THE EFFECT OF MEMORY STRUCTURE AND FUNCTION ON CONSUMERS' PERCEPTION AND RECALL OF MARKETING MESSAGES: A REVIEW OF THE MEMORY RESEARCH IN MARKETING

Edward O'Donnell, Columbus State University
Steven Brown, Columbus State University

ABSTRACT

Marketers have long recognized the important role that memory plays (e.g., by affecting consumer perception and recall of marketing messages) in the decision-making processes of consumers. In this article, we provide an overview of consumer memory structure and function. We then extend our review to examine the impact that consumer memory has on the evaluation of marketing generated information, the role that consumer involvement has in the recall and influence of marketing messages, and the affect that interference from similar competing brands has on consumers' ability to remember specific brand information. Finally, we address some of the methodological problems associated with memory structure measurement and identify areas for future research.

INTRODUCTION

Memory plays an important role in the decision-making processes of consumers by affecting their perception and recall of marketing information. Consumers knowingly and unknowingly use information stored in memory to make a myriad of decisions ranging from what brand and flavor of gum to purchase to what make and model of car to buy (Schiffman & Kanuk, 2007). Thus, the ability of consumers to recall marketing generated information has a major impact on their purchasing decisions. Unfortunately, because of the structural and functional limitations of consumer memory (Bettman, 1979), much of this information is never attended too or even, forgotten. Thus, an understanding of the nature of consumer memory and memory functions has important implications for marketers.

The goal of this article is to address this need by providing an overview of the memory research in marketing. In particular, we focus on three memory-related issues:

1) the impact that consumer memory structure has on the evaluation of marketing generated information;
2) the role that consumer involvement has on the recall and influence of marketing messages; and
3) the affect that interference from similar competing brands has on consumers' ability to remember specific brand information.

This research has important academic and managerial implications. First, though research has been conducted regarding the affect that memory has on consumer perception and decision making, there is considerably more work that remains to be done. Thus, it is our hope that this review will encourage researchers to intensify their efforts in this important area of study. Second, in the preparation of this article, a number of methodological problems were identified. Though we offer some recommendations in this article to address these problems, more in-depth theoretical and empirical development is clearly needed. Finally, organizations continue to devote extensive financial resources to reach, inform, and influence consumers (Armstrong & Kotler, 2007). Unfortunately, memory-related problems/limitations may dramatically reduce the outcomes of these efforts. By providing marketers with insights regarding the nature and limitations of consumer memory and its affect on perception and recall, the return on their advertising and promotional investments should be substantially improved.

We begin this review by providing an overview of memory structure and function. We then examine the memory research in marketing pertaining to consumer memory structure, consumer involvement, and competing brand interference effects. Finally, we address some of the methodological problems that currently exist in measuring memory structure and identify some directions for future research.

AN OVERVIEW OF MEMORY

Memory may be conceptualized as a series of storage systems with differing functions and properties (Bettman, 1979). A typical model includes a set of sensory stores, a short-term memory store, and a long-term memory store (Atkinson & Shiffrin, 1968). In these models, information passes from the sensory organs to the sensory stores and, if attended to and processed, is moved to the short-term memory store. The short-term memory store processes the information from the sensory stores and essentially acts as the center of current processing activity (Bettman, 1979). Information from the long-term memory store may be retrieved and included in the processing of information in the short-term memory. Finally, a portion of the information in short-term memory may be stored in long-term memory for future use.

There are three well accepted models of memory (Bettman, 1979): the multi-store model, the level of processing model, and the activation model. The multi-store model posits that the

sensory stores, the short-term store, and the long-term store are distinctly separate memory stores. However, there is considerable evidence to refute the strict interpretations of the multi-store model (Postman, 1975). In contrast, the level of processing model (Craik & Lockhart, 1972) provides a conceptualization of memory that is not encumbered by the distinct memory stores paradigm.

The level of processing model posits that individuals have limited processing capacity which may be utilized for information processing (Craik & Lockhart, 1972). According to this model, there are differing levels of processing that place varying demands on the limited processing capacity of the individual. For example, sensory analysis has a low level of processing whereas elaboration of information has high levels of processing. Therefore, the processing of sensory information requires less capacity allocation than cognitive elaboration of information. Furthermore, the level of processing model hypothesizes that the level of information processing determines the retention of that information for later use since higher elaboration of information is associated with higher levels of processing and long lasting memory (Craik & Tulving, 1975).

Similar to the level of processing model, the activation model is also not encumbered by the paradigm of distinct memory stores. The activation model posits that there is one memory store wherein only limited portions may be activated at a given point in time. Accordingly, only the activated portion of memory may be used for processing current information (Bettman, 1979). Furthermore, the activated portion of memory will be lost unless further effort is expended to maintain activation. A useful visualization for the activation process is that of a series of wires that glow brightly when activated then dims slowly if activation is not maintained.

The three prevalent models of memory appear to be theoretically incompatible, yet the three theories may be liberally viewed as an activation model (Bettman, 1979; Craik & Lockhart, 1972). The perspective of the multi-store model is consistent with the view that the short-term store is a temporary activation of memory stored in the long-term store (Shiffrin & Atkinson, 1969). Furthermore, the levels of processing model may be viewed as an activation model since the allocation of limited capacity is consistent with the paradigm of limited activation of memory (Bettman, 1979). Therefore, the most widely accepted model of memory appears to be the activation model.

There are two basic uses of memory. The first involves the storage of information in long-term memory and the second is the retrieval of information from long-term memory. These are separate functions yet they are not independent of each other. Furthermore, these functions occur simultaneously. The differences in these functions impact the construction process used in response generation potentially leading to incomplete retrieval of information from long-term memory. To address this, individuals have differing strategies on how and what to process, what is stored in long-term memory and how to store it and retrieve it, and so on. These processes are called memory control processes.

Memory Control Processes

Memory control processes are strategies that individuals use to direct information flow into and out of memory (Atkinson & Shiffrin, 1968; Bettman, 1979). These processes may be controlled by the individual or may be automatic. The six types of memory control processes are rehearsal, coding, transfer, placement, retrieval, and response generation.

Rehearsal involves the mental repetition of information or the recycling of information through short-term memory. Two roles are typically assigned to rehearsal: 1) information maintenance in short-term memory and 2) information transfer to long-term memory. According to Bettman (1979), rehearsal is best characterized as an allocation of processing capacity that is performed in accordance with the requirements of the task and the individual's goals. Also related to rehearsal is the coding strategy of the individual. Coding involves the associations between the rehearsed information and the data from long-term memory (i.e. the way that information is structured by the individual for rehearsal).

The transfer process involves the decision of what information to store in long-term memory and in what form to store it in (Bettman, 1979). The expected use of the information plays a significant role in determining what information is stored and the type of storage (Shiffrin & Atkinson, 1969). Furthermore, based on the perspective that individuals are cognitive misers (Wyer & Srull, 1989), the easiest transfer strategy will be employed based on the expected use of that information. For example, the rigor of the transfer strategy will be greater if the individual expects that recall is required versus mere recognition of that information. The placement of information in long-term memory has significant implications in the memory process. Placement, from a memory structure perspective, is not related to a physical location, but to the association structure that is created during item processing (Bettman, 1979). The placement of information has significant implications relative to later retrieval since retrieval of information depends on the reconstruction of that particular placement strategy.

Finally, the retrieval of information from memory is a critical part of the memory process. If the process used for coding, transfer, and placement cannot be reestablished, the ability to access an item in long-term memory may be seriously limited. From this perspective, forgetting is not related to the loss of information in long-term memory but to the failure of the retrieval process. Thus, remembering may be viewed as a constructive process and, as such, may be subject to distortion since items stored in long-term memory are not stored exactly as they were entered and completely recalled when desired. Specifically, individuals will use partial recollections from long-term memory with the gaps being filled by his/her expectations of what "must have been" (D'Andrade, 1974). Interestingly, research aimed at the retrieval process indicates that retrieval of information from long-term memory is facilitated when the situational context during retrieval matches the expected retrieval context during the storage process (Ahn & LaFerle, 2008; Thomson, 1972; Thomson & Tulving, 1970).

Despite these processes, there are a number of functional limitations that reduce an individual's ability to process information in short-term memory and to retrieve information from long-term memory.

Properties of Short and Long-Term Memory

It is widely accepted that short-term memory has limited processing capabilities. Miller (1956) hypothesized that the short-term memory is capable of simultaneously processing only seven (plus or minus two) chunks of information. According to Miller, a chunk is a configuration that is familiar to an individual and is capable of being manipulated as a single unit. In other words, a chunk is an organized cognitive structure that expands as information is added to it (Bettman, 1979). Therefore, the processing capabilities of the short-term memory may be increased by the development of larger chunks, which is related to the degree of familiarity with and previous exposure to the information content of the chunk. Furthermore, processing demands on the short-term memory may also reduce the capacity to process information (Newell & Simon, 1972). For example, if part of the total capacity of short-term memory is used for a given task, less capacity remains for chunk processing. Therefore, the normal capacity of seven chunks may be reduced to two or three chunks as other tasks such as search processes or counting tasks are undertaken simultaneously (Bettman, 1979).

The time required to transfer an item of information to long-term memory provides yet another limitation of short-term memory. Newell and Simon (1972) found that five to ten seconds are required to transfer and place one chunk of information into long-term memory that is to be recalled. As expected, the processing time for one chunk of information that is to be recognized is considerably less at two to five seconds per chunk. However, these processing times should only be used as an approximation since the rehearsal and coding strategy used by an individual will impact the processing time per chunk (Bettman, 1979).

In contrast to short-term memory, the long-term memory is hypothesized to be an unlimited and permanent store (Bettman, 1979). Semantic concepts and the associations among them is an important part of what is stored in long-term memory (Anderson & Bower, 1973; Quillian, 1968). Such concepts may include objects and the attributes of objects, events, processing rules, and so on. The long-term memory of semantic information is believed to be organized as "a network of nodes and links between nodes, with the nodes representing concepts and the links denoting the relationships between concepts" (Bettman, 1979, pp. 42). According to Collins and Loftus (1975), each link has a strength relating to how important that link is to the meaning of the concept. The processing of a concept involves activating the node corresponding to the concept of interest with activation spreading throughout the network along the links. In other words, the activation of a concept (node) leads to the activation of other concepts (nodes) that are linked to that concept (Lerman & Garbarino, 2002). The activation continues to spread throughout the memory structure

while decreasing in strength over longer semantic differences (i.e. spreading activation). New data is stored in long-term memory by creating a series of links between a new concept and an already stored concept (Bettman, 1979).

MEMORY RESEARCH IN MARKETING

So how does memory affect consumers' perceptions and ability to recall marketing messages? In this article, we look at three specific aspects of memory that have been studied in the marketing literature. First, we examine the effect that schema-based knowledge structures have on memory. Then, we address the affect that involvement has on consumers' ability to recall and recognize information for future use. Finally, we look at the impact that interference between a brand and other similar competitive products has on consumers' ability to remember marketing messages. It should be noted that the information provided here is not intended to be a comprehensive review of the memory research in marketing. For example, individual differences such as gender and emotional disposition which have been shown to impact memory and elaboration of message cues (Lee & Sternthal, 1999; Meyers-Levy & Sternthal, 1991) have not been addressed.

Schemata Related Issues

The long-term memory is organized in a hierarchical manner based on three levels of concept categories (Rosch, 1978) from the more general superordinate level, to the more specific basic level, and then followed by the even more specific subordinate level. The most abstract level is the superordinate categories, which are the largest and most general categories containing only a few attributes (i.e. furniture). The superordinate categories contain categories at the basic level, which contain concepts with attributes shared by essentially all members of the category (i.e. chair, couch, etc.). Similar to the superordinate categories, the basic categories also contain subordinate categories, which are composed of concrete, tangible concepts. However, the concepts in the subordinate categories have attributes that overlap those of the other categories. For example, the Honda Accord may have many of the same attributes as the Ford Focus or an S-10 Pick-up truck.

In addition to concepts being hierarchically organized into categories, concepts may be hierarchically organized into more complex organizational structures (Marks, 1985). In particular, this organizational structure involves three levels: concepts, propositions, and schemata. Concepts are signaled by, but not equivalent to, word and phrases (i.e. dog) whereas propositions are similar to phrases in that they can combine basic concepts into more complex structures. Schemata are a combination of a number of propositions or a network of interconnected concepts and propositions and can be conceptually viewed as a set of related concepts that may be activated together and which guide the thought process (Marks, 1985). Schemata have been classified into several basic types

such as concept, object, self, scene, person, action (scripts), and causal schemata (Fiske & Taylor, 1991).

The schema categorizations can be related to a marketing context. For example, object schemata are created from brands, product types, and product classes while action schemata are created from the process of shopping for and the purchasing of products. Action schema are typically called scripts in the marketing literature. Scripts contain an individual's generalized knowledge about specific events. Scene schemata are created from what an individual knows about the layout of a particular retail establishment while an individual's knowledge about the effects of using a particular product and the benefits derived from that product's use create causal schemata Schema Congruity. Consumer behavior researchers have investigated schema from a number of perspectives. Schema is important in consumer memory research because it impacts how consumers perceive and ultimately accept or reject the claims made by marketers. Claims that are dramatically incongruent may be rejected or altered by consumers. In contrast, if the claims are significantly aligned with consumers' schema then the message may not receive adequate attention from consumers to influence their attitudes and behaviors. Research indicates that a moderate level of incongruity may be ideal for influencing consumer's affect toward a product or service. According to Mandler (1982), the affect generated by responding to moderate incongruity will be more favorable than that typically created by responding to either congruity or extreme incongruity.

In support of Mandler's hypothesis, Meyers-Levy and Tybout (1989) find that varying levels of incongruity between the product features and the consumers' schema regarding that product impacts the favorableness of their evaluations regarding the product. Furthermore, their results suggest that moderate schema incongruity may produce favorable product evaluations even when the alternative schema activated in the evaluation process was itself unfavorably evaluated. Basically, resolution of the incongruity is hypothesized to be a rewarding process, which leads to positive affect; however, extreme incongruities results in more negative evaluation of the product due to the frustration of being unable to resolve the incongruity.

Despite the advances made in the schema congruity area, this research appears to suffer from generalizability problems. For example, the impact of moderate levels of incongruity may be different for experts than for novices. Experts possess more differentiated category structures than novices indicating that their response to incongruity may be totally different than that of novices (Meyers-Levy & Tybout, 1989). Therefore, additional testing is needed to determine the impact of moderate levels of incongruity on consumers of varying levels of expertise, age, and brand loyalty.

Brand Name Associations

Marketers have used meaningful brand names to improve the recall of advertising claims for many years. Manufacturers of products like Brawny paper towels or Mr. Clean bathroom cleaner have successful used this approach to position their products based on a particular product benefit.

Research by Keller, Heckler, and Houston (1998) found that brand names which semantically suggest a product benefit are associated more strongly in memory and facilitate recall of that benefit (Wanke, Herrmann & Schaffner, 2007). Unfortunately, this approach may hinder the creation of new brand associations if product repositioning is later attempted. For example, if the manufacturer of "Tough Stuff" pot cleaner wanted to reposition their product as a fine-porcelain cleaner, the brand name "Tough Stuff," which is an asset in the pot cleaner market will most likely become a liability in the fine porcelain market. Furthermore, research by Meyers-Levy (1989) indicates that a suggestive brand name (i.e. leading to many associations) may actually lower brand name recall since these associations may cue competing concepts thereby increasing interference.

Clearly, there appears to be some controversy regarding the effectiveness of suggestive brand names. Some research indicates that a suggestive brand name leads to increased associations thereby facilitating memory; however, other research indicates that increased interference effects may occur because of the increased number of associations related to the brand name. Therefore, additional research is needed to better define the tradeoffs between the association effect and the interference effect relative to meaningful brand names. Furthermore, the generalizability of the brand name effects should be investigated for products that require less involvement during the purchasing process (i.e. consumer non-durable goods) and with less information-intensive advertisements (i.e. television commercials).

Scripts

Scripts (action schemata) are a type of schemata that have received a great deal of attention in advertising. According to Smith and Houston (1985), scripts are distinct from other types of schemata in that they contain a set of component actions that are related in a causal temporal sequence. Script research (Puto, 1985) suggests that consumers recall script interruptions better than standard script actions. Interestingly, no significant difference was noted between the recall of a script interruption in a typical script versus that of an atypical script which seems to explain why some firms like Wisk laundry detergent have successful used atypical scripts while other firms like McDonalds have used more typical scripts with similar success. However, it should be noted that Puto's research only involved a pilot study. Additional research should be performed to verify and refine the results of his research. For example, the results from Puto's research did not identify a difference between moderate and strong interruptions relative to interruption recall. Logically, a stronger interruption should lead to better recall than that of a moderate interruption. Furthermore, the use of written scripts instead of visual scripts (i.e. television advertisements) may have accentuated the results because of the increased elaboration associated with the process of reading.

Involvement

The level of consumer involvement in advertised messages appears to play a major role in the recall and the degree of influence that the message has on consumers (Loken, 2006). The level of consumer involvement is conceptualized as the amount of attentional capacity that is devoted to encoding a particular piece of information (Craik & Lockhart, 1972). According to the Elaboration Likelihood Model (Petty & Cacioppo, 1981), higher levels of consumer involvement are associated with higher levels of cognitive effort and improved memory of advertised information (i.e. central processing). However, not all products will be considered personally relevant to consumers (i.e. high-involvement products); for these low involvement products, a peripheral processing route that is persuasive yet low in cognitive elaboration is desired.

Batra and Ray (1986) found that repetition tends to increase brand attitudes in low-involvement conditions when support and counterargument generation are low. However, as involvement levels increase, the persuasiveness of the message on the consumer's attitude toward the brand may decrease because of increased self-generated evaluative thought. In essence, involvement increases memory but often decreases persuasion.

Hawkins and Hoch (1992) studied the proposition that through repetition of a message, consumers come to believe the claim that is being made in the message under conditions of low involvement. This phenomenon has been labeled the "truth" effect (Hasher, Goldstein & Toppino, 1977). The "truth" effect may be caused by recognition and familiarity with a message such that when consumers believe that the message "rings a bell" they are more likely to judge the statement to be true. It is hypothesized that repetition activates or primes the general topic, which creates a sense of familiarity and a corresponding increase in belief. However, the "truth" effect will only occur for claims that are more ambiguous; claims that are blatantly true or false are unlikely to increase belief with increased repetition. Furthermore, Burke and Srull (1988) suggest that repetition has a positive effect on recall only when there is little or no advertising of similar products. Advertisers have successfully used this principle through the use of jingles. Jingles provide a method of low involvement repetition, which over time tends to increase the believability of the jingle's message due to the "truth" effect.

In a similar vein, Hawkins, Hoch, and Meyers-Levy (2001) studied the effect of repetition-induced increases in the belief of advertising claims that are hierarchically related. In particular, they investigated the notion of vertical and horizontal spillover relative to superordinate and subordinate concepts. The example provided in their article involves a home security system and the vertical spillover from subordinate concepts like professional installation and pick resistance and the horizontal spillover between these subordinate concepts. Their research indicates that there is a substantial amount of vertical spillover from the subordinate feature claims to the superordinate general benefit claims and that the feature claims act as a peripheral cue to support the general product benefits. In effect, the use of subordinate feature claims results in a generalized acceptance

that the product provides a benefit without specifically stating the benefit or the claim thereby leading to increased belief in the authenticity of those claims.

Despite the considerable insights provided by these researchers, research in consumer involvement appears to suffer from conceptualization and measurement problems (Schiffman & Kanuk, 2007). In particular, there does not appear to be a clear definition regarding the essential components of involvement resulting in measurement problems. Some researchers argue that involvement is a cognitive state, while others believe that the behavioral aspects or the degree of importance the product has to the consumer should be used to measure involvement. Furthermore, many researchers agree that involvement should be measured on a continuum, rather than as a dichotomy consisting of two mutually exclusive categories of "high" and "low" involvement. Therefore, the definition and measurement of involvement should be better established in order to encourage additional research in this important area of consumer memory research.

Interference

The forgetting of brand information by consumers is a significant concern of marketers. Evidence from memory research indicates that forgetting is not only due to the passage of time but also to additional learning that occurs during that time. Therefore, consumers are more likely to forget old information if they subsequently learn new information relative to a specific product offering. This process is called retroactive interference. In the case of brand information, additional information learned about a brand or similar competing brands may limit the consumer's ability to recall old information about a brand's attributes. A number of researchers (Bagozzi & Silk, 1983; Bettman, 1979; Percy & Rossiter, 1980) have argued that competition between new and existing information may inhibit consumers' memory of advertisements. Moreover, Baumgardner, Leippe, Ronis, and Greenwald (1983) found that brand evaluations deteriorated more rapidly when brand ads appeared in the same product class rather than in the context of messages of dissimilar products. In other words, advertising of similar products may inhibit the consumers' ability to remember brand information.

Burke and Srull (1988) extended earlier research and found that advertising for competing brands or even other products offered by the same manufacturer may inhibit consumers' ability to remember advertised brand information. Burke and Srull posit that a major contributor of forgetting is due to consumers' inability to retrieve brand information from memory. Furthermore, the amount and importance of interference induced forgetting appears to depend on the motivation of the consumer at the time of ad exposure and the type of product advertised. For example, if the purchase involves a low involvement product and the consumer believes that product information will be available at the point of purchase, he/she will most likely rely on brand recognition rather than recall of specific brand features. However, if the purchase involves a high involvement product and the consumer expects that limited point of purchase information will be available, then that same

consumer will increase the amount of cognitive effort to enable recall of salient product features consistent with Wyer and Srull's (1989) characterization of consumers as cognitive misers.

Overall, interference effects are an important consideration in marketing; unfortunately, there is more to be learned in this area. For example, the impact of consumers' product knowledge level should be investigated since high-knowledge consumers are better able to learn and retain complex information than low-knowledge consumers. Furthermore, high-knowledge consumers may have more defined schema regarding the salient attributes of a given product thereby reducing the effects of interference from similar product offerings.

METHODOLOGICAL CONSIDERATIONS

There are a number of methodological problems associated with memory research. Memory research relies on a number of measurement procedures to measure knowledge structures (Mitchell, 1982). In the elicitation procedure (Olson & Muderrisoglo, 1979), memory researchers apply memory probes to subjects and ask them to mention everything that comes to mind. Unfortunately, this method has a limitation in that researchers have been unable to exactly define what probes are to be used to determine a subject's knowledge in a particular domain. Another measurement procedure requires subjects to perform a particular task that involves the retrieval of information from long-term memory (Russo & Johnson, 1980). Similarly, questionnaires have been used to measure the knowledge structure within a given domain. Unfortunately, both techniques involve constructive processes, which may be subject to distortion caused by limitations in information retrieval from long-term memory. Finally, researchers use response times to measure knowledge structures; however, these types of measures require a theory of memory for interpretability. For example, if a researcher subscribes to Wyer and Srull's (1989) comprehensive model, then it seems logical to posit that more recent information and more salient information will have shorter response times.

Overall, there appears to be considerable debate about which measures provide the researcher with better estimates of the knowledge structure within a particular domain. The ability to determine what consumers actually know about a subject domain may never be completely possible due to the limitations inherent in information retrieval from long-term memory and because of the complexity and uniqueness of the schematic structure itself. However, Smith and Houston's (1985) rank order method appears to be a promising way to measure consumer script structure. The rank order method requires subjects to perform recognition tasks by distinguishing between actions relevant and irrelevant to an event and then to arrange the relevant actions in the script defined order (rather than relying on retrospective self-reported measures) thereby reducing the amount of distortion caused by the retrieval process. The rank order measure appears to provide a modest level of convergent validity with other similar measures.

Another methodological problem involves the dependence on high elaboration settings during laboratory testing. In many studies, subjects are instructed to closely evaluate an advertisement for a significant time period; furthermore, subjects are told that they will be asked questions regarding that advertisement. This results in an unusually high level of elaboration, which in most circumstances does not match the expected conditions faced by consumers during the learning process. Furthermore, the dependence on written advertising should result in higher cognition and better recall of information. In reality, most consumers are exposed to advertisements in lower elaboration settings with more environmental distractions than may be duplicated in a laboratory setting. Therefore, future studies should be performed in a number of different settings in order to determine the impact that environment, media type, and level of elaboration have on the processing and recall of information.

DIRECTIONS FOR FUTURE RESEARCH

It is apparent from this article that there is much more to be learned about consumer memory processes. Overall, our review of the extant literature suggests that research in consumer memory has yet to receive the emphasis it deserves. The area still seems to be plagued with measurement problems and much of the research has been performed under laboratory-controlled conditions. Unfortunately, not much is known regarding the memory process of consumers under more natural conditions. The impact of time pressures, external noise, and other such situational factors should be considered in future research. Furthermore, much of the memory research still relies on deliberate memorization and recall of information; yet, in reality much of the consumer's daily activities involve less involved learning.

In attitude research, a key aspect of any measurement of attitude involves the salience of a product attribute. Salient attributes are those attributes that first come to mind when a consumer thinks of a particular object. It is generally accepted that consumers look at five to nine attributes of a particular type of product when selecting a brand to purchase out of a number of competing brands. Interestingly, the number of attributes evaluated by consumers is the same chunk processing capability hypothesized by Miller (1956). Therefore, it is reasonable to hypothesize that the limitation in number of salient product attributes is related to the chunking limitation of short-term memory.

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