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Research methods are generally improved through new understandings of scientific procedure, validity, and reliability. Variations in these understandings—among knowledge communities as diverse as ethnographers, statisticians, historians, and even practitioners and researchers—yield a rich set of innovations in quantitative tools, experimental designs, data collection instruments, observational methods, sampling procedures, and interpretive frameworks. Research methods, however, must be consonant not only with the way various communities view scientific inquiry, but also with fundamental characteristics of the thought and behavior of customers and managers. Most widely used methods in marketing lack the latter consonance. The author introduces particular insights about thought and behavior from multiple disciplines as design criteria for improving research methods.

Rethinking Market Research: Putting People Back In

The development of research methodology should be guided by knowledge about the nature of the phenomena that is studied: the thoughts and behaviors of managers and customers. Improving statistical and mathematical tools, field and laboratory experimental designs, survey designs, sampling techniques, and research reporting techniques, when they neglect the nature of human thought and behavior, leaves researchers overly prominent in the research process. Researchers must engage managers and customers more actively in the research undertaking by enabling them to represent fully their thinking. This requires using knowledge about cognitive and other processes to improve how managers and customers are studied.

In this article I review a number of substantive insights that, collectively, imply a need to rethink basic assumptions about thought and behavior that underlie existing research methods. I argue that many substantive research issues on which important progress has been made, such as emotion, metaphor, nonverbal communication, and visual imagery, tend to be missed or misrepresented by current methods of inquiring into them. Greater sensitivity to the implications of these insights is needed for basic research methodology in marketing. A specific technique illustrates how current methods might be improved or new methods developed.

PUTTING PEOPLE BACK IN

The premises that follow provide a sample of the qualities of manager and customer thought and behavior that need to find expression in research methods. Readers are invited to ask first, lest they be inclined to dismiss a premise prematurely, "Would this premise have important implications for conducting research *if* it were true?" If the answer is yes, it becomes appropriate to examine the evidence cited.

Premise 1: Thought Is Image-Based, Not Word-Based

> Is thought dependent on words? ...Or are our thoughts couched in some silent medium of the brain—a language of thought or "mentalese"—and merely couched in words whenever we need to communicate them to a listener? ...The idea that thought is the same thing as language is an example of what can be called a conventional absurdity.... There is no scientific evidence that languages dramatically shape their speakers' way of thinking (Pinker 1994, pp. 56–58).

Thought arises from images, which are topographically organized neural representations that occur in the early sensory cortices. When neurons are activated sufficiently, images can be experienced as conscious thought (Damasio 1994). An image, then, is an internal representation used in information processing (Kosslyn 1994). Because two-thirds of all stimuli reach the brain through the visual system (Kosslyn et al. 1990), images often are visual. Verbal language plays an important role in the representation, storage, and communication of thought (Bickerton 1990), but verbal

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language is not the same *as* thought (Kosslyn and Koenig 1992). "Conceptual capabilities develop in evolution well before speech" (Edelman 1992, p. 108).

This premise suggests that by developing methods for engaging and/or monitoring imagic activity more directly, managers and customers can be moved closer to the way their thought occurs and thereby provide more complete representations of their thoughts and accounts of their behaviors. The imagic activity to be engaged involves both visual and nonvisual sensory mechanisms.

Premise 2: Most Communication Is Nonverbal

Although estimates vary, there is general agreement that most human meaning is shared nonverbally (Patterson 1991). A common rule of thumb is that approximately 80% of human communication is nonverbal (Weiser 1988). Birdwhistell (1970) holds that no more than 30% of the meaning in a social exchange is conveyed by words, whereas Mehrabian (1971) reports that only 7% of the meaning in any message is contained in verbal language, and approximately 93% is communicated nonverbally. Much of the meaning of verbal language is determined by nonverbal cues including haptics (touch), vocalics (paralanguage), proxemics (spatial cues), chronemics (temporal cues), and oculesics (eye contact, gaze, pupil dilation). In the event of an apparent contradiction, nonverbal cues tend to be believed over verbal ones (Knapp 1980).

Verbal language developed only recently in the context of human evolution, and written, phonetic-based language developed even more recently (Ong 1982). Growing understanding of the role of the basic senses in learning and communication and in the shaping of neural patterns reinforces the premise that nonverbal communication dominates thought (Howe 1991; Marks 1978). This is consistent with Premise 1.

Most market research tools are verbocentric. They rely on literal language to collect, synthesize, and report responses to surveys, ideas from focus groups, and literal trace data that is accumulated by scanners. Even when available, nonverbal cues generally are not processed systematically by researchers and are reported only infrequently. Premise 2 suggests that it is important to enrich verbocentric methodologies with techniques that accommodate nonverbal expressions of perception, learning, and thought that are found in manager- and customer-created visual and other sensory images. This is even more important because nonverbal cues are processed tacitly.

Premise 3: Metaphor Is Central to Thought

A metaphor involves understanding and experiencing one thing in terms of another (Lakoff and Johnson 1980); it is the perception of one thing as if it were a different kind of thing (Dent-Read and Szokolszky 1993). For example, temperature quality (hot) might be used to convey popularity or theft. Metaphors are central to understanding the human mind (Allbritton 1995; Honeck 1996). They both invoke and express nonverbal imagery. "Whatever else we are, we humans are metaphorizing animals" (Johnson 1995, pp. 158–159).

The position that thinking is represented primarily through metaphors is consistent with the interactionist view that the creation of new thoughts is shaped by metaphors. According to Gibbs (1992, p. 572), "The vast majority of linguistic metaphors reflect underlying conceptualizations of experience in long-term memory that are already structured by metaphorical schemes." Conceptual metaphorical schemes stored in long-term memory help us make sense of literal metaphors (Glucksberg 1991).

So basic are metaphors to the representation of thought that communicators and audiences alike often are unaware of their use and therefore of the significance of metaphors in the creation and expression of thought (Soyland 1994). Metaphors not only help us make sense of what we perceive, but also direct our attentional and perceptual processes (Indurkhya 1994). Observes Johnson (1987, p. 169), "Metaphorical projection is one fundamental means by which we project structure, make new connections, and remold our experience." Burgess and Chiarello (1996) and Bottini and colleagues (1994) provide descriptions of the neurological basis for this.

The process of imagining, that is, creating or arriving at what it is we know, shapes the content of knowledge. "Without imagination, nothing in the world could be meaningful," observes Johnson (1987, p. ix). "Without imagination, we could never make sense of our experience. Without imagination, we could never reason toward knowledge of reality." Metaphors are central to imagination (Goldman 1986). Without metaphors we cannot imagine: they are the engine of imagination.

Sensitivity to metaphors is thus even more important because managers and consumers are likely to process information metaphorically even when that is not the communicator's intent. One implication of this premise is that methods designed to elicit and analyze metaphors systematically could significantly augment knowledge gained from more literal, verbocentric research approaches.

Premise 4: Metaphors Are Important in Eliciting Hidden Knowledge

Metaphors are especially effective at surfacing hidden knowledge (Glucksberg 1995; Shlain 1991). A number of investigators in the field of psychotherapy have found that explicit use of metaphors helps patients make unconscious experiences progressively more conscious and communicable (Ingram 1994; Kopp 1995). Because they can elicit cognitive processes beyond those displayed by literal language, metaphors also surface important mental states that literal language might altogether miss or underrepresent. In fact, metaphors are stored not verbatim in memory, but abstractly in modality-free language (Burgess and Chiarello 1996). They are the so-called "ground"—the abstractly understood shared properties between vehicle and topic—that becomes part of our image schema (Chandler 1991).

Metaphors are powerful because they hide as well as reveal thoughts and feelings. The executive who sees him or herself as a lawn maintenance specialist keeping weeds out of his or her organization reveals a distancing attitude toward new ideas while hiding the value of cultivating change. Research methods, then, must help reveal what a metaphor might be hiding. Skilled questioning is required in the use of metaphors to elicit deep meanings that are rendered difficult to express or even hidden by standard procedures. Standard interview processes and focus group sessions are not amenable to such questioning. Given the increased likeli-

hood of uncovering important mental constructs by analyzing metaphors (Forceville 1994), it is important that research techniques do this.

Premise 5: Cognition Is Embodied

Metaphors that are based on bodily systems are central to the expression of abstract thought (Damasio 1994). According to Marks (1996) and others, the hidden knowledge elicited by metaphors is rooted in physiologically-based image schema, though distinguishing physical from cultural bases of metaphors can be difficult (Classen 1993). Johnson (1987, p. 79) argues that image schemata are recurring patterns that arise from our bodily movements and manipulation or perceptual interaction with objects; they "are those recurring structures of, or in, our perceptual interactions, bodily experiences, and cognitive operations" that provide coherence to our experiences. Thus, terms of juxtaposition (e.g., over) represent social hierarchy, direction, location, and conclusion, whereas color (e.g., blue) and orientation (e.g., down) reflect mood.

The embodied cognition thesis receives compelling support by researchers in many different areas (Danesi 1990; Thelen 1995). Metaphoric processes appear to originate in neurological substrates tied to sensory-motor-affective systems (Marks 1996; Marks and Bornstein 1987). Our abstract understanding is organized by projecting onto it patterns of sensory experience (McAdams and Bigand 1993). To understand quantity abstractly, for example, a person might draw on the physical experience of verticality (e.g., up, down), which, in turn, might be attended by judgmental associations ("up" has many more positive associations than "down").

An interesting approach to the physiological aspect of metaphors involves synesthesia, or cross-modality perception, in which one mode of sensory perception is transferred to another (Marks and Bornstein 1987). When asked, most people will characterize a sneeze as brighter than a cough. Other examples include colored speech perception and the association of soft and low pitched sounds with dark colors. Associations between sensory metaphors are patterned; that is, different individuals within the same culture display the same systematic connections between dimensions of specific modalities.

Classen and Howe (1996, p. 87) observe that, "As a basis for experiencing oneself, one's society, and the world, the senses, like the body, are *always* of cultural significance, whether extensively elaborated or ostensibly suppressed. Every society has a sensory order, and to every sensory order there corresponds a particular social and symbolic order." Different cultures approach the sensorium differently (Classen 1993; Stoller 1989) and interactions among senses differ accordingly (Howe and Classen 1991). One culture might favor sound/vision combinations, whereas another favors sound/taste. Moreover, the practical value of a particular sense may correspond to its cultural or symbolic importance (Emanatian 1995).

This premise suggests that a richer representation of abstract thought can be achieved by incorporating into research methods the elicitation and probing of metaphors tied to motor and perceptual systems (e.g., the senses) and physical movement and sense of spatial orientation. There will be commonalities in the meaning of even broad, embodied metaphors within cultures.

Premise 6: Emotion and Reason Are Equally Important and Commingle in Decision Making

Few dispute the importance of emotions in managerial and consumer decision making, yet most research methods are biased toward reason. Most methods collect and present information as if decisions were the result of logical inference and conscious processes. People are especially likely to display this quality of their decision making because it is what they are asked about, how they are encouraged to respond, and what they can articulate most readily. However, reason and emotion are not independent and must be treated as commingling forces. Thus, the assumption that decision making is driven largely by relatively overt and readily inspected logical inference is half right and therefore also half wrong (Kahneman 1994). Multiple, complex reasoning systems working in concert are essential to normal decision making. But multiple systems of emotion also exist (Harris 1993; LeDoux 1996) and are equally important in normal decision making (Isen 1993).

Studies of patients with particular patterns of brain damage reveal that when reasoning systems are intact but emotional capacities damaged, poor decisions result; similarly, when emotional systems are intact and reasoning capacities damaged, poor decisions also result (Damasio 1994; Kosslyn 1994). The separation of reason and emotion, however convenient, is misleading: "The lower levels in the neural edifice of reason," writes Damasio (1994, p. xiii), "are the same ones that regulate the processing of emotions and feelings.... Emotion, feeling, and biological regulation all play a role in human reason." Reason and emotion are not to be considered opposites. Although emotions sometimes obscure this, their complexity and biological roots are what enable them to play a crucial role in rationality (De Sousa 1987). Emotions also shape the tacit metaphorizing process of reasoning, whereby past experience is used as a metaphor to guide current actions and future plans (Bottini et al. 1994).

This premise argues for the use of research methods that enable both reason and emotion to surface, and to do so in a way that reflects their commingling. It holds, further, that these two categories are each represented by multiple systems and should not be treated as opposite each other.

Premise 7: Most Thought, Emotion, and Learning Occur Without Awareness

Emotions are biological functions of the nervous system; different groups of emotions are handled by different neural systems (LeDoux 1996). Feelings, the conscious experience of emotions, are only the tip of the iceberg. Most emotions and cognitive functions, which guide thought and behavior, occur without awareness (Plutchik 1993; Shimamura 1994); that is, most mental life is tacit.

Cautions LeDoux (1996, p. 32), "We have to be very careful when we use verbal reports based on introspective analyses of one's own mind as scientific data." His and other observations about the origins of verbal reports (Nisbett and Wilson 1977) suggest a need for prudence in the use of introspective reports, survey interviews, group meetings, and questionnaires. Even the impact of consciously experienced stimuli on attitudes and goals is unconscious and thus might be missed as a source of influence on thought and be-

havior (Janiszewski 1988). Other reasons for exercising caution in the use of verbal report data in the absence of stimuli specifically designed to activate images can be found (Seger 1994; Weiser 1993; Ziller 1990).

Concerns about reliance on standard verbal (oral and written) reports by customers and managers are reinforced by the growing body of research on memory distortion (Schacter 1995, 1996; for an important treatment of the process in marketing contexts, see Braun 1997). It is of considerable importance that what is remembered is a creative product of prior experience, current beliefs, and future preconscious plans. This does not mean that critical incident reporting is not useful. It has been of value in marketing (see Park, Iyer, and Smith 1989). The research on memory reconstruction simply implies a need for caution in implementing the procedure and interpreting results (Russo, Johnson, and Stephens 1989).

One important function of higher-order consciousness, or awareness of awareness, is to facilitate the making of choices. Consciousness, then, is a central construct for understanding decision making just as are values, attitudes, concepts, and norms (Graham 1993). However, as important as it is, consciousness is the end result of a largely unconscious system of neural information processing (LeDoux 1996) and associated implicit learning (Seger 1994). Consciousness and unconsciousness are natural biological phenomena ultimately to be explained by natural laws (Chalmers 1996; Searle 1992), particularly as they involve neurobiological processes related to vision and imagery (Edelman 1992; Zeki 1993).

Because most mental life is unconscious (Baars 1988), Premise 7 stresses the importance of studying in their own right unconscious but accessible events and processes among managers and customers. To attend to unconscious but accessible mind states, research methods must engage people in ways that enable them to bring unconscious states to a level of awareness. Metaphors are basic mechanisms for doing this.

Premise 8: Mental Models Guide the Selection and Processing of Stimuli

Thought occurs as topographically organized neurons fire. These groups of neurons represent basic constructs (Damasio 1990). Sufficient activation of one neuronal group will cause other groups with which it has established pathways to become active; one thought leads literally to another, which may lead back again to the earlier thought. Sets of connected neuronal groups constitute mental models (Eimas and Galaburda 1990). The cerebral cortex alone (an area that, if made flat, would be about the size and thickness of a table napkin) contains about ten million billion neurons with an even greater number of opportunities for connections (ten followed by millions of zeros). An extraordinary number of mental models can be created and maintained. These mental models are largely dormant; when they are active, it is usually at a level below consciousness. This reflects our limited capacity to be conscious of more than one cluster of thought at a time and explains why verbal language, which enables us to focus on finite information to keep from getting overloaded, only has the appearance of being dominant. As noted subsequently, mental models interact with various perceptual systems, such as vision.

The frontal lobe appears to have a central role in planning eye movements on the basis of mental maps (Hubel 1988). "We humans do not just sit there and wait for information to come in; we actively seek information and actively test hypotheses. If one has an inkling of what one is seeing, one can seek out confirmatory evidence by looking for particular parts to observe" (Kosslyn and Koenig 1992, p. 99). "Because our eyes register fine detail only with a very small foveal region of the visual field," explains Hochberg (1972, p. 65),

> we must learn about the visual world by a succession of glances in different directions. Such glances are made by *saccadic* eye movements, whose end-points are decided before the movement is initiated (i.e., saccades are *ballistic* movements): where one looks is decided in advance.... Where we direct our foveas when we look at pictures is guided by the hypotheses that are generated by what we see in peripheral vision.... The integration of the successive glimpses that we receive when scanning a picture must depend on our ability to fit each view into some "mental map," into a cognitive structure that stores the information (p. 68).

This occurs so rapidly that there is seldom conscious awareness of the process.

Our mental maps are made up of iconic imagery. What people attend to always reflects an inner map—a set of neuronal groupings—that is used unconsciously to organize and understand sensory experience (Weiser 1993). The most casual examination of eye fixation patterns demonstrates the use of knowledge, belief, and expectation to guide eye movement (Kosslyn and Koenig 1992). What has been described for the visual system also applies to other sensory systems that provide our understanding of our world. Thus, what we know—our mental models—and how what we know is represented by metaphor literally influences what we sense, and what we sense influences what we know. Mental models are themselves metaphors for context-specific patterns of neural associations that influence how we attend to and process information about those contexts.

Mental models are not private affairs (Gergen 1994). Sperber (1994, pp. 53ff) speaks of an "epidemiology of representation," whereby competing information is introduced into a common environment in which multiple factors influence its likelihood of successful social distribution and retention. If successful, the information becomes the basis for culturally shared mental models at local and sometimes global levels (Cole 1996). Domain-specific mental models are thus communally shared and change as individual sources of variation gain social prominence through a competitive process of contagion (Bargh 1990; Scheper and Faber 1994).

The implication of this premise is that research methods need to go beyond identifying relevant constructs. They must identify associations among these constructs as expressed initially by the people researchers study. Because subtle and not so subtle differences might exist in the thought processes that connect the same pair of constructs in different people, it is important that associations among constructs be elicited directly from customers and managers. Like constructs, the thoughts that relate them to one another can have different dimensions that cannot be provided by quantitative tools alone.

Premise 9: Different Mental Models May Interact

People's mental models describe, for example, their approaches to ill-structured problems, their dispositions toward snack foods, and what they look for in a workout. An individual person has thousands of such models (Schacter 1996), each of which contains neuronal groups (that represent constructs) linked by one or more pathways to other neuronal groups. For example, the mental model for each topic area just mentioned may contain a neuronal cluster representing the construct "escape." The similarity of this construct across models accommodates what Edelman (1992) calls *reentry*, a process whereby the construct of "escape" as it pertains to snack foods might activate (or be activated by) the notion of "escape" pertaining to a workout. Thus, a sufficiently strong activation of a mental model in one context may activate through reentry (their sharing the construct "escape") a mental model in another context. Moreover, the manner in which a model for snack foods is activated might be influenced by other coactive models. These models, then, are fluid and connected, not fixed and isolated (Millgram 1997).

The process of reentry suggests a more fundamental or global neuronal structure. For example, a generic mental model of "escape" might be understood in terms of its own connected sets of neuronal structures. "Escape" as a construct might have multiple dimensions connected by various pathways: there might be different versions of the generic model of "escape" for different contexts. This is virtually assured by the plasticity of the brain and by the fact that different pathways are involved in each instance of recall that leads to the retrieval of technically different constructs. The deconstructed version of "escape" for snack foods would resemble, but not be the same as, the version of "escape" involved in what people look for in a workout.

Constructs arise from neuronal clusters that take on meaning by virtue of their association with other constructs (neuronal clusters). Pathways thus become important to establishing the meaning of "escape." The more a particular cluster (e.g., generic "escape") is operative among different mental models, the more important that construct is in general, even if its precise meaning varies from one model to another. Because such a construct is so central to thought, it is important that research methods be capable of establishing core constructs. The core constructs identified in this way might represent deep metaphors that are powerful, socially shared, and orienting thought structures.

Premises 8 and 9 imply a need for methods that facilitate the construction of socially shared mental models. These methods must facilitate the elicitation of hidden as well as more evident constructs and enable people to represent the thought processes that connect constructs. Premise 9 stresses the importance of identifying core constructs that might be involved in kindred mental models (e.g., consumption of snack foods and motivations to work out) that may influence one another.

HELPING CUSTOMERS AND MANAGERS REPRESENT THOUGHT

A specific technique that incorporates the foregoing premises and related insights into a research method is presented in the spirit of encouraging still other ways to build substantive knowledge about thought and behavior into the methods that explore them.[1] The technique involves an intensive exploration of self-generated metaphors on the part of managers and customers.

Implementation of the Procedure

Upon qualifying for participation in a project, participants are provided with a set of instructions and guidelines for collecting images, and a two-hour interview is scheduled. Topics and participant samples vary broadly. For example, participants in a recently completed project for a manufacturer of medical equipment needed to have a chronic medical problem, be 65 or more years of age, and live independently. Some consumer topics have included how women picture their day, married couples' thoughts and feelings about using the telephone at home, and the experience of using computer-mediated communication for personal ends. Among managers, topics have included how ill-structured problems are approached, views on the firm's major challenges, how clients see the company, how the future of customer behavior is envisioned, and how marketing strategy is developed.

Because a more complete understanding of customers and managers requires tools that engage their nonverbal, especially visual, channels of thought and communication, participants are asked to take photographs and/or collect images from magazines, books, newspapers, or other sources that express for them the meaning of the research topic. Participants are usually given 7–10 days to collect images. This time period allows people with less immediate access to visual images time to find meaningful stimuli. Having participants collect pictures they define as relevant gives them control over the choice of stimuli used in the interview. Participant control yields several benefits. Participant-generated pictures are richer in meaning because what the eye perceives and encodes when viewing images such as magazine advertisements is guided by existing customer knowledge, beliefs, or expectations (i.e., their mental models). So rapidly does this occur that there is seldom conscious awareness of the process. Using researcher-supplied pictures inhibits the richness of this stimulus selection function of mental models. Having participants collect stimuli increases the likelihood that important but previously unconsidered issues will be uncovered. And by affording participants time in advance of their interview to process implicitly the images they deem relevant, the pool of important constructs to be surfaced during the interview expands. This processing is likely to be unconscious, though the meanings that result can become explicit during the interview.

An Illustration: Approaching Ill-Structured Problems

An eight-step interview process with illustrations from an ongoing project about how senior executives and academics approach ill-structured problems is described subsequently. Ill-structured problems are defined as nonroutine problems that have no clear best solution. Their precise nature may be unclear; it may only be evident that a problem exists. This

[1]The Zaltman Metaphor Elicitation Technique is available for use without restriction for academic research purposes by teaching faculty. Training materials are available and I am pleased to provide additional guidance to other academics. The technique is patented, and nonacademic use requires prior authorization. The technique has undergone a series of validations studies and has been tested with more than 20 firms and 2500 customers and managers.

topic should be of interest to *JMR* readers for the following reasons: (1) managers are an important focus of market research; (2) there is little grounded research on this topic; (3) important ill-structured problems often involve customers; and (4) understanding customers depends on more than customer data—it depends to a significant degree on how a manager thinks (i.e., on his or her habits of mind when approaching ill-structured problems). Understanding the mind of the customer requires an understanding of the mind seeking the understanding. Studying approaches to ill-structured problems is one way of gathering insight about the managerial mind.

This example involves a fairly abstract process that is important to the participants, but to which they had previously given little, if any, attention. To date, 36 executives and 6 academics have been interviewed about their approach to ill-structured problems. During the interview, every participant has reported discovering ideas central to his or her approach that were not evident before. They have also acknowledged the unexpected prominence of emotional factors in the way they address such problems.

Step 1: Storytelling. Participants are asked to describe the salient content of each picture they bring to the interview. Because human memory and communication are story-based (Schank 1990), and because participants have invested time and energy in thinking about the topic and collecting appropriate images, they come to the interview with a particular story they want to tell. During this step the interviewer probes for the deeper meaning of the visual metaphors. Pictures, then, should serve as effective entry points for exploring customer concepts (Ball and Smith 1992; Weiser 1988). Pictures typically represent basic concepts that embody extensive information and defining attributes. The stories that accompany visual metaphors are highly revealing; they crystallize the essence of a picture as a representational medium for bundles of related thought (Dissanayake 1988, 1995; Schank 1990). Frequently, the salient or relevant content of pictures identified by participants is not evident to their interviewers. In describing her approach to ill-structured problems, a vice president of marketing for a beverage company ascribed to a picture of a person crossing a makeshift rope bridge in an Outward Bound-like setting the importance of trusting other people in highly uncertain situations. Other ideas she associated with this construct related to anxiety, confidence, failure, and recovery.

Excellent discussions of the substantive value and the reliability and validity of research using pictures in consumer behavior, sociology, psychology, psychotherapy, and anthropology abound (e.g., Collier and Collier 1986; Denzin 1989; Grady 1996; Prosser 1996; Wallendorf and Arnould 1991). Given that pictures are powerfully expressive, thoughts are image-based, and visual stimuli is so prominent in the brain, the high value of pictures in research is not surprising.

Step 2: Missed images. Because pertinent pictures may not be available within the time period of the assignment, participants are asked to describe pictures they wanted to find but could not. This enables people with less access to images to specify desired stimuli. Most participants do not report any missed images; if they do, a drawing "note" of these images is made and used as part of the basic stimuli.

Step 3: Sorting. Participants are invited to bring between 12 and 15 images; if a participant arrives with more than that, he or she is asked to sort them into meaningful sets and indicate whether any pictures in a given set say the same thing and could be put aside.

Step 4: Construct elicitation. The inclusion and design of this step is based on the fundamental importance of categorization to comprehending experience (Lakoff 1987; Rosch 1978). It also is based on evidence that people possess self-reflective mechanisms for evaluating and reevaluating their state of mind and ongoing processing (Koriat 1994; Nelson and Narens 1994). The Kelly Repertory Grid technique has been used to demonstrate the presence of these mechanisms even among preschool children (Gelman and Wellman 1991). A modified version of the Kelly Repertory Grid is used with laddering techniques to elicit constructs (Gengler and Reynolds 1995; Kelly 1963). These established methods are adapted to enhance the methods' ability to identify and contribute to the understanding of the basic constructs through metaphor.

The interviewer randomly selects three of a participant's pictures and asks how any two are similar and yet different from the third with respect to their relation to the research topic. Initially this surfaces one or two constructs. Various questions are used to elicit other constructs that are the antecedents and/or consequences of the initial constructs. In response to three images consisting of a child diving off a high board into a pool, sharks chasing a swimmer, and a person lost in a maze, an executive indicated that the latter two pictures were similar with respect to his approach to ill-structured problems in that they indicated anxiety and a desire to escape, whereas the child diving represented confidence and a sense of direction. The process of randomly selecting three pictures and laddering on the constructs elicited continues until the constructs that are surfaced become redundant. Normally, four triads are required to reach this point.

Step 5: Metaphor elaboration. This step relies on procedures used in art therapy. The interviewer uses specific criteria to select two or three images. A participant might then be asked to imagine widening the frame of one of the pictures in any direction or dimension and to describe what would enter the picture that would reinforce (or sometimes contradict) its meaning for them. Participants are usually asked a variety of questions that further alter the picture. These questions are determined in advance by the research team depending on the research goal. The participant is encouraged to explore additional thoughts and feelings embedded in the way he or she has chosen to alter the images. This process of visual elaboration disrupts the equilibrium established by the pictures and stimulates emotional responses that create existential issues for the participant that involve constructs in both conscious and preconscious states (Leyton 1992; Plutchik 1993).

A research director for a telecommunications organization brought a photograph of a setting sun with a richly colored sky to reflect the feeling of peace and serenity at successfully resolving an ill-structured problem. Asked to widen this picture, he added, to his surprise, a number of unpleasant features in the foreground to illustrate the messy, difficult things that others do not see that must be done before the beautiful sunset occurs. This surfaced feelings of frustration from trying to define the problem and getting "buy-in" from others to a particular problem definition.

Step 6: Sensory images. Sensory metaphors are powerful mechanisms for bringing unconscious thought to a level of awareness at which verbal articulation can occur (Lakoff 1994; Turner 1994). Although the senses (taste, touch, smell, color, sound, emotional feeling) vary in their ability to be recreated (Engen 1991), all help recall experience (Damasio 1994). A sensory event "is integrated into the mental representation of an experience" (Engen 1991, p. 114). In this step, participants are asked to use nonvisual senses to convey what is and is not representative of the concept being explored.

Participants provide a rich and consistent set of responses during this step, and patterns emerge across participants in a given project. Emphasis here is not on specific responses, but rather on understanding why or how responses relate to a particular research topic. Linguistic analyses of imagery and understanding the hedonics involved can provide important additional insights about customer thinking and behavior.

In the ill-structured problem project, one executive indicated that her approach to ill-structured problems had the physical feeling of being on a roller coaster. Another indicated that his approach was not the color light blue because that was too peaceful. A third person said it was "the taste of aspirin dissolving in your mouth when you didn't take enough water; once you started, you had to follow through."

Step 7: The vignette. In this step participants are asked to imagine a short movie that describes their thoughts and feelings about the topic. This step is based partly on ideas involving psychodrama and partly on the fact that different areas of the brain are active when engaging moving rather than still images (Hubel 1988; Zeki 1993), which suggests that different ideas might emerge with the activation of different areas of the brain (Collins 1991). Different brain structures and functions contribute differentially to the creation of the mind and the thoughts generated therein. Finally, this step activates the voyeur's gaze, which is directed toward "a valued, cultural end and structured by personal and social motives" (Denzin 1995, p. 1). New constructs and associations among constructs often are elicited in this step.

Because of the added dimension of movement, this step accommodates expressions of embodied cognition that are related to biological motor systems and spatial orientation. The research director of a major consulting company constructed the following vignette:

> It would start with me running, screaming down the street at the thought of solving another problem.... "No, no! I don't want to do it!" I want to run away from it. Before you go in there, you just think it's dark and scary and unpleasant and very stressful—lost sleep, lots of work, lots of hours. But it's not so much that you're afraid you won't be able to solve the problem—it's just that you're afraid to solve it because of the work and the intensity of the effort required. But then I force myself to enter the land of the problem, going inside the pyramid. This is the incubator. This is where you have all the intensity and concentration and focus and you're just really working on the problem. Once you get in there, you're no longer afraid because you're so wrapped up into it and there's a sense of enjoyment in actually doing it when you go through a process of gestation for a couple of days where there might be ... all kinds of things streaming into this place so they're all like thought rays and working rays and stress rays. And then you pop out the other side and instead of running, screaming, fearful, you're running, screaming, happy.

Step 8: The digital image. In the final step the participant creates a summary image or montage that expresses the topic under study. This step, like Step 7, reflects the notion that a person's assumptions influence interpretations by "forecasting" how a story will end (Collins 1991). The story told in the digital image brings forth assumptions, frames of reference, and decision rules, some expressed for the first time during the creation of the digital image and some raised during earlier steps.

Creation of the digital image actively distorts and violates the previously symmetric images. It is precisely this process of recreation through distortion that elicits new ideas, intensifies feelings, and deepens insights (Leyton 1992). When their reconstructed images are complete, participants are asked to tell the stories they represent as if they were explaining the images to someone who had not been present during any part of their interviews.

Because creative capacity is far more basic and inherent as a cognitive process than is generally acknowledged (Finke, Ward, and Smith 1992; Smith, Ward, and Finke 1995), virtually every participant has a successful experience in this step. This step necessitates the involvement of a specialist in digital imaging techniques to serve as the participant's "hands." The participant's pictures are scanned into the computer, and image management software is used to create the montage. The focus of this process is to help participants express their thinking (Lanham 1993) rather than to develop an image that is aesthetically pleasing. Technicians are trained to avoid leading participants when conveying what the technology permits. However, they do prompt participants to explain the relevance of particular image editing decisions. For example, the orientation of, proximity to, and consonance with other elements of a cutout placement can be quite meaningful. The overall structural pattern might hold significance, as might the sequence in which image elements are introduced into the collage. The interviewer seeks to understand the meaning.

One executive's digital image and description are presented in Figure 1. To present more fully the vocalic quality (paralanguage) of the description, it is usually given in the participant's own voice on video tape or interactive CD-ROM.

CONSTRUCTING THE CONSENSUS MAP

A construct by itself possesses little innate meaning. Constructs acquire meaning primarily through causal associations with other constructs (Edelman 1992; Gergen 1994b). Consequently, the data must be aggregated (see *Laddermap* for an effective software procedure). Transcripts, audio tapes, images, and interviewers' notes are examined for constructs and construct pairs. The resulting *consensus map* depicts the most important set of constructs and the connections among them that influence customer and manager perception, understanding, and behavior.

A rule of thumb used in developing the final consensus map is that a given construct must be cited by half or more of the participants in a project and be associated directly with another such construct by one-third of the participants. A completed consensus map usually includes between 25 and 30 constructs and represents 85% of the constructs sur-

Figure 1
SOLVING ILL-STRUCTURED PROBLEMS

*Transcript and Image for Stephan Haeckel**

This is a representation of the way I think about messy problems at two levels: generally, as a human being, and specifically, as Steve Haeckel.

Humans extract signals from their environment (represented by the background photo of the universe) (**anomaly detection**) and filter them through a set of concepts and perceptions (**frames of reference**). The carousel is a metaphor for the brain, and the slides in it symbolize individual percepts and concepts that extract specific patterns (**pattern recognition**) and colors from the "white light" of signals constantly bombarding us. This reduces data glut by several orders of magnitude and is the first step in creating meaning. The patterns are then interpreted by mental processes (**frames of reference**) in a manner governed but not dictated by our DNA (represented by the extract from a print-out of part of the human genome). We translate these interpretations into action (**solution formulation**) by making decisions and acting upon them, thereby creating real world objects (symbolized by the Step Pyramid) and/or intellectual objects (exemplified by the excerpt from the score of Beethoven's Ninth Symphony).

At a personal level, the universe represents my habit of trying to get the largest, most expansive context to frame an ill-structured problem when it presents itself (**problem sensing, problem definition**). The universe is also meant to reflect a disconcerting awareness that this perspective is only one of an infinity of possible perspectives, and unique in its particulars to me (**values, distance**). Next, I test this overarching structure with several different filters (the individual slides in the carousel of my mind) (**switching rules**) that I have accumulated through experience, borrowed from others, and developed by learning. These slides are selected from all of the slides I have collected on the basis of intuitive and subjective judgments about their quality and relevance. The results, projected on the "screen" of my particular DNA-governed consciousness, are a set of candidate understandings and conclusions about the nature of the problem.

I then typically force myself to articulate these conclusions in written form—which is why I used the textual representation of DNA rather than a more graphical helix icon. It has been my experience since elementary school that this is the most reliable way for me to make a self-assessment of the quality of my thinking (**distance, integrity**). It seems that I'm not aware of what I'm thinking until I say it, not sure of what I'm saying until I write it, and it's often only when I've read what I've written that I'm sorry or happy that I thought it.

An important criterion for me in making this assessment is how big the idea seems to be (**passion**). Some of the most intrinsically satisfying and exciting moments of my life are associated with encounters with huge ideas (**reflective intelligence**). I can remember the place and people around me when I first was exposed to the hubris and implications of the second law of thermodynamics, and the insight encapsulated by the line from Macbeth, "Though all things foul would wear the brows of grace, yet grace must still look so." (Left on the cutting room floor in the editing process leading to the composition of this digital image is a close-up photograph of Grace Kelly's eyebrows. So important does that quote seem to be in explaining how I deal with messy problems—i.e., trying not to reject the obvious and the apparently insincere or banal out of hand—that I actually contrived to smuggle it into the ZMET interview by using this terrible visual pun.)

So I strive for the biggest idea possible (**passion**), which on reflection may explain why I feel compelled to search initially for the largest possible context—the broadest canvas on which to paint. But the result is always a textual/verbal expression of a conclusion about the essential nature of the problem and how to deal with it. The outcome is a result of conscious and subconscious choices made along the way about (1) what signals to pay attention to (**anomaly detection, problem-sensing**), (2) what frames to use in filtering meaning out of these signals (**frames of reference, problem definition**), (3) the mechanisms internal to me for deciding what the highest order potential solution is (**integrity, values, switching rules**), and (4) acting on that decision by expressing it as an idea (**reflective intelligence, trust**).

The fact that I chose Beethoven's Ninth and Imhotep's 4700 year old pyramid—the first and still one of the largest man-made artifacts—is a reflection of my personal conviction that these rank among the very largest and most successful ideas in human history for solving important ill-structured problems.

*Stephan Haeckel, Director of Strategic Studies, IBM Advanced Business Institute. Printed with permission.

faced by any one participant. At most, data from four or five participants, randomly selected, are generally required to generate all of the constructs in a consensus map (Zaltman and Coulter 1995). This should not be surprising. The mind is not the possession of the individual. It grows from interpersonal associations and other interactions within a sociocultural world (Bargh 1990; Gergen 1994a; McClamrock 1995; Resnick 1991; Sperber 1994). These associations arise in a sociocultural context that produces commonly shared meanings for objects or events found within that context (Clemen and Winkler 1985; Morrison and Schmittlein 1991). Emotions also are socially constructed (Oatley 1993; Saarni 1993). Therefore, the constructs in a consensus map that are based on a small sample of participants can be representative of a larger population. At the same time, the relationships between constructs must be viewed with caution and tested with a larger sample.

Figure 2 presents a subset of the consensus map of key constructs, based on 36 interviews from the approach to ill-structured problems study. The map reflects the thoughts and feelings of senior executives and academics who have substantial experience addressing ill-structured problems. Less experienced managers would likely produce a different map. A discussion of the important relationships among these constructs is not feasible here. Normally, these maps are presented electronically so that a person can "click" with a mouse on a construct or connection between them to generate a sample of illustrative images accompanied by descriptions of their meaning delivered in participants' own voices.

FUTURE RESEARCH DIRECTIONS

Further research needs to follow several directions. One general direction concerns further research and development with respect to the premises and steps discussed here. A second general direction concerns new uses of these ideas and procedures. Both are discussed subsequently.

Improving Metaphor Elicitation

Considerably more research is needed into the complex interplay of verbal and nonverbal representations of thought just as more is needed in how best to leverage the image basis of thought. For example, the technique used here for illustrative purposes stresses visual stimuli. It may be that for some populations and topics, such as entertainment or transportation, stress should be placed on other perceptual systems, such as audition. People might collect examples of music and other sounds as the basis for the initial storytelling. Also, more work is possible with respect to the analysis of data from Step 6 involving sensory metaphors. This would be especially appropriate in cross-cultural studies. To date, little work has been done using this technique (and Step 6 data in particular) in other countries or with culturally diverse groups on a comparative basis. The technique is based on processes that are universal in a cultural sense, though the specifics uncovered in different cultural settings (e.g., the type of metaphors used, the meanings they hide and reveal) would likely differ depending on the topic. Step 7, the vignette or movie, represents another fruitful direction for research and development. Currently, people verbalize the movie scenes they imagine. Newer software may permit the participant to construct a vignette on a computer with the help of a technician just as the digital image is now constructed as part of the interview. The use of animation in this process may permit more complete expression of embodied cognition.

The research technique discussed here is labor intensive, and it is likely that other efforts to build on these same premises might share this quality initially. A major challenge is how to implement these methods and develop ways of analyzing the resulting data more efficiently without sacrificing effectiveness. A related issue involves the representativeness of the relationships arising between constructs. It is suggested here that these relationships represent hypotheses whose representativeness of a larger population must be established in other ways. Validation studies to date support the contention that the constructs elicited are representative of a much larger population (appropriate to the sample). Insights about the representativeness of the associations between constructs have been encouraging but still are inadequate. It is yet to be determined how many people interviewed with this method need to specify a given relationship between constructs for that relationship to be considered representative. The number is likely to be in excess of that which is needed to establish relevant constructs. Some validation studies have involved comparisons with large surveys (in excess of 35,000 respondents in one case), but the survey data provided so far only showed relevant constructs, not associations or pathways among them.

New Applications

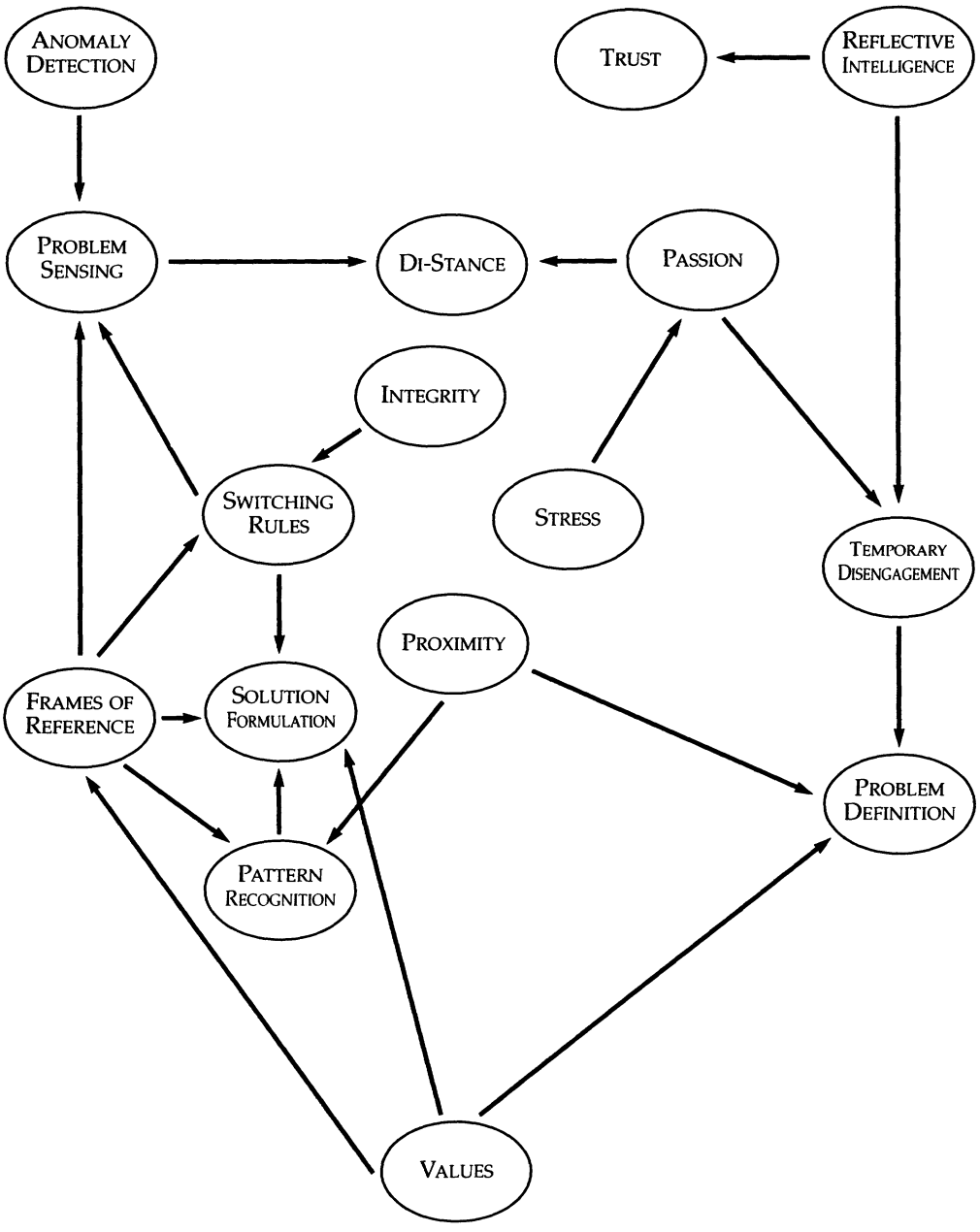
The use of physiological measures of consumer response is familiar to marketing (Bagozzi 1991; Olson and Ray 1983; Rothschild and Hyun 1990). Electroencephalograph (EEG) measures, skin reactance, vocalics, and pupillography, for example, have been used with varying degrees of success. Newer technologies such as positron emission tomography (PET) scans and functional magnetic resonance imaging (fMRI) have created new opportunities to measure with far greater precision than previously possible, mental events that were not amenable to ready observation until recently (Cabeza and Nyberg 1997; Kosslyn et al. 1993). New technologies expected in the next few years, coupled with the rapid accumulation of knowledge about brain structure and functioning, promise even more exciting opportunities to act on several of the premises discussed at the outset of this article.

In a study now underway at Harvard University and the Massachusetts General Hospital, Stephen M. Kosslyn and I are using PET scans to assess the impact of three alternative marketing stimuli (relating to automobile dealerships) developed by Lewis Carbone of Experience Engineering for a division of General Motors. The constructs involved in these stimuli (about which study participants also complete a written questionnaire) include anxiety, trust, and comfort.

Subsequent work will use PET and fMRI to identify and assess constructs, monitor sequential events (forward and backward) consistent with Premises 8 and 9, and identify and evaluate salient metaphors. It also will be used to evaluate the salience, character (positive, negative), and memorableness of metaphors contained in digital images created in Step 8, vignettes developed in Step 7, and other images, such as those articulated in Step 6. PET and fMRI present special opportunities to identify deep or root metaphors that

Figure 2

PARTIAL CONSENSUS MAP: MANAGER'S APPROACH TO ILL-STRUCTURED PROBLEMS



Definition of Key Constructs Appearing in Partial Consensus Map

Anomaly Detection. Sensing changes, aberrations, and disruptions to normal patterns.
Di-Stance. Gaining insight while being a part of and also apart from the problem situation.
Frames of Reference. The expectations, assumptions, and decision rules used as filters.
Integrity. Admitting to being part of a problem and acknowledging a limited ability to contribute to a problem's solution.
Passion. Strong convictions about the importance of a problem and solution.
Pattern Recognition. The ability to see and/or create order out of confusion.
Problem Definition. Who owns and is affected by the problem? Is it worth trying to solve?
Problem Sensing. Being aware intuitively of the possibility of a problem.
Proximity. The appropriate viewing distance (e.g., trees versus forest).
Reflective Intelligence. Devoting time to a problem, thinking deeply about it.
Solution Formulation. Generating alternative solutions and knowing when to quit.
Stress. Pressures, the consequences of failure, and the capacity to leverage stress constructively.
Switching Rules. Deliberately alternating filters or frames of reference.
Temporary Disengagement. Engaging physically and mentally in unrelated activity.
Trust. Willingness to make oneself vulnerable to the decisions of others.
Values. Knowing what personal and organizational values influence your approach.

could engage diverse market segments and assess the relative importance of key constructs and the strength of associations among them.

Existing segmentation techniques identify groups of people on the basis of shared constructs. A more fundamental unit of analysis is instead the thought processes (i.e., the lines rather than the shapes in a construct map) that bring constructs to life. That the lines in a consensus map represent thought processes that are shared by different people suggests that it may be possible to identify market segments on the basis of shared common thought processes. This is the equivalent of identifying subgroups within a larger social network. Statistical tools of analysis employed in sociometric research would be appropriate to use.

Mental models might also be used to explore brand equity when construed as the value customers place on their relationships with a brand. The relevant dimensions of customer value are reflected by the constructs in a consensus map related to a brand. This map is the customers' characterization of their relationships with the brand; it is the thought structure that orients them toward the brand. Assessing the relative importance of each construct and the strength of the associations among them would provide an overall measure of brand equity and identify individual components of brand equity that might be managed more effectively.

SUMMARY

Research methods and analytical tools vary in their assumptions and the kinds of questions to which they are best suited. Constructive debate often revolves around the underlying assumptions and appropriate approaches to collecting and analyzing data, and the nature of data, facts, problems, and methods. This article contributes to this discussion by stressing the need to include in research design wherever possible greater sensitivity to the nature of thought and behavior among those we study. Several premises, as noted subsequently, have been introduced as design criteria for creating or improving research methods.

Research design should reflect better the occurrence of thought as images. Procedures must stimulate imagery more effectively. Because metaphors are central to the creation and preverbal expression of thought and are particularly powerful in eliciting thoughts and emotions often hidden with conventional techniques, managers and customers should be enabled to express their thoughts through visual and other metaphoric images. Abstract thought is both shaped and expressed by physicality, which suggests that metaphors involving sensory and physical motor programs must be developed further. To include room for individual and cultural differences, our methods of inquiry must accommodate a wide variety of metaphors and metaphoric expressions. The various premises are interwoven, though this has not been addressed formally. For example, mental models not only guide the selection of stimuli (Premise 8) such as pictures participants bring to the interview, but also contain the metaphoric embodiment (Premise 5) of tacit and often hidden knowledge (Premises 2 and 4) that underlies unconscious thought and emotion (Premise 7), which influence decision making (Premise 6).

Because most thought, emotion, and learning occur without awareness, probing methods must be developed to bring these experiences to a level of awareness that can be articulated. It also is important that the process of surfacing and articulating key constructs permits the mapping of the thought processes that connect constructs and produce mental models. Several related steps illustrate one method of probing. The storytelling (Step 1) or verbal conveying of initial nonverbal meanings sets up the construct elicitation procedure (Step 4) and provides the basis for the interviewer selection of images for metaphor elaboration (Step 5). In addition, other sensory images (Step 6) provide a foundation for the richer thinking characterizing the creation of vignettes and digital images (Steps 7 and 8). In nearly all cases, the digital images are based on the pictures used in Step 1 even if their meaning has changed.

Although nearly all premises relate to all steps, the more prominent associations are presented in Table 1. For example, the storytelling step is rooted in the premise that thought is image-based; that most meaning is shared nonverbally and therefore nonverbal images (i.e., pictorial and other sensory metaphors) contain considerable preverbal and often, initially, unconscious meaning; that metaphors such as visual and other sensory images are important in creating and conveying thought, especially hidden thought; and that existing mental models guide the selection and interpretation of salient images and thus the stories told. The vignette and digital imaging steps, for example, are grounded in the premises that thought is image-based; that most communication is nonverbal; that cognition is embodied and therefore perceptual, and motor systems and spatial orientation are used metaphorically to express abstract thought and also contain much hidden knowledge; that emotion and reason are both important in decision making; that much thought and emotion occurs without awareness but is capable of being brought to conscious expression; and that mental models guide our creation (processing of stimuli) of stories.

Table 1
STEPS AND PREMISES

	Premises								
Steps	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Storytelling	√	√	√	√				√	
2. Missed Images	√								
3. Sorting	√			√					
4. Construct Elicitation	√			√		√	√	√	√
5. Metaphor Elaboration			√	√		√	√		√
6. Sensory Images	√	√		√	√	√	√	√	
7. Vignette	√	√		√	√	√	√	√	
8. Digital Image	√	√	√	√	√	√	√	√	

Premise 1: Thought is image-based.
Premise 2: Communication is nonverbal.
Premise 3: Metaphor is central to thought.
Premise 4: Metaphors elicit hidden knowledge.
Premise 5: Cognition is embodied.
Premise 6: Emotion and reason are equally important in decision making.
Premise 7: Thought, emotion, and learning occur without awareness.
Premise 8: Mental models guide processing of stimuli.
Premise 9: Mental models interact.

The examples in this article of how important premises about basic human processes may be used in the design of research methods are intended to guide others interested in incorporating into the design of new and existing research techniques important qualities of customer and manager thought that are absent in standard research tools. Although these techniques have been used successfully in conjunction with many different populations and research issues, the example is itself in a process of continued development.

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