stand out from this study. First, although not adequately defining the role of figurative knowledge and interpretive knowledge representations, the results indicate that it may be promising to do so. The ultimate impact of interpretive knowledge on different aspects of managerial decisions needs to be studied. Several leading questions can be suggested: Are particular dimensions of decision outcomes more susceptible to being influenced by figurative representations of knowledge? Are different decision tasks important in understanding the role of figurative knowledge? Are decision simulations adequate representations of actual action taking? Second, this research did not connect knowledge representations and decision tasks on a substantive level. How might the influence of general and particular knowledge representations change when a tight link is established between knowledge and decision task? Does a close specification between knowledge and task content eliminate figurative knowledge representation, or are there ways that figurative knowledge can be substantively specified? Are specific combinations of interpretive, general, and particular knowledge most conducive to managerial learning and decision making? If so, how should these representations be presented in order, in time, and in relation to each other? Finally, this work holds implications for, and raises new questions about, managerial decision making in general. In this study, managerial cognition was primed and schemata were activated according to experimental treatments. It is unknown how managerial cognition is typically primed in the normal course of organizational life. Decision-making research, for example, might seek to identify what contextual factors normally prime managerial cognition. What repertoire of schemata are used by managers? How malleable are these schemata? How do they differ by organizational level and by professional function? Empirical pursuit of these and similar questions concerning the relation between knowledge representation and knowledge transfer seems essential if the academy is to seriously address the relationship between scholarship and practice.

In closing, we recognize that the knowledge developed in this study is represented as abstract and literal—in the general form, in the parlance of this article. It is ironic, then, that we have adopted the representational form that our own results indicate to be the least generative for managers. Although our intended audience is other scholars rather than managers, this irony causes us to reflect upon the practices of knowledge generation and dissemination in the management community. These reflections caution us against strong statements, because we understand that the findings reported here are provisional and suggestive, not definitive. The standards for general knowledge require that the present study be followed by extended research that refines theory, measures, and designs. However, we now ask ourselves whether that very process of refining and verifying general knowledge among management scholars limits the development and dissemination of particular and interpretive knowledge forms.

In this regard, we observe that there is a lack of variety in the knowledge representation forms available in the scholarly literature. It may be, as
our findings provisionally suggest, that the dominance of general knowledge representations is not adequately stimulating to managers. A more fundamental question is whether knowledge itself is being limited through current writing and publishing practices. Might it not be that managers and academics alike would benefit from more varied outlets for knowledge representations? Two points are noteworthy. First, although some practitioner-oriented journals do offer more particular representations for managers, there exists a largely unrealized opportunity for the writing and publishing of interpretive, narrative, metaphorical, and allegorical knowledge. We recognize that reviewing and establishing the merit of such articles poses challenges and takes the field into uncharted territories. Second, where opportunities do exist for the publishing of alternative knowledge forms, the academy has implicitly favored segregation of journals into pure forms dominated either by general representations—as is, for example, the Academy of Management Journal—or by particular representations—as is the Academy of Management Executive. Such segregation promotes homogeneity of knowledge forms within a journal and closes the door on alternative representations. We ponder whether it would be fruitful for some prestigious journals to encourage and seek varied forms of scholarship, mixing articles that represent knowledge in diverse ways and even presenting different knowledge representations within a single article. We speculate that this diversity might be highly generative for future management researchers and professionals alike.

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APPENDIX A

Knowledge Representation Treatments

Theme 1: Relationships of Technology and Human Behavior

Interpretive treatment: Technology and the self. As Tzu-gung was traveling through the regions north of the River Han, he saw an old man working in his vegetable garden. He had dug an irrigation ditch. The old man descended into a well, fetched up a vessel of water in his arms and poured it out into the ditch. While his efforts were tremendous, the results appeared to him very meager.

Tzu-gung said, "There is a way whereby you can irrigate a hundred ditches in one day, and whereby you can do much with little effort. Would you not like to hear of it?"

Then the gardener stood up, looked at him and said, "And what would that be?"

Tzu-gung replied, "You take a wooden lever, weighted at the back and light in front. In this way you can bring up water so quickly that it just gushes out. This is called a draw-well."

Then anger rose in the old man's face, and he said, "I have heard my teacher say that whoever uses machines does all his work like a machine. He who does his work like a machine grows a heart like a machine, and he who carries the heart of a machine in his breast loses his simplicity. He who has lost his simplicity becomes untrue in the strivings of his soul. Uncertainty in the strivings of the soul is something which does not agree with honest sense. It is not that I do not know of such things; I am ashamed to use them."

General treatment: Technology and social change. The written word made it possible to supplement oral forms of communication by recording thoughts and by examining, debating, and revising these thoughts. Over many years, the development of recorded knowledge stimulated the emergence of a technological world. However, a number of unanticipated consequences occurred as well.

First, the written word often narrows what we value as knowledge, and hence what we experience. It also creates a separation between knowledge and knower that may result in increased specialization, fragmentation, and social isolation.

Second, writing played an integral part in unleashing the scientific revolution, industrialization, and modernity. While this has led to longer life expectancies, improved public health, and greater economic well-being for many, a large portion of the world's population does not enjoy these benefits. Economic philosophies and institutions have improved the lives of many but have yet to solve the problem of widespread poverty and illiteracy.

Third, even in today's world, some societies are preliterate. These societies have little impact on the world, and are likely to die out under the pressure of technological civilization. The reduction of cultural diversity may be an inevitable result of current trends.

While few individuals would be willing to forego the tremendous improvements in human well-being resulting from written communication, making these benefits universal continues to be an issue. The central question is whether technology can be directed toward human ends or whether technological effects are essentially uncontrollable. And, if humans are capable of hoding technology toward common purposes, how can this be achieved?

Particular treatment: Technology and work. Bill La-very, a foreman of a paint-finishing department in an automotive plant, feels he spends too much time on technical matters and too little time on personnel issues. The tools and equipment used by his work group and the flow of materials through the department direct his primary attention to the maintenance and care of machinery. He also has to stay continually in touch with information generated by real-time computer-based information on material usage, quality, and labor productivity.

Bill appreciates the economic benefits of the company's strong commitment to technology. Not only does the technology allow for impressive economies of scale, it is also necessary for his department to keep up with the fast pace of production elsewhere in the plant. At the same time, Bill thinks that he should spend more time instructing, coaching, and supervising his employees. He believes that the department will be more productive over the long term if he spends more time developing the members of his work group.

Bill has attended supervisory training sessions, and he has talked with other supervisors about how they handle similar conflicts. No one has presented an answer that has helped him accomplish both the technical and the personnel tasks. He has resolved to devote at least an hour each day to direct supervision and support for his work group. He is concerned, however, that this plan is not realistic and that it might simply increase his personal workload.

Theme 2: Group Cohesion and Violation of Authenticity

Interpretive treatment: Reactions to communications on the Net. A quadruplegic woman types on a
computer keyboard with her headstick, conversing with persons at other keyboards in the vast elsewhere of the computer virtual world. She offers her many women friends advice for their emotional problems that helps them effect real and positive change in their lives.

A few years later, it becomes known that the disabled woman is an imagined person, a perceived entity created by a middle-aged, physically able, male psychiatrist. Feeling emotionally manipulated by this revelation, some women renounce the gains they made in their lives. Others feel the gains are justified regardless of the misrepresentation, and they want him to continue "her" role. They argue that "reality" is totally subjective and the world is nothing more than the sum of our perceptions.

**General treatment: Member relationships and group cohesion.** Every cohesive group develops its own system of cultural symbols, widely accepted by its members and around which the emotional life of the group is organized. Insofar as the members act toward each other, they take the other's perspectives toward their own actions and interpret and assess activity in communal terms. Internalized understandings arise in this way to guide individual behavior in the group.

On occasion, a lack of authenticity by a key member is revealed in relation to the internalized understandings of the group. When this occurs, the symbolic and emotional system of the group breaks down, individuals reject the former positive experiences of the group, and the group quickly fragments into mutually suspicious and hostile factions.

**Particular treatment: Leadership and corporate morale.** Young staff members in the finance department of a Fortune 1000 firm were unusually pleased with Jim Greenley, head of their department. They felt that they had received opportunities for significant learning and development due directly to the support and encouragement of Jim Greenley.

One day the office of the CEO issued a terse announcement that Jim would be leaving the firm, effective immediately. Information gradually emerged that Jim had been implicated in embezzling funds from the company. The younger staff members of the department were shocked, demoralized, and felt deceived by Jim. The resulting discord within the finance department indicated to the company the importance of credible and trustworthy leadership.

**APPENDIX B**

**Decision Task Case Scenario: Standard Media Plan**

It was a lazy Saturday afternoon in mid-December, and Bob Smith, a research analyst for L&H Marketing Research, was working furiously to complete the media plan portion of the Standard Grooming Products report. Standard was considering introducing a men's hairspray and needed demographic characteristics and media habits of male hairspray users, as well as attitudinal information about such product attributes as oiliness, stickiness, masculinity, and fragrance.

The findings were to be presented Monday afternoon, and a long series of problems and delays had forced Bob to come in on Saturday to finish the report. Complicating matters, Bob felt that his boss, Barry Michaels, expected the statistical analysis to be consistent with L&H's initial recommendations to Standard. Bob, Barry and Marjorie Glass, from Standard's advertising agency, were to meet Monday morning to finalize L&H's presentation to Standard.

Back in September, Bob had recommended surveying 250 users of men's hairspray from each of 15 metropolitan areas. Charles Chastain from Standard's marketing department had argued that conclusions about local usage in each city would not be accurate unless each city's sample size was proportional to its population. That is, the sample sizes for larger cities should be larger than for smaller cities. Furthermore, Charles feared that males in metropolitan areas differed from rural males on usage or other important characteristics. Bob finally convinced Charles that sample sizes proportional to population would mean only 5 to 10 interviews in some smaller cities—too few to draw statistically valid conclusions. Furthermore, expanding the survey to include rural users would have required committing more money to the project—money Standard didn't want to spend. Since Standard was a new account with big potential, a long-term relationship with them would be valuable. (Business at L&H had been slow this past year.) Feeling "under the gun," Bob met with Barry and Charles, who agreed to reduce the sample to 200 men in each of only 11 metropolitan areas.

In October, a Des Moines, Iowa, pretest revealed that the questionnaire's length was driving the cost per completed interview to about $18. Total expenses would be well over budget if that cost held for the 15 metro areas. If the survey costs exceeded $65,000 (counting the pilot study), precious little money would be left for the focus groups, advertising, and packaging testing in L&H's contract with Standard (see Table A1).

In early November, a new problem arose. After surveying eight metro areas, Bob discovered that his assistant, whom he had a good long-term relationship, had accidentally deleted all questions on media habits from the questionnaire given to L&H's vendor for the phone interviews. When telling Barry and Charles of the missing questions problem, Bob omitted indicating the source of the problem. Barry and Charles became visibly angry at the vendor, but after much discussion, they decided there was too little time to hire a new vendor and resample the eight areas. Therefore, they agreed to reinsert the media questions for the remaining three cities and just finish the survey.

Bob's task now was to make the most of the data he had. Because responses from each of the three cities were reasonably similar, and each city came from a different region (East, West and Midwest), Bob felt confident that the three-city data were representative.
Therefore, he decided to base the media plan on the large differences between his results and the national averages for adult men—making sports magazines and newspapers the primary vehicles for Standard's advertising (see Table A2).

Bob's confidence in the media plan based on sports magazines and newspapers was bolstered by a phone conversation with Marjorie Glass. Until a short time ago, her agency had handled the advertising for American Toiletries, so she had valuable information about this competitor's possible responses to Standard's new product. Marjorie liked Bob's recommendations, had no misgivings about using information about a former client, and agreed to support the media plan in Monday's meeting. Indeed, Bob thought, Marjorie had been a big help.

The Standard project had put a great deal of stress on Bob, who hated spending weekends away from his family—especially near Christmas! If the presentation went well and more business was forthcoming, Bob suspected he would be spending even more weekends here. But if the presentation went poorly or the data collection errors became an issue, then Standard might look elsewhere for market research, thus jeopardizing Bob's future with L&H. Either way, he felt apprehensive. He wondered how he should present his results and how much information he should share with the client. Should he reveal to Standard any or all of the problems L&H experienced in conducting the project? Or should he simply present his results and recommendation as a credible basis to proceed with Standard's media plan and not mention technical issues? The question really was about the level of understanding that his client would want about the basis of the recommendations. He also thought that his boss, Barry Michaels, would be much more concerned about how well the proposals fit with L&H's initial recommendations and would certainly be upset if he lost the account. The choices weren't easy. Bob wished he could turn to somebody outside the organization to share his dilemma and seek a fresh, independent perspective.

### APPENDIX C

**Codes and Categories Used to Analyze the Quality of Decision Making**

**Work Process**
- Establish code of conduct for projects
- Need for establishing and/or using proper methodology
- Need for project estimates and time budget
- Set project management guidelines
- Establish project teams
- Resist pressure of budget to limit work
- Need for accurate data
- Determine reasons for data inadequacies
- Need for honest assessment of data
- Need for complete assessment of all data
- Need program of independent verification
- Review or establish quality control of project and training relative to project
- Explore reasons for external pressure
- Need structure for discussing ethical issues
- Identify reasons for budget inadequacies
- Establish feedback mechanisms to encourage learning

**Professionalism in the Organization**
- Promote certain (unspecified) beliefs and values
- Promote culture of honesty
- Resist culture of compliance by employees
- Overcome culture of denial
- Promote open communication
- Promote professionalism
- The right culture begins with good leadership
- Understand employee motivations and limitations
- Institute better hiring procedures
- Need to maintain good client relations
- Promote open communication regarding project
- Management to take the lead in communicating with client honestly
- Create and manage client expectations
- False data and/or analysis will defraud/hurt client
- False data and/or analysis will hurt the company
- False data and/or analysis will hurt Bob
- Question of ethics in relation to data quality

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**TABLE A1**

**Proposed Budget**

<table>
<thead>
<tr>
<th>Item</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone survey</td>
<td>$ 8,000</td>
</tr>
<tr>
<td>Focus group study</td>
<td>6,000</td>
</tr>
<tr>
<td>Advertising pretesting</td>
<td>25,000</td>
</tr>
<tr>
<td>Package pretesting</td>
<td>14,000</td>
</tr>
<tr>
<td>Miscellaneous expenses</td>
<td>5,000</td>
</tr>
<tr>
<td><strong>Proposal total expenses</strong></td>
<td><strong>$109,000</strong></td>
</tr>
</tbody>
</table>

**TABLE A2**

**Comparison of Media Habits, Three-City Sample of Male Hairspray Users versus U.S. Adult Males**

<table>
<thead>
<tr>
<th>Item</th>
<th>U.S. Male</th>
<th>Users of Hairspray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magazines</td>
<td>28%</td>
<td>19%</td>
</tr>
<tr>
<td>At least one subscription</td>
<td>Entertainment 4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Sports 39</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Other 0</td>
<td>6</td>
</tr>
<tr>
<td>Newspaper subscription</td>
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<td>14</td>
</tr>
<tr>
<td>(at least one daily)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Favorite radio format</td>
<td>Pop/rock 51</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Country 26</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>EZ listening 7</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>News/talk 5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Other 11</td>
<td>5</td>
</tr>
<tr>
<td>Hours watching television</td>
<td>17.5</td>
<td>23.5</td>
</tr>
<tr>
<td>per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drama 8.3</td>
<td>8.4</td>
</tr>
<tr>
<td></td>
<td>Comedy 7.3</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>News 1.1</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>Other 2.3</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Question of ethics in relation to method employed
Consider legal issues of involvement with her
Dissociate from Marjorie
Respect ethics of confidential data

Individual and Personal Concerns
Need better time management for Bob
Need better career planning for Bob
Bob should consider leaving company
Bob should resist pressure to bias his analysis
Bob must maintain his personal integrity—be honest
Bob must understand objectives and expectations
Bob should act as a professional
Need to communicate with top management
Determine priorities in life
Sense of well-being and comfort with work more
important than job
Satisfy self to be at peace
Spend more time with family

Potential Actions
Delay presentation and/or redo study or collect new
data
Present best face of the data collected
Reveal inadequate data to management and/or client
Reveal limits of conclusions
Reveal project history to management
Reveal reasons for recommendations
Reveal cost overruns
Reveal Marjorie’s involvement
Rely on Standard to draw its own conclusions
Let client decide next step
Recognize best interest of the client

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