The Role of Imagery in Information Processing: Review and Extensions

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Mental imagery is receiving increased attention in consumer behavior theory and research. This article describes imagery, characterizing it as a processing mode in which multisensory information is represented in a gestalt form in working memory, and discusses research on the unique effects of imagery at low levels of cognitive elaboration. It specifies researchable propositions for the relationship between high elaboration imagery processing and consumer choice and consumption behaviors. Finally, it reviews specific methods for studying imagery.

Information processing research has traditionally focused on discursive or descriptive information processing (Bettman 1979; Greenwald 1968; Olson, Toy, and Dover 1982; Swasy and Munch 1985; Wright 1974, 1980).[1] As such, researchers have examined how *symbols* (most commonly words and numbers) are combined in working memory to represent and solve problems. Discursive (symbolic, language-like) information processing encompasses a broad range of strategies. Compositional choice strategies, counterarguments, attributions, and formulations of choice rules are illustrations of discursive information processing. Increasingly, however, attention has been given to the role of mental imagery in information processing (Childers and Houston 1982, 1984; Childers, Houston, and Heckler 1985; Lutz and Lutz 1977, 1978; Rethans and Hastak 1981; Rossiter 1982; Rossiter and Percy 1983; Smith, Houston, and Childers 1984). Imagery is a conceptually distinct way of representing information, a way that is "very like picturing and very unlike describing" (Fodor 1981, p. 76).[2] To date, this emergent research stream has focused predominantly on imagery processing at low levels of cognitive elaboration—for example, mentally picturing a stimulus object. More recently, there have been discussions that refer to imagery processing at higher levels of elaboration. These discussions suggest that elaborated imagery plays a role in influencing (1) affective responses to stimuli, and (2) behavior (Calder 1978; Cohen 1982; Greenwald and Leavitt 1984; Rossiter and Percy 1978, 1983; Smith et al. 1984).

This article addresses the meaning of imagery processing, how it differs from discursive processing—particularly under varying degrees of cognitive elaboration, and what unique effects it has on processing outcomes. It also reviews research on the unique effects of imagery under conditions of low elaboration and explores the potentially unique effects of imagery at higher levels of elaboration. The article gives specific attention to the role of imagery in problem framing, assessing probabilities, forming intentions, and generating affect. In addition, it considers the use of imagery in consumer settings throughout the phases of consumption and develops researchable propositions to guide future research on elaborated imagery. Finally, it explores issues related to the conduct of research on imagery.

THE MEANING OF IMAGERY

Imagery is defined here as (1) a process (not a structure) by which (2) sensory information is represented in working memory. Imagery processing, and information processing in general, fall on an elaboration continuum that ranges from processes limited to the simple retrieval or evocation of a cognitive concept to

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[1]As used here, discursive means passing from premises to conclusions; proceeding by reasoning or argument (Oxford dictionary). Descriptive processing is a somewhat broader term suggesting any meaningful combination of verbal or other symbolic units. Although the two terms have a slightly different connotation, they will be used interchangeably here for ease of presentation.

[2]This is not to say that the debate of what imagery is and what it is not has been resolved (cf. Block 1981). Processing probably often occurs on a continuum between "pictures" and "symbols." For example, maps and stick figures (as mental images) would have features of both (Fodor 1981).

processes involving multiple concepts and constructions (e.g., problem solving, creative thinking, and daydreaming). The following section will describe each of these issues in greater detail, and will serve to (1) distinguish imagery processing from schemas and scripts, (2) distinguish imagery processing from discursive processing, and (3) describe the elaboration continuum for imagery processing.

Imagery as a Process, Not a Structure

While the idea of imagery processing is widely accepted, the assumption that knowledge is *stored* or represented as images has been hotly debated (Pinker and Kosslyn 1983). Propositional theorists (e.g., Anderson 1978; Anderson and Bower 1973; Lang 1979; Pylyshyn 1973, 1981) argue that knowledge is represented only as a set of verbal propositional networks composed of nodes (representing concepts) and connected by links (representing relationships between concepts; see also Kieras 1978). Others have argued that knowledge can be stored as images. In support of their argument they note that studies on mental rotation of objects, image size, and parallel processing are more consistent with an imagery perspective than a propositional one (Bugelski 1983; Kieras 1978; Kolers 1983; Kosslyn 1975; Kosslyn and Pomerantz 1977; Kosslyn et al. 1981). These researchers contend that images have emergent properties that cannot be explained by propositional network theories.

While the debate between propositional theorists and imagery theorists is far from resolved, Yuille and Catchpole (1977) have developed a compromise position based on the work of Piaget and Inhelder (1973). They propose that the ability to generate images does not necessarily imply that knowledge is stored as images. They argue that knowledge is stored in an abstract (but not necessarily verbal) operational code. The well-substantiated ability to move from words to pictures and pictures to words suggests that there is a representation in memory that encompasses both. Once a knowledge structure has been activated, imagery can be generated from information contained in that structure. For example, after activating the knowledge structure for birds, an individual may imagine a prototypical bird such as a sparrow (see Mervis and Rosch 1981 for a review).

Consistent with the views of Yuille and Catchpole (1977), imagery is conceptualized here as a mode of processing information. In other words, imagery *processing* is viewed as distinct from information *structure* (knowledge storage). This distinction serves to differentiate imagery from such knowledge structures as schemas and scripts. The latter constructs refer to knowledge structures regarding an object, person, role, event, or action (cf. Abelson 1976; Rosch 1978). It is the instantiation of a schema or script that generates imagery, not the schema or script itself. For example, an individual may draw upon a script of a "romantic evening" in imagining such an evening. Information from schemas or scripts can also be processed in a discursive mode. Hence, the information structure is viewed as distinct from processing mode.

Since imagery processing relies on stored knowledge, the evocation and vividness of the image is likely to depend on the level of knowledge development. Consistent with this notion, Smith et al. (1984) found that individuals who possessed a script for a given event reported evoking imagery experiences when they instantiated that script. Moreover, individuals with well-developed scripts reported that their imagery experiences were significantly more vivid than did individuals without well-developed scripts.

Imagery as a Sensory Process

Imagery processing has several qualities that distinguish it from discursive processing. Most fundamentally, imagery processes are evoked as sensory experiences in working memory. Imagery processing includes perceptual or sensory representations in working memory that are used in much the same way as perceptions of external stimuli. Thus, imagery involves concrete sensory representations of ideas, feelings, and memories, and it permits a direct recovery of past experiences (Yuille and Catchpole 1977). The evocation of imagery may be multi-sensory—involving images that incorporate, for example, smell, taste, sight, and tactile sensations—or may involve a single sensory dimension, such as sight. In contrast, discursive processing (such as verbal retrieval, cognitive responding, and verbal encoding) is more detached from internal sensory experiences. The absence of sensory dimensions of information in working memory makes these discursive processes less concrete (more abstract) than imagery processes. Moreover, unlike discursive processing, imagery can be described along several unique sensory-related dimensions. For example, vividness refers to the clarity of images. And controllability reflects the extent to which images can be held in mind and/or altered in specific ways at will (Marks 1972).

That imagery involves internal sensory experiences has both intuitive and empirical support. Early research suggested that people can confuse imaging with perceiving (Perky 1910). Even before research on imagery existed, people talked naturally about the "pictures" in their heads. Research has since indicated that imagery and perceiving (or sensing) share the same physiological machinery, and that imagery produces physiological effects that mirror perceptual processes (Deckert 1964; Finke 1980; Lang 1979; Perky 1910; Shaw 1940). Imagery content also influences a broad range of physiological responses (e.g., muscular reactions, heart rate, eye movements, galvanic skin response; Lang 1979). Other research stresses the analogue relationship between imagery and pictures (Kosslyn 1980; Kosslyn et

al. 1983; Paivio 1975; Shepard 1978; Shepard and Meltzer 1971). Specifically, imagery is presumed to have properties that preserve the spatial and size dimensions in actual stimuli. Thus, just as an ant looks small compared to a butterfly, imagery would reproduce their relative relationship. Compared with symbolic or language-like processing, imagery processing bears a nonarbitrary correspondence to the thing being represented.

While it is recognized that imagery is a sensory and sometimes a multisensory process, the remainder of this article focuses predominantly on visual imagery. That is, the examples and discussion tend to emphasize picturing and visualizing rather than other sensory properties of the information in working memory.

The Elaboration Continuum Of Imagery

Several streams of research have proposed that information can be processed at different levels of cognitive elaboration (Cacioppo and Petty 1984; Chaiken 1980; Craik and Lockhart 1972; Craik and Tulving 1975; Greenwald and Leavitt 1984; Mitchell 1981; Petty and Cacioppo 1983). Elaboration reflects the extent to which information in working memory is integrated with prior knowledge structures. Information processed at a low level of elaboration may elicit only a recognition response. Information processed at higher levels of elaboration, however, establishes connections between encoded information and prior knowledge, and thus involves the activation and integration of data from multiple knowledge structures. Thinking, problem solving, cognitive responding, and daydreaming are all processes involving high degrees of cognitive elaboration (Arieti 1976; Bugelski 1983; Greenwald and Leavitt 1984; Simon 1978).

There has been an implicit confound in some research between processing mode (imagery vs. discursive) and processing level (high vs. low elaboration; Craik and Lockhart 1972; Craik and Tulving 1975; Petty and Cacioppo 1983). Specifically, low elaboration has been implicitly linked to imagery and high elaboration to discursive (symbolic, language-like) processing. However, both imagery and discursive processes can be described on an elaboration continuum (see the Figure). At the low end of the elaboration continuum are simple responses such as the retrieval of a verbal label, and/or an image of a perceptual object. At the high end of the elaboration continuum are discursive processes such as counterarguments, attributions, and compositional choice strategies (Wright 1980), and imagery processes such as daydreams, fantasies, and visual problem solving (Hilgard 1981; Richardson 1983). The same factors that influence elaborated discursive processing also stimulate elaborated imagery processing. For example, involvement in an activity (Greenwald and Leavitt 1984; Klinger 1977; Mitchell 1981; Sarbin 1972) and prior knowledge (Burnkrant and Sawyer 1983; Cacioppo and Petty 1984; Petty and Cacioppo 1983; Smith et al. 1984; Yalch and Yalch 1984) can elicit elaborated imagery processing, elaborated discursive processing, or both.

It is important to remember that imagery and discursive processing are not mutually exclusive processes (Arieti 1976; Bugelski 1983; Holbrook and Moore 1981a). For example, an individual may evoke an image and give it a verbal label or generate cognitive responses based on imagined (visualized) scenarios. When consumers in "real" contexts engage in imagery, it is quite likely that discursive and imagery processing and the contents of each become elaborately intertwined.[3] Based on current research, it is difficult to disentangle imagery and discursive processing and ensure that the unique effects of each processing mode are independent of content effects. Nevertheless, it is important to understand the situations that influence the dominance of one processing mode over the other. Understanding the unique effects of each processing mode on processing outcomes is an equally important issue. Research that addresses these issues is summarized in the Figure, which serves as a framework for the remainder of this article.

Our attention will now turn to the unique effects of low elaboration imagery (vs. low elaboration symbolic/language-like processing) on learning and memory, the potential effects of elaborated imagery on information processing and the phases of consumption, and finally, issues involved in the conduct of research on imagery (imagery-eliciting strategies and measures of imagery processing).

REVIEW OF LOW-ELABORATION IMAGERY PROCESSING

The bulk of research on imagery has examined imagery experiences that fall at the low end of the elaboration continuum. Two broad imagery research streams are: (1) studies of the effect of imagery as a mnemonic device, and (2) studies of the effect of imagery in enhancing incidental learning. Excellent reviews of these studies exist elsewhere (cf. Ernest 1977; Lutz and Lutz 1978; Paivio 1971; Richardson 1983); hence, the review provided here is brief and selective.

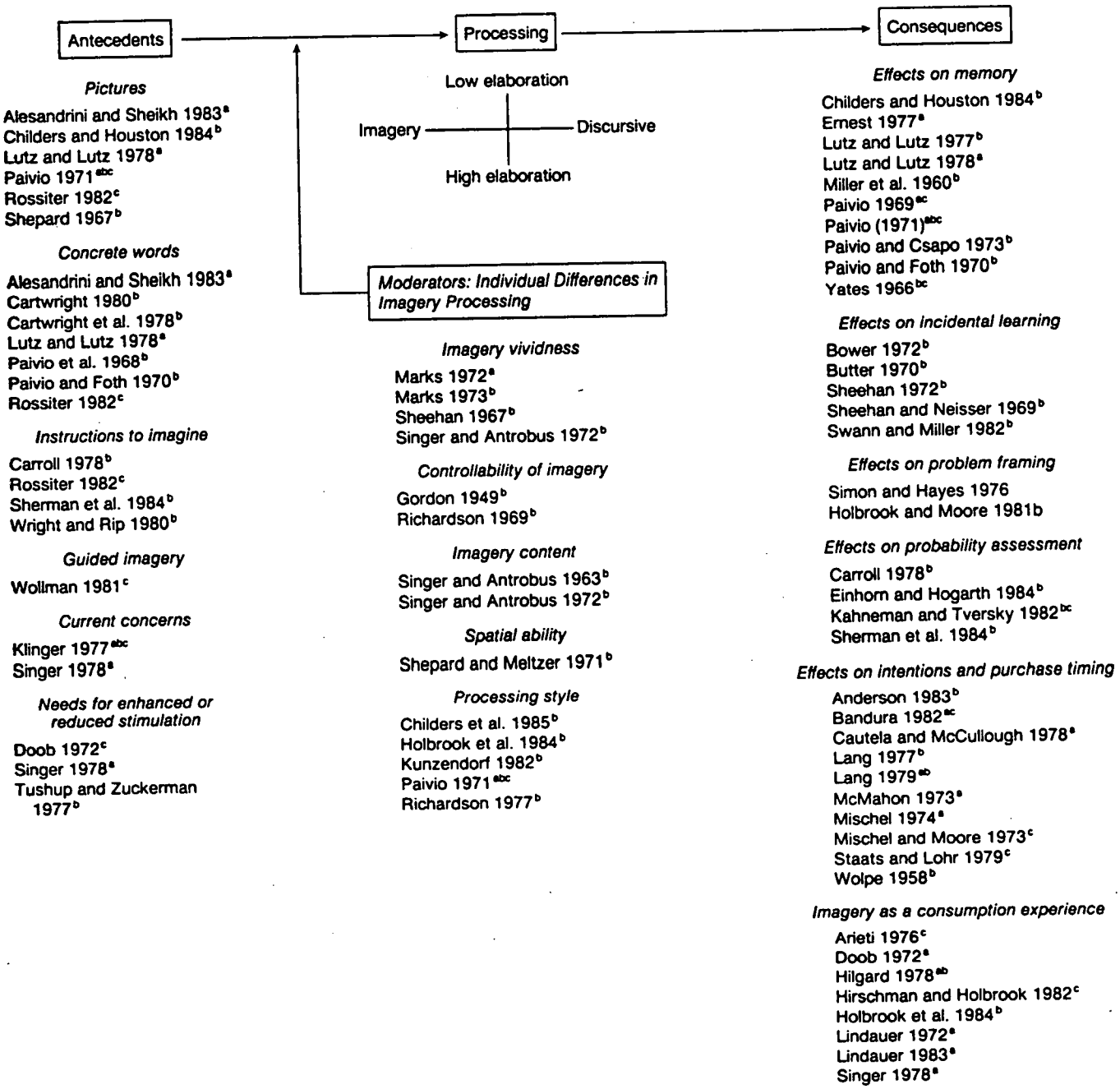
Imagery as a Mnemonic Tool

General Findings. One research stream indicates that, compared to non-imagery processing strategies such as verbal rehearsal, imagery can substantially enhance memory for pairs of stimuli (Bower 1970, 1972; Paivio 1969, 1971; Yates 1966). A factor explaining the effect of imagery on paired associate learning is that imagery provides a holistic construction that serves to

[3]One reviewer noted that a related but separate line of inquiry would not seek to disentangle the experimentally divisible process and content domains, but would instead focus on consumers' use of imagery in naturalistic settings.

FIGURE

ANTECEDENTS AND CONSEQUENCES OF IMAGERY PROCESSING



[a] Review article.
[b] Empirical article.
[c] Theoretical article.

unify object pairs in a meaningful association (Bower 1970, 1972). Thus, memory for a pair of words like "tub" and "bug" can be enhanced by imagining a bug taking a bath. These memory effects may be substantial if the unification of the object pairs results in a bizarre image. Miller, Galanter, and Pribram (1960) found that subjects could remember as many as 500 responses by imagining a stimulus in a bizarre image. The unusual image created by a bizarre association may create a more distinctive memory trace that enhances the likelihood that subjects will recall the appropriate target word (Nelson, Reed, and McEnvoy 1977). Paivio and Csapo (1973) found that memory for objects increased as the concreteness of the stimulus words increased. Thus,

memory was greatest for pictures, less for concrete words, and least for abstract words. In sum, imagery has greater effects on paired associate learning when the stimuli are concrete (particularly if they can be unified in an interactive image).

Marketing Applications. In marketing, the effects of imagery on paired associate learning have been applied in several ways. Lutz and Lutz (1977) found that pictures (imagery-eliciting stimuli) in advertisements had a positive effect on memory for product-relevant information when the brand (company) name and product attribute were unified in a picture (interactive image). Memory was reduced when items in the pair did not interact. Childers and Houston (1984) found that redundancy between pictorial and visual information in advertisements produced a superior effect on recall for the advertisement, particularly when a sensory processing strategy, as opposed to a verbal (symbolic) processing strategy, was used. The authors proposed that because of chunking at encoding, interactive images create a stronger memory trace that facilitates retrieval.

While much of the research on imagery effects upon intentional learning has focused on memory for noun or item pairs, Wright and Rip (1980) examined the role of imagery in learning a problem-framing rule. They hypothesized that imagery instructions might enhance learning by making the attributes more concrete and salient, and hence, more memorable. However, the effects of imagery on learning were modest at best. One important factor influencing these results may be that the subjects, as novices, had little schematic information about the attributes or the problem situation. For them, attribute-based information was abstract, not concrete. Thus, their ability to generate imagery may have been limited.

Imagery Effects on Incidental Learning

General Findings. Several studies indicate that imagery-eliciting stimuli (e.g., pictures, concrete words, instructions to imagine) enhance incidental learning, and thus reduce the gap between incidental and intentional learning-task conditions (Bower 1972; Butter 1970; Sheehan 1972; Sheehan and Neisser 1969). Stimulus concreteness is one factor that may help to reduce this gap. Butter (1970) asked subjects to read pairs of words that were either abstract or concrete. Subjects did not expect a recall test, making the task an incidental learning situation. Subjects recalled a significantly greater number of concrete than abstract word pairs. Butter hypothesized that concrete words elicit imagery that enhances incidental learning. In several studies reported in Sheehan 1972, Sheehan manipulated both the concreteness of the word pairs (concrete vs. abstract) and the learning conditions of subjects (incidental vs. intentional learning). In these studies, subjects in the intentional learning condition remembered both abstract and concrete pairs. However, in the incidental learning situation, subjects recalled significantly more concrete than abstract words. Sheehan (1972) proposes that imagery-eliciting stimuli in general (e.g., pictures, concrete words, imagery instructions), and not merely concrete words, enhance incidental learning. Consistent with Sheehan's hypothesis, Bower (1972) found that imagery instructions facilitated incidental learning. Half of the subjects were told to memorize 20 noun pairs and expect a recall test (intentional learning). The others were told to rate the vividness of mental images generated by the word pairs. No mention of a recall task was made to this group (incidental learning). The results indicated that imagery-orienting instructions at encoding significantly reduced the gap between intentional and incidental learning.

Marketing applications. The effects of low-elaboration imagery on consumer learning and memory offer a rich domain for future research. For example, given the often cited notion that much of consumer behavior is of the "low involvement" variety (e.g., Batra and Ray 1983), studies of the role of imagery in enhancing incidental learning would be quite informative. Since both imagery vividness and stimulus concreteness affect the usefulness of imagery in incidental learning tasks (Swann and Miller 1982), marketers need to explore the factors under their control that can influence imagery vividness and concreteness and that thus affect consumers' abilities to remember product-related information.

ELABORATED IMAGERY: REVIEW AND EXTENSIONS

In a consumer context, the role of imagery processing at high levels of the elaboration continuum remains illusory, although it is also important. Research in other fields indicates that elaborated imagery experiences (such as daydreams, fantasies, and visual problem-solving) are ubiquitous across cultures (Doob 1972) and age groups (Giambra 1977). Elaborated imagery processing can help an individual anticipate future situations (Kolers 1983; Singer 1974, 1978; Singer and Antrobus 1972) and work out solutions to current problems (Klinger 1977), and can influence affective experiences. Few consumer researchers have examined the types of consumption experiences that may evoke elaborated imagery processing or the types of consumption-related experiences that are processed as imagery.[4] Moreover, little is known about whether elab-

[4]Exceptions are studies by Holbrook et al. (1984) and Rethans and Hastak (1981). Holbrook et al. found that individuals enjoyed games more when their preferred cognitive style (imagery vs. verbalization) matched the game format (visual vs. verbal). Rethans and Hastak found that a significant portion of consumers' fears about product hazards is evoked as imagery experiences.

orated imagery produces effects that differ from discursive processing.

The following section reviews studies on elaborated imagery processing made elsewhere and develops propositions about the potentially unique effects of elaborated imagery on selected consumer behaviors. In particular, the influence of elaborated imagery on problem framing, the assessment of probabilities, purchase intentions, and affect are explored. Research relevant to this discussion is listed in the Figure.

Consumer Imagery and Problem Framing

Research in human problem solving indicates that problem framing is an important part of subsequent problem-solving activities. Both discursive and imagery processes can be used to frame problems (Simon and Hayes 1976). For example, an individual may visually imagine a product in use and use that evoked scenario as a basis for subsequent problem-solving activities (e.g., attribute evaluations, risk assessment). Alternatively, using discursive processing, an individual might examine a series of brands and attributes in a matrix and invoke a choice heuristic (e.g., a lexicographic strategy) to make a product selection decision. Research has demonstrated that the way in which a problem is represented (visually or otherwise) can have a dramatic impact on the amount of time it takes to solve a problem. It also affects the solution strategies used (Simon and Hayes 1976). While research in the choice and decision making literature has been extensive in marketing (e.g., Bettman and Park 1980; Bettman and Zins 1977; Grether and Wilde 1984; Lussier and Olshavsky 1984; Park and Lessig 1981; Wright 1974), little is known about whether imagery is used in these decision making activities and whether imagery influences decision making strategies and outcomes.

The Effect of Imagery Processing on Brand Evaluation Strategies. Most research has assumed that consumers either combine attributes to make an overall brand evaluation (choice by processing brands) or compare all brands on one or more attributes, such as price or quality (denoted as choice by processing attributes; Bettman 1979). Discursive processing obviously allows for both types of brand-evaluation strategies. Research has demonstrated that the structure of the task, information presentation format, and the prior experience and learning goals of the consumer all affect the use of brand- and attribute-evaluation strategies (Bettman and Kakkar 1977; Biehal and Chakravarti 1982; Brucks 1985; Johnson and Russo 1980).

The effect of imagery processing on brand evaluation strategies has not been explored. However, Park and Mittal (1985) indicate that elaborated imagery processing is likely to differ in important ways from elaborated discursive processing. In particular, while discursive processing can be characterized as an implicit or explicit summary of features or attributes using some combination rules, imagery is holistic. A particularly interesting study suggests the impact of mental imaging on the presence of cue configurality (feature interactions) in a product evaluation task (Holbrook and Moore 1981b).[5] While the study focused predominantly on processing differences for verbal versus pictorial presentations, the subject's claimed processing strategy (discursive vs. imagery) was found to exert a significant moderating effect on the presence of cue configurality for different input formats. As such, imagery processing does not readily lend itself to piecemeal comparisons across brands. Hence, as a tool for framing problems, imagery is more appropriately characterized as a *brand*-based processing strategy.

As a within-brand problem-framing tool, imagery becomes an effective strategy for making a *single* outcome or scenario specific and concrete. For example, the individual may first simply imagine (visualize) the product. Having made this construction, the image may be elaborated as the individual develops a scenario of the product being used. Of course, alternative scenarios might be imagined to reflect multiple-usage situations. There is obviously a tradeoff between evaluating a single brand thoroughly and evaluating multiple brands using fewer criteria. Since imagery encourages a focus on a single brand, resources available for processing information about other brands are reduced.[6] It is important to remember, however, that the use of imagery in choice contexts does not imply that the individual ignores information about other brands. Specifically, imagery may be used as part of a phased decision-making strategy along with other choice rules (Cohen 1982; Park and Mittal 1985). For example, the individual may use discursive processing to reduce the number of alternatives and then use imagery to evaluate the few that remain.

Decision Complexity and Imagery Processing. The extent to which consumers use imagery as an alternative to complex information-integration rules is not known. The issue is an important one, however, because it has implications for consumers' abilities to deal with a large array of data for a single product. Using a linear compensatory choice model, there is a positive relationship between the number of attributes or brands considered and the complexity of the problem: the greater the number of attributes or brands, the more information that must be evaluated, and hence, the more complex the decision. This guideline has been implicit in researchers' understanding of information load. While

[5]The presence of feature interactions is consistent with holistic and integrative processing.

[6]This effect may be heightened if visualizing the brand has arousal value (i.e., it's exciting and fun to imagine use of the brand). The arousal effects of imagery are discussed in subsequent sections of this article.

consumers in general seem to be able to handle a few more attributes than alternatives before information overload sets in, both attributes and alternatives affect decision complexity (Malhotra 1982).

Using imagery, it is much easier to consider a larger set of attributes than to evaluate a larger set of brands.[7] While considering a larger set of brands requires the construction of additional images, a larger set of attribute information may be helpful in "filling out" or enhancing an image. In fact, for imagery processing, there may be an inverse relationship between the number of attributes and the complexity of the decision. When attributes are not given, the image is likely to be vague, making the evocation of the image and the evaluation of the product more difficult. In contrast, greater numbers of attributes add clarity and precision to the image, which could facilitate the evaluation of the product. Of course, as noted in previous sections, this would depend on the concreteness and hence imagability of the attributes. Comparable to the novelist's detailed description of characters, detailed information on the features of a product may make visualizing the product and its uses much easier.

Missing Information and Imagery Processing. Finally, since imagery processing encourages within-brand product-evaluation strategies, it has some important implications for how consumers deal with missing information in product selection decisions. Recent research suggests that consumers use information about comparable brands to fill in missing information on a partially described alternative (Huber and McCann 1982; Meyer 1981, 1982). For example, consumers using an across-brand strategy (or processing by attributes) may assign a discounted mean value to the missing attribute (Huber and McCann 1982). Other research suggests that consumers use information about other attributes of the partially described alternative to fill in the missing values (within-brand strategy; Ford and Smith 1985). Both types of inferences have been demonstrated, but the conditions that lead to across-brand versus within-brand inferences have not been determined. Understanding the type of processing used could improve predictions of the likelihood of differing inferential strategies. While consumers using discursive processing might infer price by substituting a discounted average price of the product across brands, consumers using imagery would be more likely to infer price by first representing the product based on available information for the brand and then determining value. The following propositions summarize this discussion of the influence of elaborated imagery on problem framing[8]:

P1: When imagery processing is used, consumers will be more likely to rely on within-brand processing strategies as opposed to across-brand strategies.

P2: Consumers will evaluate fewer brands when imagery processing rather than discursive processing is used, controlling for processing motivation.

P3: There will be an inverse relationship between the number of attributes given and perceived decision complexity when imagery processing is used. In contrast, there will be a positive relationship between the number of attributes given and perceived decision complexity when a discursive processing strategy is used.

P4: When imagery processing is used, consumers will infer missing attributes based on existing information about the product rather than on estimation of the mean value of the missing attribute from information on other brands.

Imagery Effects on Probability Assessment and Consumer Satisfaction

In framing consumption problems and product alternatives, consumers are likely to elaborate on the consequences of product use (Ajzen and Fishbein 1980; Wright 1980). In using imagery to elaborate on product or purchase outcomes, systematic effects in probability assessment and behavioral intentions may arise. These effects are explored in the sections that follow.

Conjunctive Probability Assessment. Recent research suggests that individuals overestimate conjunctive probabilities (i.e., the likelihood that two events will occur together; Fischhoff 1985; Tversky and Kahneman 1983; Wallsten and Budescu 1983). While there are many possible sources of biases in predictive judgments of this sort, one of the most important appears to be elaborated imagery. Recent research by Kahneman and Tversky (1982) indicates that when individuals imagine a future scenario they attach probabilities to the scenario as a whole, not to the individual sequences of events that make up the scenario. As Kahneman and Tversky note, "the cumulative probability of at least one fatal failure in the sequence of

[7]This would not necessarily generalize to sequential tasks (i.e., where additional attributes are provided at a second exposure) since the nature of the information stored in memory for imaginal versus discursive processing may vary (see Fiske 1982). Little is known about the factors that affect information use in memory-based choice, but there is some evidence that consumers use prior overall evaluations and that the extent of brand-attribute feature processing in general is reduced (Bichal and Chakravarti 1986; Lingle and Ostrom 1979; Loken and Hoverstad 1985).

[8]It is recognized that discursive processing refers to a broad set of processing strategies, including cognitive responses and cognitive algebra. For ease of presentation, these (and subsequent) propositions are simply formulated around the general term, without specifying the specific form of discursive processing.

images could be overwhelmingly high, even though the probability of each individual cause of failure is negligible" (1982, pp. 207–208). Relatedly, Einhorn and Hogarth (1984) found that individuals tend to assign a high probability to conjunctive events that they can readily imagine and pay little attention to the number of contingent outcomes between the two events. Moreover, the authors suggest that imagery may be one of the most frequently used methods for estimating conjunctive probabilities. Thus, when asked about the probability of event 1 and event 2 co-occuring, respondents may decide about the plausibility of the scenario by imagining (visualizing) a scenario in which the events co-exist. The research discussed earlier on the relationship between the presence of feature interactions and processing strategy (discursive vs. imagery) also provides indirect support for the importance of processing strategy in conjunctive probability assessment (Holbrook and Moore 1981b).

Likelihood Assessment. Because of its impact on conjunctive probability assessment, imagery is likely to increase the perceived likelihood that the visualized scenario will unfold as imagined. That is, probabilities of individual events that make up the scenario are discounted in judging the likelihood of the imagined scenario. However, imagery also affects perceived likelihoods more directly. Some research suggests that the very act of visualizing an event can make the event seem more likely. Carroll (1978) conducted experiments in which individuals were asked to imagine a specific outcome for a future event (e.g., the outcome of a presidential election or a football game). The remaining subjects were given no imagery instructions. For subjects who imagined the outcome, a portion was asked to verbally elaborate on the reasons for the imagined outcome, while the remainder engaged in imagery without verbal elaboration. The dependent variable was the perceived likelihood that the event would occur as imagined. Subjects who imagined the future outcome perceived a higher likelihood of the event occurring than did subjects who did not imagine the future event. Moreover, verbal elaboration (a discursive processing strategy) had no additional effect on expectations. This effect has been explained in terms of the availability heuristic: imagining outcomes increases their perceived likelihood by making the outcomes more salient and easier to recall.

Several other studies have demonstrated that imagining or explaining a hypothetical future event increases subjects' subjective probability estimates that the event will actually occur (Anderson 1983; Gregory, Cialdini, and Carpenter 1982; Hoch 1984; Sherman et al. 1981, 1983, 1984). Sherman et al. (1984) told college students about a new disease that was increasingly prevalent on campus. The disease was described to one group of subjects in terms of several concrete, easy-to-imagine symptoms. To the other group, the disease was described with nebulous, difficult-to-imagine conditions. When these two groups were asked to imagine themselves contracting the disease, only those given the easy-to-imagine symptoms increased their estimated likelihood of getting it. (Those given the difficult-to-imagine symptoms actually reduced their perceived chance of contracting the disease.) These results suggest that imagery can upwardly bias perceived likelihoods, particularly when subjects are provided with concrete information that enhances the vividness of images.

While several studies suggest that the presence (vs. absence) of imagery can influence likelihood assessments, the results do not clearly establish whether elaborated discursive processing (such as the construction of explanations or reasons) and elaborated imagery have equivalent or differing effects on perceived likelihoods. For example, Carroll's 1978 study suggests only that the effects of imagery are not enhanced by the addition of verbal arguments. Moreover, the extent to which the effect is the consequence of the nature of imagery processing itself or the indirect effect of imagery on content is also unclear. Certainly, providing a construction of explanations or reasons for a particular outcome differs from visualizing the outcome—not only in processing style, but also in content.

There are several reasons to suspect that elaborated imagery may affect perceived likelihoods more than would elaborated discursive processing. For example, imagery is likely to be more concrete and bear a closer resemblance to perceptual phenomena (perhaps increasing the salience of imagined outcomes over verbal arguments). Nevertheless, it is clear that both types of processing can affect likelihood estimation, and there is, at present, no unambiguous test of which type of processing has the greater impact.

Extremity of Decision Outcomes Considered and Consumer Satisfaction. In addition to its potentially biasing effect on likelihood assessment and estimates of conjunctive probabilities, elaborated imagery may lead to a positivity bias with regard to future decision outcomes (O'Neal 1974). The fact that imagery provides a sensory analogue makes it natural for consumers to focus on outcomes that feel good. Note that the positivity bias is an indirect effect of imagery processing. The sensory analogue properties of imagery processing cause consumers to focus on positive consequences.

If imagery does promote a positivity bias, it has serious implications for consumer satisfaction, especially when examined in conjunction with the biases discussed above. For example, as a brand-based evaluation strategy, imagery may reduce the number of brands that consumers consider in their evoked set. Instead of thoroughly evaluating a number of alternatives, consumers may focus on a single brand, imagining one or several scenarios that are both positively biased and seen as highly likely (e.g., conjunctive biases and perceived likelihoods). The likelihood that the imagined scenario

will unfold as planned is quite low. Even if the actual outcome is favorable, it is likely to differ from the imagined outcome. Deviations of the actual outcome from the imagined outcome give rise to surprise. Deviations of this sort have been noted in the satisfaction literature as an important cause of consumer dissatisfaction (Anderson 1973). The effect of imagery on the extremity of the decision outcomes considered before purchase and post-purchase satisfaction has not been investigated.

Individual differences in product- or purchase-related knowledge are likely to influence the magnitude of a "halo effect" and the number of alternative scenarios generated. A better developed knowledge base allows for the construction of greater numbers of alternative scenarios. Consequently, if consumers are willing and sufficiently knowledgeable to imagine multiple scenarios, they are less likely to expect any one of these to unfold as planned (Carroll 1978). Moreover, in a probabilistic sense, there is an enhanced likelihood that at least one of the scenarios will unfold as planned. In addition, an experienced consumer might not only draw favorable outcomes but may develop unfavorable outcome scenarios as well. These imagined negative scenarios not only affect the direction of expectations; they also make it possible for the individual to engage in prepurchase behaviors that reduce the likelihood that the negative imagined event will occur (risk-reduction strategies).[9]

Based on this discussion, several propositions for the effects of imagery on probability assessment and consumer satisfaction can be developed:

P5: Consumers will estimate higher conjunctive probabilities for decision outcomes when an imagery processing mode as opposed to a discursive processing mode is used.

P6: Consumers will estimate higher likelihoods for the decision outcomes when an imagery processing mode as opposed to a discursive processing mode is used.

P7: When imagery processing is used, the level of prior knowledge moderates the relationship between imagery and satisfaction. Specifically, the lower the level of prior knowledge, the higher the level of purchase dissatisfaction (for a given level of decision involvement).

Imagery Effects on Purchase Intentions and Purchase Timing

Imagery Effects on Purchase Intentions. Since antiquity, philosophers have suggested that elaborated imagery (such as daydreams) affects intentions to act (see McMahon 1973). Research in some areas has substantiated this effect (Cautela and McCullough 1978; Staats and Lohr 1979; Wolpe 1958). In clinical psychology, research indicates that elaborated imagery of a feared outcome is a major factor perpetuating phobias (intentions to avoid an object). Moreover, imagery-based treatment strategies can successfully reverse these intentions (Bandura 1982; Cautela and McCullough 1978; Wolpe 1958). At least in clinical contexts, imagery processing has been found to be more effective than discursive processing in influencing behavioral intentions (Cautela and McCullough 1978). The latter explain imagery's effect on intentions as a form of "covert conditioning," suggesting that people approach (avoid) objects that they associate with positive (negative) rewards via imagery. Similarly, Staats and Lohr (1979) view imagery as a stimulus that can elicit approach (avoidance) responses.

On the basis of several experiments, Lang (1977, 1979) concludes that intentions are affected only if there is an emotional reaction evoked by the imagined scenario. On the basis of experimental results he argues that emotional reactions to imagined scenarios that include feared objects are highest when elaborated imagery processing is used. In particular, the strongest effects were observed when subjects imagined themselves interacting with the feared object (rather than simply imagining the feared object or reading about the feared object).

Outside of the clinical context, there is little research on the connection between imagery processing and behavioral intentions. In one study, however, Gregory et al. (1982) found that subjects who imagined themselves enjoying the benefits of cable TV were more likely to subscribe to cable TV service than were subjects who only heard of these benefits. Anderson (1983) had subjects imagine either themselves, a liked friend, or a disliked acquaintance performing (or not performing) a set of behaviors (e.g., donating blood, taking a trip). The effect on intentions was most dramatic for self-related imagery. Subjects who imagined themselves performing the set of behaviors significantly changed their behavioral intentions. Furthermore, greater changes in intentions were found the longer subjects imagined themselves performing the behavior. The effect of self-oriented imagery on intentions was also quite enduring (at least 3 days).

The effect of self-related imagery on intentions might be explained in two ways: by the concreteness of the imagined scenarios and/or by the greater emotionality of the imagery. It might be that individuals can imagine their reactions to constructed scenarios better than they can imagine the reactions of others. Thus, the imagined scenario (including responses) is more concrete (Anderson 1983). Alternatively, the effect might occur because imagery is more emotionally provocative when it is self- versus other-oriented. Recall that Lang's (1977,

[9]Other individual differences (e.g., optimism vs. pessimism), past experiences, and particular circumstances may also affect the extent of a positivity bias.

1979) results suggested that the extent to which imagery affects intentions is related to the emotionality of the image. Self-oriented imagery may also make more information available. Mowen (1980) examined the relationship between imagery and purchase intentions, hypothesizing that imagery would make information more available and, hence, impact intentions. He found no effects. According to Mowen, however, several aspects of the study and the manipulations used may have led to the null effects. Thus this hypothesis deserves further testing.

Imagery Effects on Purchase Timing. Research on delay of gratification (Mischel 1974; Mischel and Moore 1973) indicates that the degree of elaboration invoked in imagery can influence subjects' abilities to delay gratification. It finds that imagery of having and using a desired object produces a positive sensory and emotional experience, which in turn enhances desires for the object. The emotions induced by elaborated imagery reduce subjects' abilities to delay gratification. The implicit reasoning is that while the imagery itself offers a positive sensory and emotional experience, actual consumption of the product would offer more tangible sensory and, thus, emotional benefits. Research by Mischel also suggests that when subjects simply generate static images of the desired object, but do not engage in an elaboration of these images, imagery enhances their abilities to delay gratification. While it is easy to see how using imagery to produce a positive sensory and emotional experience would decrease the ability to delay gratification, it is not intuitive why imagining a static image of the desired object (versus imagining nothing at all) would increase the ability to delay gratification. Mischel (1974) proposes that generating an image of the object serves to remind individuals that the object is still there to be acquired at some future time. Because the image is not elaborated, emotional responses (and resulting frustrations) are kept to a minimum.

The relationship between elaborated imagery and enhanced purchase desire is directly relevant to promotional strategy. To be effective in reducing the delay between purchase consideration and actual purchase, persuasive communication strategies need to focus on helping audiences imagine the positive sensory and emotional experiences they would derive from having the object. Just reminding consumers of the product's existence is not sufficient to stimulate desires. In fact, it may even help them to delay purchase. Despite the intuitive importance of the relationship between elaborated imagery and reduced purchase acquisition time, this relationship has not been investigated in consumer research.

Summarizing the preceding discussion of imagery effects on purchase intentions and timing in the form of propositions:

P8: There will be a greater change in behavioral intentions when elaborated imagery as opposed to discursive processing is used.

P9: Self-related imagery will affect intentions more than will imagery that does not include the self.

P10: The more concrete and emotional the imagery, the greater the change in behavioral intentions.

P11: Controlling for ability to buy, elaborated imagery will reduce the delay between purchase consideration and actual purchase.

P12: The degree of elaboration moderates the relationship between imagery and purchase motivation. Specifically:

a: Controlling for ability to buy, elaborated imagery will reduce the delay between purchase consideration and actual purchase.

b: Controlling for ability to buy, visualizing the desired object (low-elaboration imagery) will increase the delay between purchase consideration and actual purchase.

Imagery as a Consumption Experience

One of the most important and unique qualities of high-elaboration imagery is that it is a sensory analogue that provides the imager with a surrogate experience (Arieti 1976). Doob (1972) proposes that high-elaboration imagery enables people to secure "substitute satisfaction." Hilgard (1978), Lindauer (1972, 1983), and Singer (1978) provide evidence that high-elaboration imagery offers a form of self-entertainment, gratification, and stimulation. The ability to secure substitute satisfaction through imagery applies not only to preconsumption activites, but to activities throughout the phases of consumption: preconsumption, consumption, and post-consumption.

Preconsumption Imagery. At the preconsumption stage, imagery processing allows vicarious consumption through browsing or shopping. While researchers have noted that experiential pleasures can result from browsing and shopping (Bloch, Sherrell, and Ridgway 1986; Hirschman 1980), the extent to which imagery affects satisfaction with these browsing and shopping activities has received little attention.

In facilitating vicarious consumption, elaborated imagery is likely to be most valued and prevalent when consumers perceive actual consumption to be blocked by situational contingencies. For example, inability to buy, risk associated with product use, or other personal circumstances make imagery an important tool for attaining some of the entertainment, gratification, and stimulation that would derive from actual consumption. The implication is that elaborated imagery is most useful as a substitute experience when actual consumption is not a viable alternative and when some of the benefits

of consumption can be attained from imagined consumption. Obviously, there are limits to the benefits that can be attained with imagined consumption. In particular, since imagery offers a sensory substitute, it is most useful when the benefits of product use involve sensory stimulation (as opposed to, for example, functional benefits). Thus, elaborated imagery is most useful as a substitute experience when the benefits of consumption are sensory and high, and the costs and/or risks of product acquisition are also high. In this case consumers can attain some of the benefits of product consumption without incurring the costs. Interestingly, whereas elaborated imagery *with ability to buy* can increase frustration and reduce the delay between purchase consideration and actual purchase, elaborated imagery without the ability to buy may provide satisfaction through a substitute sensory and emotional experience. Thus, whether elaborated imagery processing leads to reduced or enhanced purchase desire depends on whether actual consumption is viewed as possible or not (given the costs and risks of consumption).

Consumption Imagery. Imagery can also play an important role during the actual consumption experience. Many products are purchased explicitly for the fantasy imagery they generate (Hirschman and Holbrook 1982; Holbrook and Hirschman 1982). Products are often viewed as important for their role in stimulating imagery (e.g., records, books, movies). Playful consumption, which includes leisure activities, sports, games, etc., is a domain where imagery appears to play a particularly important value-enhancing role (Holbrook et al. 1984). As such, the value of many products is a function of both intrinsic qualities and qualities imbued by imagery during the consumption experience. Thus, imagery in the consumption phase has the potential for increasing product satisfaction. Lindauer (1983) provides an extensive review of the use of imagery experiences in the pursuit of hedonic consumption activities (e.g., listening to music, through literature, etc.). Research has suggested that some individuals report substantial levels of imagery when engaged in hedonic consumption activities (Hilgard 1978). Nevertheless, the connection between imagery processing during consumption and levels of consumption satisfaction has not been established. Some indirect evidence in consumer behavior of this connection is the finding that enjoyment of games (positive feelings and pleasure) is a function of the congruency between the type of game and the preferred cognitive style (imagery or discursive). Hence, at least for people who like to engage in imagery, products that facilitate imagery provide more pleasure and fun (Holbrook et al. 1984).

The relationship between imagery and hedonic and symbolic consumption experiences offers a rich terrain for future consumer research. Unfortunately, as Lindauer (1983) notes, much of the research thus far has been poorly conceptualized and methodologically flawed. Important and interesting questions for marketers include the role of imagery in the stimulation of hedonic and symbolic consumption, and satisfaction with hedonic and symbolic consumption activities. Understanding the fantasies consumers associate with the consumption of hedonic and symbolic products can facilitate the promotion of these products. Further, understanding consumption imagery can provide marketers with an important way of increasing satisfaction with the consumption experience.[10] If imagery enhances the value of the consumption experience, products (especially hedonic and symbolic ones) can be designed to stimulate imagery. Even consumption of certain functional products may be enhanced by associating the product with positive imagery. For example, the communications research manager at Coke summarizes one advertising strategy as imbuing the object with imagery to give it added value (Wall Street Journal 1984). He goes on to note that concrete cues can be associated with positive imagery such that the presence of these cues in other circumstances elicits positive imagery regarding the product.

Post-Consumption Imagery. Remembered consumption has long been viewed as an important input into decisions about future consumption activities (Engel and Blackwell 1982). Nevertheless, little attention has focused on the nature of remembered consumption. Tendencies to save mementos, ticket stubs, and photos indicates consumers' desires to relive consumption experiences. Imagery can play an important role in reliving these experiences. Recent work indicates that valued possessions are often treasured for the imagery experiences and memories they generate (Csikszentmihalyi and Rochberg-Halton 1981; Wallendorf 1984). Consistent with earlier discussions, research has indicated that imagery of past experiences is most often associated with experiences and events that were particularly salient and/or emotional at the time (Marks 1972). Hilgard's (1978) work refers to "reintegrating stimuli"—stimuli that reinvoke a state-dependent retrieval experience. She observes that stimuli are most successful in retrieving a memory image if they include some of the direct perceptual properties (e.g., sights, sounds, smells) associated with the remembered experience. These stimuli serve as concrete cues that elicit imagery.

Imagery used to relive consumption experiences should be of interest to marketers for several reasons. First, using imagery to relive a valued consumption experience suggests that a consumption experience can live well beyond its typically conceived duration. Flowers, champagne corks, photographs, and other items may be saved for a lifetime and used to relive important events. Huge expenditures for events like weddings, proms, and special vacations are often justified not solely by their present value, but by their future value.

[10]This would probably come as no surprise to the novelist or movie director concerned with helping audiences "live the story." Nevertheless, the importance of imagery in other consumption activities has been overlooked.

If marketers want to encourage investment in apparently transient consumption experiences, they may find it useful to emphasize the lasting power of these experiences through imagery. Moreover, elaborated imagery after consumption can increase the remembered satisfaction of consumption. The same kind of "halo" effect that appears to operate with imagery processing in general is likely to operate with imagery of remembered events. In this way, consumption experiences that included a mixture of good and bad events may be remembered in a positive light. Finally, elaborated imagery after consumption can encourage repurchase behavior. Recall that elaborated imagery, by providing a positive sensory and emotional experience, is likely to reduce ability to delay gratification when controlling for ability to buy.[11] The relationship between elaborated imagery and consumption experiences can be summarized in several propositions:

P13: Vicarious consumption facilitated by imagery will be most satisfying when the perceived benefits from actual consumption are sensory in nature and the cost/risks of actual consumption are perceived as prohibitive.

P14: Consumption satisfaction for hedonic and symbolic products will be higher when elaborated imagery as opposed to discursive processing is used.

P15: Consumers will report higher levels of satisfaction with the recall of a past consumption experience when elaborated imagery as opposed to discursive processing is used.

P16: Elaborated imagery of a past consumption experience will increase intention to repurchase (controlling for ability to buy).

CONDUCTING RESEARCH ON IMAGERY

The final section addresses issues involved in the conduct of research on imagery. Intended as a brief overview of research on the manipulation and measurement of imagery processing, the section's primary purpose is to acquaint the unfamiliar reader with the basic tools for conducting imagery research. Two domains, summarized in the Figure, are reviewed: (1) strategies for manipulating imagery, and (2) strategies for measuring the extent of imagery processing.

Imagery-Eliciting Strategies

As the Figure indicates, a number of external sources can induce imagery (see Alesandrini and Sheikh 1983 and Lutz and Lutz 1978 for reviews). The sources described briefly here are: pictures, concrete words, instructions to imagine, and guided imagery. Throughout this discussion it is useful to keep in mind that imagery can also occur in the absence of external stimuli simply via information voluntarily retrieved from memory. "Current concerns" or "unfinished business" often trigger daydreams of potential, anticipated, or future outcomes (Klinger 1977). Needs for stimulation caused by sensory deprivation also increase spontaneous imagery (Singer 1978; Tushup and Zuckerman 1977). Finally, needs to escape an excessively stimulating environment can also give rise to an internal focus on imagery (Singer 1978).

Pictures. Pictures are well-established predictors of imagery (Bugelski 1983; Finke 1980; Paivio 1971; Rossiter 1982; Shepard 1967; Singer 1978). The fact that visual information tends to be remembered better than verbal information (the picture superiority effect) has also been explained through imagery (Alesandrini and Sheikh 1983; Childers and Houston 1984; Lutz and Lutz 1977; Paivio 1971). However, pictures need not induce only imagery processing (Kieras 1978; Rossiter and Percy 1983); hence, it is dangerous to equate the mode of information presentation with its representation in working memory (Rossiter and Percy 1983). With the increased focus on the impact of pictures in consumer information processing (e.g., Childers and Houston 1984; Edell and Staelin 1983; Kisielius and Sternthal 1984; Rossiter 1982; Rossiter and Percy 1983), understanding the conditions under which pictures produce imagery becomes important.

Concrete Words. Concrete words can stimulate the generation of imagery as well (Paivio and Csapo 1973; Paivio and Foth 1970; Paivio, Yuille, and Madigan 1968; Richardson 1980). Ratings of the concreteness of words are highly related to their rated imagery value (Paivio et al. 1968). Recent work by Cartwright (1980; Cartwright, Marks, and Durrett 1978) indicates that abstract words can be made imaginal by instructing subjects to think of an imagery-based exemplar. For example, abstract words like "peace" and "quarrel" can be made concrete by evoking an image of a dove (an exemplar of peace) or an image of people actually engaged in a quarrel. Thus, the relationship between concrete and abstract words and imagery may be more complex than initially thought.

Instructions to Imagine. Instructions to imagine represent another external source to the generation of imagery. Some marketing researchers (Mowen 1980; Wright and Rip 1980) have relied on instructions to imagine in stimulating imagery. These studies reported negligible effects on learning and attitudes from the imagery manipulation. However, other studies using this manipulation have reported important and significant effects (cf. Carroll 1978; Gregory et al. 1982; Sherman et al. 1984). Rossiter (1982) suggests that in an adver-

[11] In this context it is useful to note that certain consumption experiences may be viewed as unrepeatable and hence positive imagery would not imply repurchase. However, as one reviewer noted, a positive imagery experience may generate word-of-mouth communications that affect others' purchase of the consumption experience.

tising context, instructions to imagine are less effective as imagery-eliciting strategies than are "high imagery visuals." However, this interpretation should be qualified. Instructions to imagine may be ineffective in situations where little schematic knowledge exists (Wright and Rip 1980) or where external stimulation interferes with the generation of imagery (Mowen 1980). However, imagery instructions may be an important manipulation strategy when consumers are allowed the time to generate vivid imagery, when cues are concrete (Paivio and Csapo 1973; Richardson 1983), when instructions focus on subjects' reactions to the image (Lang 1979), and when consumers have sufficient knowledge to generate imagery about reactions (Rethans and Hastak 1981; Smith, Houston, and Childers 1983).

Guided Imagery. "Guided imagery" (Wollman 1981) is an imagery-eliciting strategy that resembles imagery-based methods used in clinical settings. Participants are first asked to relax and then practice developing vivid imagery scenarios. To facilitate imagery evocation and vividness, participants are given cues that help to guide their imagery. The procedure is repeated for several trials, and finally, subjects are asked to imagine the object that is the focus of the study. Wollman (1981) warns that the usefulness of this procedure may be confined to those who have vivid, controllable imagery. Demand characteristics may also operate with this procedure.

Measuring Imagery Processing

Measuring the presence and content of imagery represents a significant challenge to researchers. Several different methods have been used to measure imagery processing, each with its own unique limitations. Currently, few guidelines for imagery measurement have been established, but a considerable amount of research has focused on developing scales to measure individual differences in imagery processing. The next section provides a brief overview of this research.

Overview of Imagery-Measurement Approaches. Many researchers rely on criterion-based responses, not manipulation checks, in assessing imagery processing. Thus, imagery processing is manipulated by one of the strategies already discussed and inferred from the results (cf. Anderson 1983; Carroll 1978; Lutz and Lutz 1978; Paivio 1971; Sheehan 1972). An important exception is the research by Lutz and Lutz (1977). They manipulated mental imagery with the use of pictures, but also provided simple manipulation checks to ensure that groups provided only with verbal stimuli generated less mental imagery than the experimental groups.

Other researchers have given explicit consideration to measuring the content of imagery processing using both simple and complex verbal responses. Klinger (1978) recommends a procedure called "thought sampling," where the experimenter interrupts individuals involved in imagery processing and asks them to describe the content of their imaginal experiences. In a related procedure called "event sampling," imagery content is assessed by asking subjects to indicate whenever a certain type of image is aroused. Smith et al. (1984) asked subjects to write out their script for visiting the school placement office and indicate whether imagery was present or absent and high or low in vividness. Rethans and Hastak (1981) relied on a free-elicitation procedure described by Olson and Muderrisoglu (1979) to tap imagery associated with product hazards. It is possible to criticize these measurements on several counts. First, most require that respondents translate imagery processing into a discursive mode (e.g., verbal responses), confusing even more the distinction between the processing modes. Moreover, individual differences in verbosity or vocabulary can influence the nature of this translation. In addition, studies that ask individuals to detail imagery scenarios may not be assessing the extent of detail contained in the image, but rather subjects' abilities to control their image so that details can be specified.

Physiological reactions are also used as indicators of imagery processing. Brain wave patterns (see Ley 1983) are presumed to indicate the presence of imagery, but are extremely difficult to interpret and highly intrusive. Some psychologists have suggested that muscular activation mirrors imagery content and have therefore used electromyogram readings to assess imagery content (see Ley 1983). Again, however, these measures are inferential and highly obtrusive. Moreover, assessments require a considerable level of technical sophistication.

Measuring Individual Differences in Imagery Processing. A number of scales have been developed to study the role that individual differences play in imagery processing (see Ernest 1977 and Sheehan et al. 1983 for reviews of several of these scales). The scales can be classified into four basic categories: (1) scales of imagery ability (vividness and controllability), (2) scales of imagery content, (3) scales of spatial ability, and (4) scales of imagery vs. verbal processing styles.

Scales of imagery ability assess individual differences in imagery vividness and controllability. Imagery vividness is a known moderator of imagery effects in incidental learning (Ernest 1977; Sheehan and Neisser 1969; Swann and Miller 1982). It also moderates the relationship between imagery and emotional and physiological arousal (Drummond, White, and Ashton 1978; Grossberg and Wilson 1968). Two commonly used scales to assess individual differences in imagery vividness are The Betts Questionnaire Upon Mental Imagery (QMI; see Durndell and Wetherick 1976; Richardson 1977; Sheehan 1967; Westcoff and Rosenstock 1976) and Marks' Vividness of Visual Imagery Questionnaire (see Childers et al. 1985; Marks 1973; Rossi 1977). The controllability of imagery has also been demonstrated to influence a number of cognitive pro-

cesses, including mental rotations (Ernest 1977). A commonly used measure of imagery control was developed by Gordon (1949) and modified by Richardson (1969; see Childers et al. 1985; Westcott and Rosenstock 1976).

Scales of imagery content have been developed by Singer and Antrobus (1963, 1972) and Huba et al. (1982). The shorter version of the Imaginal Process Inventory (IPI; Huba et al. 1982) taps imagery vividness, the use of imagery to relieve boredom, general feelings about the usefulness of imagery, the use of imagery in anticipating the future and solving problems, fantasy imagery, distractibility, and emotional arousal from imagery. The scale is infrequently used in research applications, but has adequate internal consistency and test-retest reliabilities.

Spatial ability tests are designed to assess individuals' abilities to hold pictures of visual objects in memory and perform mental operations (e.g., mental rotations). While clearly related to the controllability of imagery, tests of spatial ability are generally independent of tests of imagery vividness (Richardson 1983). Several tests of spatial ability are available and commonly used (see Bennett, Seashore, and Wesman 1947; Likert and Quasha 1970; Shepard and Meltzer 1971; Thurstone 1938).

Finally, *scales to measure processing style* are designed to assess preferences for using imagery versus verbal processing in thinking, studying, and problem solving. The Visualizer-Verbalizer Questionnaire (VVQ) is a commonly used measure developed by Richardson (1977). The VVQ has been shown to influence imagery effects on cognitive processing (Ernest 1977) and to mediate the relationship between visually presented ads and measures of attitudes (Rossiter and Percy 1978). Two measures have been developed in consumer behavior that appear to overcome some of the criticisms of the VVQ. Childers et al. (1985) developed a new measure called the Style of Processing Questionnaire (SOP), which more clearly differentiates ability dimensions from processing preferences. The SOP scale has been related to measures of advertising recognition and recall (Childers et al. 1985). Another scale, the V/V Index, takes as its starting point the Prevalence of Visual Imagery Test (PVIT) developed by Kunzendorf (1981, 1982) to resolve some of the difficulties with the VVQ. Developed by Holbrook et al. (1984), the V/V Index differs from the PVIT by using both pictorial and verbal anchors for each scale, thus overcoming some of the earlier criticisms of measuring imagery preferences on verbal scales.

SUMMARY AND CONCLUSIONS

Even though there is considerable debate about the meaning of imagery processing and the causal role of imagery in problem-solving and sensory experiences, there is little doubt that imagery seems to play an important role in information processing (Block 1981). Empirical evidence is mounting that imagery processing affects a multitude of cognitive, physiological, and behavioral phenomena. In a marketing context, imagery processing is likely to be important in understanding incidental learning, numerous facets of the choice process, the likelihood and timing of purchases, and the nature of many hedonic and symbolic consumption experiences and re-experiences (remembered consumption). The purpose of this article has been to review research on imagery processing, contrast it with discursive (symbolic, language-like) processing, and suggest important ways in which imagery impacts consumers' learning, choices, and satisfaction. The article has also considered the role that imagery is likely to play throughout the phases of consumption. Although other research suggests that imagery is pervasive, little is known about its relative impact in consumption contexts.

A review of the research on imagery processing suggests several important possibilities to consumer behavior researchers. First, imagery is likely to have a positive impact on incidental learning. Since much of consumer learning is incidental, imagery may be even more important in consumer contexts than in other problem-solving contexts. Second, imagery processing may encourage within-brand product evaluation strategies. Within-brand strategies, in turn, have implications for how missing information is dealt with. Third, the conditions for decision complexity are likely to differ between imagery processing and cognitive algebra models. In particular, imagery processing seems best suited for the evaluation of very few brands on many attributes. Fourth, imagery may bias estimates of conjunctive probabilities and estimates of the likelihood and positivity of outcomes. These biased estimates may lead to disappointment with post-purchase outcomes. Fifth, imagery (especially self-related imagery) affects purchase intentions and the timing of purchases (by inhibiting the ability to delay gratification). Finally, imagery can offer a positive sensory and emotional experience that can substitute for consumption (e.g., vicarious consumption), enhance or supplement consumption (i.e., make hamburger taste more like steak), and play an important role in remembered consumption and intention to repurchase.

While this article has outlined some promising domains for imagery research and provided a basic overview of some of the tools of imagery research, much remains to be done. Even such basic issues as what factors stimulate imagery processing and how imagery processing is to be measured are far from resolved. Research is needed to explore the types of consumption problems consumers represent with imagery and the ways that imagery interacts with consumption experiences. Similarly, while this article focused on conceptually distinguishing imagery processing from discursive processing, there are likely to be important interplays between these two processing modes. Research investigating the stages in the decision process where imagery

is most commonly used would be important in describing part of the interplay between imagery and discursive processing.

Significant challenges lie ahead in imagery research. Methodological practices need improvement, and theoretical grounding is necessary. Because the science is in its infancy, imagery research—and elaborated imagery processing, in particular—offers an opportunity to construct theory. Consumption-related choices and experiences provide a rich domain for theory construction. The nature of learning, problem-solving, and experiences in the consumer domain are well suited to exploration of elaborated imagery processing. Consumers often make decisions with less than full information, considering only one or two alternatives. Moreover, in many cases evaluation of the decision requires information about sensory and emotional reactions to the experience. For example, in the choice of many services and symbolic or hedonic products, the most important part of the choice involves assessing how it will feel (the sensations surrounding the anticipated consumption). Imagery processing provides a uniquely appropriate mode for evaluating the sensory qualities of products. Finally, a considerable proportion of people's hopes and dreams focuses on consumption related experiences—spending a million dollars, owning a fast car, building their own home. As such, consumer researchers are provided with a natural environment in which to explore some of consumers' most important imagery experiences.

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