INTERFERENCE EFFECTS IN MULTI-ATTRIBUTE ADVERTISING

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FORIDA

2002

This work is dedicated to the memory of my deceased father, Peter A. Noel, and my grandparents – Victor and Thelma Noel also deceased. I love you all.

ACKNOWLEDGMENTS

This dissertation would not have been completed without the input of many individuals. First and foremost, I am deeply indebted to the chair of my dissertation committee, Chris Janiszewski. He has been an advisor, a role model, and a friend during this arduous process. His guidance helped equip me with the research tools that I need to successfully pursue a career in experimental research. Additionally, I am thankful for the insightful comments and suggestions of the members of my dissertation committee – Joe Alba, Ira Fischler, Alan Sawyer, and Steve Shugan. I am especially grateful to Alan Sawyer for his guidance and support beyond that of a dissertation committee member. I would also like to thank Joel Cohen, Richard Lutz, and Barton Weitz for their advice and encouragement during my doctoral studies. In addition to the mentoring provided by faculty, I could not have made it through the program without the help of my colleagues; to this end I would like to thank Americus Reed, Amitav Chakravarti, Marcus Da Cunha, and Eduardo Andrade for providing me with feedback and advice when I needed it. I also thank Tony Gonzalez, Ricky Lovell, Coswell De Peza, Marlon Morris, Stephen Eugene and Fulton Wilson for their unflagging support. Last, but by no means least, I would like to thank my family in the United States and in Trinidad – especially my mother Mona Noel, and my sister Joanne Noel. Without their love, support and prayers I would not have been able to complete my studies.

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December 2002

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When people view two different ads for the same brand, the first ad interferes with memory for the product-attribute information in the second ad (i.e., proactive interference); and the second ad interferes with memory for the product-attribute information in the first ad (i.e., retroactive interference). The implication is that multi-attribute brand advertising reduces consumer memory for known attributes with each additional attribute advertised. One potential solution for this memory interference problem is to present ads for a brand's multiple attributes close together in time. Although this recommendation is inconsistent with anecdotal advertising advice to limit an ad's content to a single benefit and with empirical findings suggest that dispersed presentations are more effective at enhancing memory access, the benefits of grouping brand-attribute presentations appear to be rather robust. Implications for ad execution and ad flighting are discussed.

CHAPTER 1
INTRODUCTION

Advertising repetition can be used to achieve two related goals. First, ad repetition can increase the likelihood that a brand name is remembered (Craig, Sternthal, and Leavitt 1976; Pechmann and Stewart 1988; Ray and Sawyer 1971; Unnava and Burnkrant 1991). Second, ad repetition can strengthen an association between a brand name and a product benefit (Burke and Srull 1988). The greater the memory for a brand name or its product benefits, the greater the likelihood that the brand will enter into a consumer's consideration set (Hauser and Wernerfelt 1990; Hutchinson, Raman, and Mantrala 1994). Changes in consumer consideration set inclusion are directly related to changes in market share.

Although one might assume that the benefits of advertising repetition are pervasive, evidence suggests that the benefits are limited to a very specific set of circumstances. For example, Burke and Srull (1988) found that when people view two different ads for the same brand, the first ad interferes with memory for the product-attribute information in the second ad (i.e., proactive interference) and the second ad interferes with memory for the product-attribute information in the first ad (i.e., retroactive interference). In a later study, Burke and Srull (1988) also found that competing ads from the same product category create memory interference and that repetition of the target ad is only effective when there is a single competing ad (also see Keller 1987). Thus, existing empirical evidence suggests that advertising is less effective

if a brand advertises on more than one attribute or if a brand operates in a product category where more than one brand advertises. In other words, advertising is fairly ineffective for most brands in most product categories since most brands advertise more than one attribute and most brands have competitors that also advertise.

Recommendations about how to solve the memory interference problem inherent in a competitive advertising environment have been limited. The best advice for limiting memory interference has been offered by Keller (1987) who argues that advertisers must find unique cues (e.g., spokespeople) to associate with their brand attributes. The unique cue can form an independent association with product attributes or can combine with the brand name to provide two cues for recall of the attribute information. Keller, Heckler, and Houston (1998) argue that suggestive brand names (e.g., PicturePerfect televisions) can also serve as unique cues, but that the cue is only effective for semantically related benefits. Unfortunately, suggestive brand names also hinder recall of subsequently advertised, semantically unrelated benefits.

In this paper, I argue that there are situations in which repetition can be used to enhance recall in multi-attribute advertising or multi-competitor advertising contexts. I begin with a review of evidence related to brand name and product-attribute recall. Then I discuss explanations of memory inhibition and facilitation in the context of repeated exposure to material. I consider three different theories that could explain the memory processes involved in learning repeatedly presented material – encoding variability theory, reconstruction theory, and study-phase retrieval. Then through a series of four experiments, I examine competing predictions from these theories to determine which theory or theories have the most predictive power in a given context. My goal is to show

that brands can use multiple ads to advertise multiple attributes without incurring a memory interference penalty and that ad repetition strategies exist that are more or less effective in competitive advertising environments.

CHAPTER 2
THEORETICAL BACKGROUND

Advertising Repetition

Studies examining the influence of advertising repetition on memory can be categorized into two separate, but related advertising goals. First, brand managers are interested in increasing the accessibility of brand names in consumers' memory. Second, brand managers are interested in increasing the strength of the associations between brand names and product attributes or benefits.

Brand Recall

There is considerable evidence that ad repetition increases the recall of brand names (Craig, Sternthal, and Leavitt 1976; Singh and Rothschild 1983; Singh, Rothschild, and Churchill 1989; Singh et al. 1994; Unnava and Burnkrant 1991). Craig et al. (1976) find that increasing the number of ad repetitions increases the recall of the brand names mentioned in the ads, but that the effect is most robust with long delays between ad exposures and test. Singh and Rothschild (1983) show that increasing the number of television commercial exposures from one to two to four increases recognition of brand names, product claims, and product packages. Singh et al. (1988) showed that increasing the number of television commercial exposures from one to two increases the recall and recognition of the product classes and brand names mentioned in the commercials. In general, ad repetition enhances memory for information contained in the ad.

Repeated exposure to advertising may increase memory for brand names because each ad exposure involves a different encoding context, hence each exposure creates additional retrieval cues (Singh et al. 1994; Unnava and Burnkrant 1991). The encoding variability hypothesis states that the more different the first presentation (P1) is from a second presentation (P2) of a stimulus, the more paths there are to retrieval at test (Glenberg 1976; Melton 1970). For example, Unnava and Burnkrant (1991) had people view a shampoo ad with two different executions or identical executions. People had higher unaided and aided recall of the brand name when the ad executions were different than when they were the same. Unnava and Burnkrant (1991) attributed the increased recall to the variable encoding associated with the different meanings in the two ad executions (e.g., the picture and tag lines accompanying the brand name varied in each execution of the ad).

Similarly, Singh et al. (1994) exposed people to two presentations of an identical television commercial with a short lag (e.g., one intervening commercial) or a long lag (e.g., four intervening commercials). They found increased recall of the commercial in the long lag condition provided there was a delay between exposure and test. Singh et al. (1994) argued that the increase in time between the two presentations resulted in a greater difference in contexts at the time of encoding and that this increased the likelihood that one of these contexts would be similar to the context at a delayed test. Finally, Unnava and Sirdeshmukh (1994) developed two approaches to counter the detrimental effects of competitive advertising based on the encoding variability hypothesis. They found that competitive advertising had less influence on people experiencing varied ad executions than on people experiencing constant ad executions.

Support for the encoding variability theory in advertising studies has not been accompanied by an equivalent level of support in verbal learning studies. Madigan (1969) presented variable (fever-chill, snow-chill) or constant (fever-chill, fever-chill) cues with to-be-remembered words and found a weaker spacing effect in the varied cue condition. D'Agostino and De Remer (1973, Experiment 2) showed similar results with cues embedded in constant or variable sentences. In addition, manipulations of context and meaning in different stimulus presentations often show no improvement, and sometimes show a decrease, in recall (Dempster 1987; Murdoch and Babick 1961; Postman and Knecht 1983). Thus, there is evidence that repeated presentations of an ad can lead to better recall for brand names, but there is some debate about whether the encoding variability hypothesis best explains the observed memory facilitation effects.

Brand Associations

A second advertising research stream investigates how people use brand names as cues to recall information about a brand. Brand managers advertise product features because they want to position their brand relative to other brands and because they want consumers to retrieve attribute information and to conclude that their brand is superior to competitor brands. Encouraging consumers to remember more information about a brand may lead the consumer to conclude that the brand has more benefits, or performs better on key benefits. Similarly, if consumers cannot remember much about competing brands, they may infer that the competing brands are inferior on the missing information (Simmons and Lynch 1991).

Brand associations are sensitive to interference from additional presentations of competing ads in the same product category and additional ads by the same brand that

advertise a different product attribute. For example, Keller (1987) studied competitive interference using four brands (B_i) positioned using four sets of unique product claims (e.g., $B_1 \rightarrow A_1$, $B_2 \rightarrow A_2$, $B_3 \rightarrow A_3$, $B_4 \rightarrow A_4$). Subjects who saw ads for two of these brands were more likely to remember the attributes paired with brand 1 than were subjects who saw four ads. Thus, repetition from competing ads interfered with recall of the attributes associated with the target brand. Burke and Srull (1988) argued that this same interference process could occur when a target brand did additional advertising of a second attribute. Burke and Srull (1988) replicated Keller by presenting two ads for two competing brands advertising two competing attributes ($B_1 \rightarrow A_1$, $B_2 \rightarrow A_2$) and two ads for the same brand advertising two competing attributes ($B_1 \rightarrow A_1$, $B_1 \rightarrow A_2$). Both conditions showed the same pattern of interference, thus a second ad for a brand interfered with recall of attributes from the first ad just as much as a second ad for a competing brand.

There have been a number of recommendations about how to increase the effectiveness of brand name cues. First, consumers can be encouraged to elaborate a brand name and the brand benefit, thus increasing the strength of the association between the brand and the benefit (Pechmann and Stewart 1988). Elaboration can be encouraged via repetition. For example, Rethans et al. (1986) found that repeated exposures to an ad increased familiarity with both a new product and the ad, and that recall of the ad content also increased with frequency of exposure. Elaboration can also be encouraged via processing goal. For example, Burke and Srull (1988) had some of their subjects indicate their interest in the ads they viewed while others indicated brand purchase likelihood. Subjects in the brand purchase likelihood condition showed no retroactive interference

from additional competitive or same-brand ads, apparently because the processing goal encouraged elaboration of the brand-attribute association at Time 1. Second, advertisers can limit the number of advertised attributes to a single feature. As the number of advertised attributes increases within or across ads, recall of any feature declines (Burke and Srull 1988; Keller 1987). Third, brand names can be accompanied by a distinctive cue (Keller 1987). A unique cue can join with the brand name to create a stronger activation of the product attribute or a unique cue can form independent association to the product attributes. For example, Keller (1987) showed that reproducing the photo and headline from an ad on a product package increased the likelihood that the product attribute would be recalled. Likewise, Keller et al. (1998) showed that a unique, suggestive brand name increased the recall of semantically related product attributes.

Multi-Brand/Multi-Attribute Advertising

Keller (1987) and Burke and Srull (1988) found that advertising multiple attributes across multiple ads results in lower recall of a specific attribute than if the advertising had been limited to a single attribute, assuming that exposure is equal. As the number of attributes advertised by a brand increases, recall of any one attribute should decrease. Similarly, as the number of competing brands increases, recall of the attributes advertised for any one brand should decrease. This should be so unless the advertiser can encourage the person to elaborate an ad, a difficult prospect in a passive message delivery environment.

Insights into how to encourage elaboration in multi-ad/multi-attribute advertising, and hence remove the interference associated with advertising more than a single attribute, may be found in the spacing literature. Research on the spacing effect

compares a massed condition, where repeated items are presented one after the other, with a distributed condition, where repeated items are separated by intervening items, tasks, or the passage of time (Hintzman 1974; Singh et al. 1994). In general, a distributed presentation schedule results in better memory for the items than a massed presentation schedule, a result commonly called the spacing effect. The spacing of stimulus presentations has been shown to enhance memory for nonsense syllables (e.g., Ebbinghaus 1985/1913), words (e.g., Glenberg and Lehmann 1980), sentences (e.g., Rothkoph and Coke 1966), pictures (e.g., Hintzman and Rogers 1973), and faces (Cornell 1980).

Explanations of the spacing effect can be divided into two categories: deficient processing explanations and enhanced processing explanations. Deficient processing explanations propose that the *massed* presentation schedule reduces processing of the first presentation of a stimulus (P1) or the second presentation of a stimulus (P2). Enhanced processing explanations propose that the *distributed* presentation schedule provides an opportunity to engage in additional processing during P1 or P2. The two enhanced processing explanations that specifically address the increased elaboration of material at P1 or P2 are the retrieval hypothesis and the reconstruction hypothesis.

Retrieval hypothesis. The retrieval hypothesis predicts that spacing effects are directly related to the study-phase retrieval of P1 and that the primary function of P2 is to serve as a cue for retrieval of P1 (Braun and Rubin 1998; Thios and D'Agostino 1976). For example, a person may be able to access more information at test if they bring an earlier elaborated instance of the stimulus (P1) into consciousness, as opposed to attempting to elaborate the current instance (P2) during study. Perceiving P1 should

become more difficult as the number of intervening items increases and this difficulty of perception should facilitate memory access at a later time (Jacoby 1974; Thios and D'Agostino 1976). It should be noted that perception is an involuntary operation that occurs when an individual encounters a stimulus. This process enables the individual to discriminate common or familiar objects from novel objects. For example, when a subject sees a stimulus for the second time, she/he will automatically try to bring a previous instance of that object into consciousness. This becomes more difficult if the previous presentation has occurred farther back in time. When one is presented with a cue at time of recall, it is the additional processing that occurs at P2 while attempting to bring an item into the realm of consciousness that leads to enhanced memory, and not the success of identifying a previously seen stimulus.

The retrieval hypothesis predicts that the key to an effective repetition strategy is to encourage elaborated processing of an ad at P1 and not at P2 so that there would be successful, but effortful, attempts at perceiving P1 when P2 is presented. For example, this hypothesis predicts that the common practice of having an initial flight of 60-second commercials at the start of an ad campaign followed by a subsequent flight of 15-second reductions of these commercials may be more effective at building memory traces than two flights of 60-second commercials. Fifteen-second commercials contain fewer retrieval cues, and as a consequence, successful perception of information from the 60-second commercial becomes more difficult.

Reconstruction (accessibility) hypothesis. The reconstruction hypothesis predicts that the spacing effect depends on whether or not P1 can be reconstructed at P2. Reconstructive memory theories assume there is no fixed memory structure, just a

recreation of subjective perception given activation in various parts of the brain caused by external and internal cues (Braun and Rubin 1998). The hypothesis assumes that people have the option of accessing P1 from short-term memory or, in an attempt to bring P1 into consciousness, involuntarily reconstructing P1 when they encounter P2 (Jacoby 1978). If an item is repeated while a previous representation is still accessible in short-term memory, then there is no need to reconstruct it. If the repetition is delayed and the P1 presentation begins to fade, then it is necessary to go through a reconstruction process that infers the missing portions of P1. Reconstructing a stimulus is thought to increase retention because the reconstructed portions of the stimulus become likely to be reconstructed again in the future, similar to a perceptual bias (Jacoby and Craik 1978; Lockhart, Craik, and Jacoby 1976).

Like retrieval, reconstruction is an involuntary operation that helps the person discriminate common or familiar objects from novel objects. For example, when a subject sees a stimulus for the second time, she/he will automatically assess whether the object has been seen before in an attempt to bring the object into consciousness. This assessment depends on the reconstruction of the stimulus with an easier reconstruction leading to the inference that the stimulus is familiar. The reconstruction becomes more difficult as the previous presentation occurs farther back in time. When one is presented with a cue at time of recall, it is not successful perception, but the act of attempting to reconstruct the stimulus during the process of perceiving it that creates greater access to that stimulus and that leads to enhanced memory at test. Thus, the reconstruction hypothesis predicts that reconstruction of P1 depends on elaboration of P2 when an individual is trying to bring a stimulus into consciousness.

Summary and Hypotheses

The retrieval hypothesis and the reconstruction hypothesis both predict that repetition improves memory when the pattern of repetition encourages additional processing of P1 or P2 that, in turn, leads to retrieval or reconstruction. The retrieval hypothesis predicts that it is the difficulty of perceiving P1 that strengthens the memory trace, whereas the reconstruction hypothesis predicts it is the elaboration of the P2 cue used to retrieve the P1 item that influences memory performance. Although verbal learning studies have attempted to differentiate between these two theories, this was not necessary for my purposes, since these two views both yield similar predictions. They both suggest that structural characteristics of a presentation may encourage more effortful perceptual processes. For example, in a cued recall task (i.e., where a cue was provided at test to aid recall of a specific target), Cuddy and Jacoby (1982) presented subjects with repeated pairs of related words in which the second member was presented either intact or with letters missing. They found that using intervening material that was similar to to-be-remembered items resulted in better recall than using different intervening material. In this instance, the presentation of similar intervening items led to greater interference. This made for more effortful attempts at perception, since it would then be more difficult to bring an item into consciousness with similar items appearing before P2. This implies that if a single brand wants to advertise multiple benefits, it may be advantageous to group the presentation of these brand-attribute pairs close together in time. Grouping brand-attribute pairs close together in time would mean that there would be contiguous presentation of attributes that are all related to the same brand. Attempts at perceiving the first instance of the pairing at P2 would be more effortful, and would create additional

accessibility to the material at test. Thus, according to the retrieval and reconstruction hypotheses:

> H1: When a brand advertises multiple attributes, grouping these brand-attribute presentations close together in time will facilitate cued recall.

The hypothesized benefits of grouping different ads for a brand are not a foregone conclusion. First, the spacing literature shows that massed (i.e., consecutive) presentations of a stimulus result in less recall of the stimulus and/or its associates. Second, the encoding variability hypothesis predicts that massing the presentation of stimuli reduces the variability of the encoding contexts accompanying the presentation of the stimuli and limits memory access. How would this impact a cued recall task? In a cued recall task, the predominant source of trace activation is the descriptive components of the stimulus (in this instance, the brand and its specific unique elements). The context in which the brand is presented would impact the nature of descriptive components that are stored. Reduced variability in encoding contexts would lead to reduced variability of descriptive components. In other words, massing the presentations limits the opportunity of unique contextual or descriptive cues to aid in the prediction of a brand's associate. Thus, according to the encoding variability hypothesis:

> H2: When a brand advertises multiple attributes, grouping these brand-attribute presentations close together in time will inhibit cued recall.

CHAPTER 3
EXPERIMENT 1: THE INFLUENCE OF GROUPING

The objective of Experiment 1 was to determine if spacing of repeated stimuli would interact with different presentation schedules in a manner that would enhance recall of a brand's multiple attributes. Research by Burke and Srull (1988) and Keller (1987) showed that advertising multiple attributes across several ads results in reduced recall of individual attributes. Spacing of repeated attributes and using different presentation schedules might actually encourage elaboration, and thus eliminate the interference that is normally associated with multiple attribute advertising. The spacing effect theories that were outlined earlier provide insight into how this could be achieved.

Both the reconstruction and retrieval hypotheses, henceforth called the R&R hypotheses, predict that the use of intervening material that is similar to the repeated stimuli would result in better recall than if different intervening items were used. Thus, grouping the presentation of brand-attribute pairs may lead to more effortful perceptual processes and enhance recall. However, the encoding variability theory predicts that grouping may reduce variability and actually hurt, and not enhance, recall. Thus, in this experiment, I tested the influence of grouping multiple brand-attribute presentations on the cued recall of the attributes. This allowed examination of a hypothesized mechanism for reducing interference in multiple brand-attribute presentations. Also, because of the differentiating predictions of the hypotheses being used, the results would enable us to identify a theory or theories that best explain the underlying processes involved

I used a completely within-subject design, with two factors – *spacing* and *grouping*. The two levels of the spacing factor were the *massed* and *spaced* conditions often used in spacing experiments. The two levels of the grouping factor were *grouped* (different attributes related to the same brand were all presented in a contiguous manner) and *dispersed* (different attributes related to the same brand were separated by intervening brand-attribute presentations from other brands).

Stimuli and Procedure

The experimental design was a two (massed/spaced) by two (dispersed/grouped) within-subject design with four category replicates (e.g., cameras, automobiles, cell phones, and televisions). In addition, each condition had four unique attributes paired with a single brand. Thus, there were 16 brand names (i.e., four per product category) and 64 product attributes (i.e., four per brand). In the massed-dispersed condition, there were massed brand-attribute presentations for an attribute, but dispersed brand-attribute presentations for different attributes. For example, as displayed in Table A-1, if letters are brands and numbers are attributes, the presentation sequence for the massed-dispersed condition was A1, A1, B5, B5, C9, C9, D13, D13, A2, A2, B6, B6, C10, C10, D14, D14, A3, A3, B7, B7, C11, C11, D15, D15, A4, A4, B8, B8, C12, C12, D16, D16. Note that there are back-to-back presentations of any brand stimulus pair (e.g., A1, A1), but that presentations of that same brand with a different attribute (e.g., A2, A3, A4) occur after a delay. In the spaced-dispersed condition, there were no contiguous brand-attribute presentations for an attribute (e.g., E17, F21, G25, H29, E18, F22, G26, H30, E19, F23, G27, H31, E20, F24, G28, H32, E17, F21, G25, H29, E18, F22, G26, H30, E19, F23, G27, H31, E20, F24, G28, H32). As in the massed-dispersed condition, all presentations

of a brand-stimulus pair (e.g., E17, E18, E19, E20) occur twice, but they occur far apart in time.

Two additional conditions grouped the brand-attribute presentations into blocks. In the massed-grouped condition, the brand-attribute presentations occurred contiguously (e.g., I33, I33, I34, I34, I35, I35, I36, I36, J37, J37, J38, J38, J39, J39, J40, J40, K41, K41, K42, K42, K43, K43, K44, K44, L45, L45, L46, L46, L47, L47, L48, L48). Note that there are back-to-back presentations of any brand stimulus pair (e.g., I33, I33) and all presentations for a given brand (e.g., I33, I34, I35, I36) occur in a block. In the spaced-grouped condition, there were contiguous brand presentations but no contiguous brand-attribute presentations (e.g., M49, M50, M51, M52, N53, N54, N55, N56, O57, O58, O59, O60, P61, P62, P63, P64, M49, M50, M51, M53, N53, N54, N55, N56, O57, O58, O59, O60, P61, P62, P63, P64). As in the massed-grouped condition, all presentations of a brand-stimulus pair (e.g., M49, M50, M51, M52) occur twice, but they occur far apart in time.

Pretests were used to select unfamiliar, neutral brand names from a list of foreign brand names found on the Internet. This was done to limit the possibility that subjects would use pre-existing associations to brand names to aid the recall of attributes. Additional pre-testing was conducted to select product attributes with which subjects were moderately familiar. In general, attributes that scored lower than 3 or higher than 5 on a 7-point familiarity scale were not used. However, there were a few instances where attributes that were rated higher than five were chosen. These were all randomly distributed among the different conditions. Subjects were invited into a lab and told that they would be viewing a series of brand-attribute pairs and that they would be given a

recall test at the end of the session. Then, the brand-attribute pairs were presented on a computer screen using an Authorware program. The screen contained a product category label, and the brand-attribute pair. Each screen was displayed for 4 seconds and was separated by an inter-stimulus interval of .5 seconds. Immediately after the presentation of the 32 brand-attribute pairs in a condition, subjects were prompted with a category label and brand name and asked to list any attributes that were associated with the brand. After entering one attribute, a new screen appeared that prompted the subject to enter another attribute. If subjects recalled an attribute, then this process continued until all four attributes were entered. Subjects were allowed 18 seconds to begin typing an attribute; otherwise they were prompted to go on to the next brand. The assignment of brand name to a set of four product attributes within a product category was counterbalanced. The order of presentation of the conditions was counterbalanced. The order of presentation of brands in the recall task was randomly determined. Note that one brand and four attributes from each of the four product categories appeared in each of the four conditions, thus there could be no category by condition confound.

Predictions

Predictions about the influence of grouping can be made relative to the dispersed conditions. Recall that the dispersed conditions are representative of the stimulus presentation schedules observed in most spacing studies; hence the R&R and the encoding variability hypotheses predict that recall will be higher in the spaced-dispersed compared to the massed-dispersed condition. In order to examine the prediction of the R&R hypotheses for example, we can compare Gosen (Brand A in the massed-dispersed condition) with Kunnan (Brand E in the spaced-dispersed condition) (Table A-1). In the

massed-dispersed condition, on the first presentation of the first Gosen brand-attribute pairing (P1-A1), one would encounter some difficulty in trying to perceive the stimulus. Since the individual would have recently been exposed to the same stimulus, this effort would be reduced on an immediate repetition of the pairing (P2-A1). This same sequence of "increased effort" perceptual processes followed by "reduced effort" perceptual processes would occur for subsequent massed presentations of the Gosen brand-attribute pairings (i.e., A2, A2,…A3, A3,…A4, A4). Compared to the massed condition, the spaced presentations would undergo more effortful attempts at perception for each presentation of a brand-attribute pairing. Thus, both P1 and P2 would undergo "increased effort" perceptual processes. The retrieval and reconstruction hypotheses predict that this would create additional accessibility to the spaced material at test and result in the typical spacing effect (Figure B-1b). The encoding variability hypothesis predicts that the spacing of repetitions would result in the second presentation of a brand-attribute pairing occurring in a different encoding context. This variability in encoding would lead to enhanced recall in the spaced-dispersed condition relative to the massed-dispersed condition, where brand-attribute pairs are repeated within the same encoding context (Figure B-1a).

Grouping of brand-attribute pairs would yield somewhat different predictions. Note that the grouped conditions create a more contiguous presentation of brand-attribute pairs. In effect, grouping creates additional massing; hence most explanations of the spacing effect predict that grouping will hurt recall. For example, the encoding variability hypothesis predicts that moving from dispersed to a grouped presentation schedule reduces variability from Brand-attribute 1 to Brand-attribute 2, hence there should be

fewer descriptive and contextual cues that encourage the recall of any attribute (Hypothesis 2). Therefore, encoding variability theory predicts a positive effect of spacing and a negative effect of grouping on recall (Figure B-1a).

It is also possible that grouping can help cued recall of brand attributes. The R&R hypotheses predict that grouping should result in greater difficulty in trying to perceive brand attributes because of similar material appearing immediately before the repeated stimuli. For example, with the first repetition of a Gamo brand-attribute pair (i.e., I33, I33), we would undergo the same type of processes in trying to perceive the item as in the massed-dispersed case – greater difficulty in perceiving the first instance (P1-I33) and reduced difficulty in perceiving the second (P2-I33). However, unlike in the massed-dispersed presentation schedule, when trying to perceive the second attribute (I34), there would be competition generated by the recently presented brand-attribute pairings which attempted to form associates to the same brand. This would lead to a more difficult perception opportunity at P1-I34. This competition would also exist at P2-I34, resulting in increased difficulty in perceiving that stimulus as well. This would occur for all subsequent pairings for the Gamo brand in the massed-grouped condition. For example, at P2-I36, even though this pairing appears immediately after P1-I36, there would be interference created by the presentation of I33, I34, and I35 immediately before I36. Therefore, it would be difficult to bring the P2-I36 brand-attribute pairing into consciousness. This presentation schedule creates competition from similar items when trying to perceive later occurrences of brand-attribute pairs related to the same brand. This leads to greater accessibility to the material at a later stage. Thus, at test when a cue

is presented, the result would be a facilitating effect on memory in the massed-grouped condition relative to the massed-dispersed condition (Hypothesis 1).

The R&R hypotheses do not predict a facilitation effect of grouping in the spaced condition. In the spaced-grouped condition, even though there are similar items appearing before presentations, e.g., M49, M50, and M51 appear before M52, this competition is not as great as in the latter stages of the massed-grouped case. Thus, while there is some difficulty in perceiving later presentations, e.g. M52, this might not be enough to overwhelm the impact of spacing. Thus, the spaced-dispersed and spaced-grouped conditions should only benefit from the impact of spacing, and the grouping variable would have little or no impact. As far as the impact of spacing, these two groups both have approximately the same number of items between repetitions; hence there should be little difference in recall between these two groups (Figure B-1b).

Results

Forty-six undergraduate students participated in the experiment for extra credit. A repeated-measure MANOVA found no interaction of the brand name or condition order counterbalance factors with the spacing or grouping manipulations (all $F < 1.0$). A test for an interaction between spacing and grouping variables was significant ($F(1, 45) = 6.35, p < .05$). In the dispersed condition, the percentage of attributes correctly recalled was significantly greater in the spaced condition ($\rho = .50$) and the massed condition ($\rho = .38$; $F(1, 45) = 6.38, p < .05$). In the grouped condition, the percentage of attributes correctly recalled did not differ between the spaced condition ($\rho = .51$) and the massed condition ($\rho = .49$; $F(1, 45) = 1.58, p > .05$). A test comparing the grouped ($\rho = .49$) to the dispersed ($\rho = .38$) presentation schedule in the massed condition was statistically

significant (F (1, 45) = 6.32, $p < .05$). In the spaced condition however, there was no significant difference between the grouped condition ($\rho = .51$) and the dispersed condition ($\rho = .50$, F (1, 45) = 0.82, $p > .05$).

Discussion

The key finding of Experiment 1 was that the massed-grouped presentation schedule improved recall relative to the massed-dispersed presentation schedule, even though the net effect of grouping was to further mass the presentations. The encoding variability hypothesis predicted that additional massing would hurt recall, whereas the R&R hypotheses predicted that the extra massing would help recall.

The results have some practical implications for advertising scheduling. For example, suppose that the massed presentation of my stimuli (e.g., A1, A1) is equivalent to a 60-second advertisement within which a brand name and a product attribute are repeatedly paired. Results in the massed-dispersed condition show that dispersing the presentations of ads promoting different attributes will hurt the recall of each individual brand attribute. In contrast, if these four 60-second ads promoting four different attributes were shown close together in time (i.e., same commercial block), there would be no such interference in memory for the brand attributes. The results also show that when ad length is lessened (e.g., 30 seconds) so that there is less repetition in an individual ad, but the frequency of this advertising is increased, both dispersed and massed presentation schedules will encourage the recall of brand attributes.

There is an alternative explanation for the results. Grouping may not only lead to an interference effect and greater degree of difficulty in perceiving the stimuli, but grouping could also lead to greater elaboration of the brand-attribute pairs. If this is so,

then a voluntary attention hypothesis could also explain the results of Experiment 1. The voluntary attention hypothesis predicts that people voluntarily pay less attention to P2 when it occurs shortly after P1. Zechmeister and Shaughnessy (1980) argued that a massed presentation schedule gives people a false sense of confidence about the stimulus at P2, hence they ignore P2. In the massed-grouped condition of Experiment 1, it could be argued that people no longer ignore P2 because they can elaborate about how it combines with all of the other attributes associated with the brand. Given the possibility, Experiment 2 compares the predictions of the R&R hypotheses with a voluntary attention hypothesis.

CHAPTER 4
EXPERIMENT 2: THE EFFECT OF WITHIN-CATEGORY COMPETITION

Experiment 2 examined the impact of grouping in a competitive environment. In Experiment 1, the brands used in each condition were not from the same product category. In each condition, four category replicates (e.g., cameras, automobiles, cell phones, and televisions) were used, and only one brand was associated with each category. Previous research in marketing has already demonstrated that competing ads from the same category can generate interference that impairs memory for a brand's attributes (Keller 1987). We have already shown that grouping could enhance memory when multiple attributes are associated with a brand. In this instance, we would also expect grouping to enhance memory for the multiple attributes. This is predicted by both the R&R hypotheses and the attention hypothesis when items are massed. However, the two theories make differentiating predictions when items are spaced. The R&R hypotheses predict an advantage of grouping and the attention hypothesis does not. Thus, Experiment 2 allows an examination of a context in which the R&R hypotheses and the voluntary attention hypothesis made different predictions about the cued-recall of brand attributes. Second, the experimental context used was one in which different brands shared the same attributes, a common occurrence in markets consisting of many competitors.

Stimuli and Procedure

This experiment contained four within-subject conditions, and used an eight-cell design. Four of the cells were repeated from Experiment 1. Therefore, I simply replicated the stimuli from that experiment, but used half as many brand replicates (e.g., compare the C and D stimuli in Table A-2 to C and D stimuli in Table A-1). In four new conditions, I changed the brand name presented during P2. For example, the A1, A1, B5, B5 stimulus stream in the massed-dispersed condition became A1, Q1, B5, R5. Again, I used only two brand replicates per category replicate. Thus, I added the same/different brand name cue factor by altering the P2 brand name for half of the brand replicates used in Experiment 1 (Table A-2).

Again, I measured recall of brand attributes given a brand name cue. For attributes paired with two brand names, each brand name was given as a cue and the subject's attribute response was scored in each case. This created an opportunity for twice as much recall relative to the same brand name cue conditions, so I will focus my analysis on differences in the patterns of recall across the same and different brand name cue conditions.

Predictions

When the same brand name was paired with the same attribute at P2, the design was identical to the design used in Experiment 1, thus I should observe the same pattern of means as in Experiment 1. The massed-grouped presentation schedule should improve recall relative to the massed-dispersed presentation schedule, and there should not be a significant difference in recall in the spaced-grouped and the spaced-dispersed conditions. However, when two brands are paired with the same attribute (different

brand cue condition), the hypotheses make both common and differentiating predictions. First, both hypotheses predict that recall should decline when a second presentation of an attribute is accompanied by a different brand name. There is one less chance for the association between the brand name and attribute to strengthen. In addition, the voluntary attention hypothesis predicts that attention to the second presentation of the attribute should increase owing to the change in brand name. Thus, the voluntary attention hypothesis predicts a potential decrease in recall owing to the weaker brand-attribute association and a potential increase in recall owing to the increased attention to the attribute at P2, but no difference in the pattern of recall (e.g., no three-way interaction of spacing, grouping, and brand name cue consistency.

Although the R&R hypothesis also predicts a decline in recall owing to the change in brand names at P2, it also predicts a three-way interaction. Wherein the dispersed conditions in Experiment 1 showed a spacing effect, they should now show a null effect for the different brand name cue stimuli. In the dispersed condition, each item is perceived as unique and the same amount of processing is involved for each item, whether it is massed or spaced. Thus, there should be no spacing effect. In addition, wherein the grouped conditions in Experiment 1 showed a null effect, they should now show a spacing effect when different brand name cues are used. In the different cue condition, the changed brand name results in the paired associates appearing to be unique, once-presented items. When these items are grouped, the contiguity of presentation helps the subject elaborate on the manner in which these once-presented stimulus-response pairs are all associated. This elaboration of P1 or P2 promotes retrieval and/or reconstruction. This is easier to do in the spaced-grouped condition (e.g., *M49, M50,*

M51, M52), than in the massed-grouped condition (e.g., *I33*, U33, *I34*, U34, *I35*, U35, *I36*, U36). Hence, spaced-grouping leads to elaboration and promotes retrieval at test.

Results

Thirty undergraduate students participated in the experiment for extra-credit. A repeated-measure MANOVA found no interaction of the brand name or condition order counterbalance factors with the spacing, grouping, or brand name cue consistency manipulations (all $F < 1.0$). A test for a three-way interaction of spacing, grouping, and brand name cue consistency was statistically significant ($F(1, 29) = 6.27, p < .05$).

The test for a spacing by grouping interaction in the same brand name cue condition was significant ($F(1, 29) = 6.47, p < .05$). In the dispersed attributes condition, the percentage of attributes correctly recalled was significantly greater in the spaced condition ($\rho = .69$) than in the massed condition ($\rho = .50$; $F(1, 29) = 6.30, p < .05$). In the grouped attributes condition, the percentage of attributes correctly recalled did not differ between the spaced condition ($\rho = .71$) and the massed condition ($\rho = .67$; $F(1, 29) = 2.21, p > .05$). These results replicate the results of Experiment 1.

The test for a spacing by grouping interaction in the different brand name cue condition was significant ($F(1, 29) = 5.48, p < .05$). As predicted by the R&R hypotheses, in the dispersed condition, the percentage of attributes correctly recalled did not differ between the spaced condition ($\rho = .45$) and the massed condition ($\rho = .42$; $F(1, 29) = 1.58, p > .05$). Additionally, as predicted by the R&R hypotheses, in the grouped condition, the percentage of attributes correctly recalled was significantly greater in the spaced condition ($\rho = .60$) than in the massed condition ($\rho = .48$; $F(1, 29) = 5.42, p < .05$).

Discussion

These results are consistent with the R&R hypotheses. Experiment 1 showed that the massed presentation of brand-attribute pairings could be beneficial if the brand was paired with multiple attributes in a concentrated period of time (e.g., the massed-grouped condition). Experiment 2 showed that this strategy was not effective if competing brands are advertising the same attributes. The spaced exposure combined with grouped-attributes presentation schedule was shown to be more effective at promoting brand learning. The spaced-grouped presentation schedule limited the interference from competing brands and encouraged elaboration of the brand-attribute pairs for specific brands.

Again, the results have potential implications for advertising practice. First, they confirm that competitor advertising hurts cued-recall of brand attributes. I extend the findings of Keller (1987) and Burke and Srull (1988) by showing this interference also occurs when the competing ads mention the same attribute. A second important result is that one method to combat this interference is to block a brand's advertisements on multiple attributes and schedule these blocks at different time than competitor's advertisement. This second conclusion is interesting because theories of proactive and retroactive memory interference would argue that blocking multiple brand-attribute ads for a single brand will always reduce memory for each attribute paired with the brand. However, Experiment 2 shows that grouping ads for a brand can benefit memory in some circumstances.

Thus far, I have evidence that grouping the presentations of brand's ads can aid recall of the attributes presented in the ads. Yet, there are two more issues to be resolved.

First, I have argued that grouping can help memory access when a brand advertises multiple attributes. Yet, there is no evidence that moving from one to four attributes enhances the recall of any one attribute. My evidence only shows that some brand – multiple attribute presentation schedules are better than others. The grouping in the first two experiments may simply be lessening the amount of interference. Pairing a brand with four attributes could be much worse than pairing a brand with a single attribute. Spacing and grouping may only partially mitigate the interference problem.

Second, I have assumed that it is the difficulty of retrieving/reconstructing a P1 presentation of a stimulus that leads to increased memory and I have also assumed that greater elaboration at P1/P2 supports retrieval/reconstruction. If this were true, then techniques that either enhance or reduce elaboration at P1/P2 should lead to enhanced or impoverished recall; providing further support for the memory accessibility characteristic of the R&R hypotheses. I handle this latter problem in Experiment 4, leaving the former problem for Experiment 3.

CHAPTER 5
EXPERIMENT 3: SINGLE ATTRIBUTE VS. MULTIPLE ATTRIBUTES

Experiment 3 investigates the degree of interference when brands are paired with a single attribute, two attributes, or four attributes. Recall that Burke and Srull (1988) showed that two brand ads for the same brand advertising two competing attributes (e.g., $B_1 \rightarrow A_1$, $B_1 \rightarrow A_2$) reduced memory for both of the attributes. Burke and Srull used a spaced presentation schedule and found that the interference effect was mitigated when subjects were encouraged to elaborate on the advertisement. Given my claim that grouping brand ads that promote different attributes encourages elaboration, which in turn improves recall, I expected that grouping would mitigate any interference effect associated with a brand advertising competing attributes.

Stimuli and Procedure

The experimental design was a two (massed vs. spaced) by two (dispersed vs. grouped) by three (1 vs. 2 vs. 4 attributes) within-subject design with seven product category replicates (e.g., personal computers, cordless phones, computer printers, cameras, automobiles, cell phones, and televisions). The design of Experiment 3 was similar to Experiment 1, but included an additional variable – number of attributes associated with a brand. For Experiment 3, the stimuli were designed to limit confounding variables. Four unique brands were paired with four unique attributes, two unique brands were paired with two sets of unique attributes, and one brand was paired with four attributes. In this way, the subject had the opportunity to recall four attributes

for the single attribute brands, four attributes for the double-attribute brands, four attributes for the quad-attribute brand. Within the one and the two attribute conditions, brand-attribute pairs came from different product categories. In other words, there were four unique brand/product categories in the one attribute condition, (Brands A, B, C, and D), and two unique brand/product categories in the two attribute condition (Brands E and F) (Table A-3). The design included the same four conditions as were used in Experiment 1 with an adjustment for the attribute manipulation. In the massed-dispersed condition (Table A-3), subjects saw A1, A1, E5, E5, G9, G9, B2, B2, E6, E6, G10, G10, C3, C3, F7, F7, G11, G11, D4, D4, F8, F8, G12, G12. In the spaced-dispersed condition, subjects saw H13, L17, N21, I14, L18, N22, J15, M19, N23, K16, M20, H13, L17, N21, I14, L18, N22, J15, M19, N23, K16, M20. Note that the number of intervening items for the single attribute brands (e.g., H, I, J, K), the double-attribute brand (e.g., L, M) and the quad-attribute brand (e.g., N) was a constant two items.

In the massed-grouped condition, subjects saw O25, 025, P26, P26, Q27, Q27, R28, R28, S29, S29, S30, S30, T31, T31, T32, T32, U33, U33, U34, U34, U35, U35, U36, U36). In the spaced - grouped condition, subjects saw V37, V38, X39, Y40, Z41, Z42, AA43, AA44, AB45, AB46, AB47, AB48, V37, V38, X39, Y40, Z41, Z42, AA43, AA44, AB45, AB46, AB47, AB48. The order of the single-attribute brands, the double-attribute brands, and the quad-attribute brand was counterbalanced in the grouped conditions to control for primacy and recency effects. The condition presentation order was counterbalanced.

Predictions

When the brand is paired with four attributes, the design is similar to the design used in Experiment 1. Therefore, the R&R hypotheses would predict similar results to Experiment 1 for the massed-grouped and spaced-grouped cells. In the two-attribute condition, the design is similar to that of the four-attribute condition. But when brand-attribute pairs are grouped, the two-attribute pairings yield a different presentation format than the four-attribute pairings. In this instance, fewer brand-attribute pairs that are associated with the same brand are presented contiguously in the two-attribute condition (e.g., J39, J39, J40, J40) than in the four-attribute condition (e.g., K41, K41, K42, K42, K43, K43, K44, K44). Thus, I would expect there to be "increased effort" perceptual processes in the grouped four-attribute compared to the grouped two-attribute condition. This would occur since there are a greater number of similar items appearing immediately before the repeated stimuli. This would lead to higher levels of recall in the four-attribute condition (Cell A) than in the two-attribute condition (Cell B) (Figure B-5b).

As discussed in Experiment 1, the dispersed conditions are representative of the presentation schedules observed in most spacing studies; hence there should be higher recall in the spaced-dispersed than in the massed-dispersed condition whether or not two or four attributes are used. The findings of Keller (1987) and Burke and Srull (1988) imply that as the number of attributes advertised by a brand increase, recall of any one attribute should decrease. Thus, in the massed-dispersed condition, we would expect a decrease in recall when moving from two attributes (Cell E) to four attributes (Cell F) (Figure B-5b). In the one-attribute condition, the presentation schedules are the same in

both the grouped and dispersed conditions; therefore the R&R hypotheses would predict no difference in the pattern of results in these two conditions. I would expect a spacing effect here since this presentation format is also similar to those used in spacing studies. As there is no additional elaboration generated from the massed-dispersed presentation format, I would expect increased levels of interference when the number of attributes increases. Thus, there would be lower levels of recall for conditions with a greater the number of attributes (Cell D → Cell E → Cell F).

The encoding variability hypothesis would predict a different pattern of results. This hypothesis would predict an advantage of spaced stimuli over massed stimuli in all conditions. As in Experiment 1, moving from dispersed to a grouped presentation schedule would be predicted to have a negative impact on recall as there would be less varied descriptive and contextual cues. In addition, the encoding variability hypothesis would predict that increasing the number of attributes associated with a brand would further impoverish recall. This theory predicts that the retrieval process is subject to cue overload, in that a brand would lose its effectiveness as the number of attributes with which it is associated increases (Glenberg 1979). Thus, moving from one to two, and then four attributes would lead to increasingly lower levels of recall (Figure 5).

Results

Sixty-three undergraduate students participated in the experiment for extra-credit. A repeated-measure MANOVA found no interaction of the brand name or condition order counterbalance factors with the spacing, grouping and attribute number manipulation (all $F < 1.0$). A test of the three-way interaction of spacing, grouping, and number of attributes was statistically significant ($F(1, 61)=4.57$, $p < .05$). In the massed-

grouped condition, there was no significant difference between recall in the two-attribute condition ($\rho = .67$) compared to the four-attribute condition ($\rho = .73$; $F(1, 61) = 2.16$, $p > .05$). However, compared to the one-attribute condition ($\rho = .52$), recall was significantly greater in both the two-attribute ($F(1, 61) = 6.89$, $p < .05$) and the four-attribute case ($F(1, 61) = 7.84$, $p < .05$. There was no significant difference in the one-attribute condition when comparing the grouped and dispersed case ($F(1, 61) = 0.18$, $p > .05$). In the dispersed condition, there was no significant difference between recall in the two-attribute ($\rho = .43$) compared to the four-attribute condition ($\rho = .39$; $F(1, 61) = 1.48$, $p > .05$). But in a result that was opposite to the grouped case, when items were massed and dispersed, recall was significantly lower for the two ($F(1, 61) = 3.86$, $p < .05$) and four-attribute ($F(1, 61) = 4.69$, $p < .05$) conditions compared to the one-attribute condition ($\rho = .51$).

There was a significant difference between grouped and dispersed stimuli. A significantly greater number of grouped attributes ($\rho = .68$) were recalled compared to dispersed attributes ($\rho = .57$; $F(1, 61) = 38.19$, $p < .05$). Additionally, there was a significant difference between recall in the different attribute conditions, a greater number of attributes were recalled in the two ($\rho = .63$) and the four-attribute ($\rho = .66$) conditions compared to the one-attribute condition ($\rho = .515$; $F(1, 61) = 9.51$, $p < .05$).

Discussion

I have argued thus far that grouping can help memory access when a brand advertises multiple attributes. The results of this experiment confirm this and also provide evidence that grouping enhances memory for individual attributes even when we move from one to four attributes in the massed-grouped condition. The results also

provide some support for the explanations of Keller (1987) and Burke and Srull (1988) – moving from one to four attributes results in increased interference and leads to reduced recall of individual attributes in the massed-dispersed condition. These results are consistent with the R&R hypotheses, which predicted that grouping would positively interact with an increase in the number of attributes. The encoding variability hypothesis predicted incorrectly that grouping would have a deleterious effect on recall as the number of attributes increased.

In terms of advertising practice, these results would also be of some significance. They confirm that an increase in the number of competing attributes associated with a specific brand leads to greater interference and reduced recall. But the results illuminate several avenues that could reduce said interference. As in the previous experiments, further massing, in the form of a grouped presentation schedule, enhances recall. An advertising parallel is the repeated exposure of distinct ads that promote each of these attributes close together in time (such as in the same commercial block). As in Experiment 1, the results also confirm that reducing ad length along with increasing ad frequency - both in dispersed and grouped schedules - would also enhance recall. One other interesting finding is that when a product uses a unique positioning (i.e. promotes only one attribute), recall is enhanced mainly when shorter, more frequently presented ads are used.

CHAPTER 6
EXPERIMENT 4: THE EFFECT OF RELATED ATTRIBUTES

Experiment 4 investigates whether manipulating variables that promote elaboration at P1 or P2 enhances recall. I have assumed in my previous experiments that greater elaboration at P1/P2 supports retrieval/reconstruction. If this were true, then techniques that either enhance or reduce elaboration at P1/P2 should lead to enhanced or impoverished recall. One such variable is the relatedness of attributes that are associated with a particular brand. Attributes can have some semantic link (e.g., Horch Automobile – Side airbags, Antilock brakes, Rear seatbelt; all attributes related to safety) or they may not possess any link (e.g., Adler television – Channel Block, Mute function, Closed caption; no clear relationship exists among these attributes). When a set of related attributes is presented, we would expect different predictions from the R&R hypotheses and the other major theory, the encoding variability hypothesis. The encoding variability theory predicts that in a cued recall task, relatedness of attributes would have little or no effect. However, the R&R hypotheses predict that there would be a positive impact of grouping when attributes possess some semantic relationship – this would occur in both the massed and spaced conditions.

Stimuli and Procedure

The context used here was one in which some brands were associated with attributes that possessed a semantic link, and other brands did not.

Recall in Experiment 2, the contiguity of presentation of once-presented items lead to greater elaboration and enhanced recall. When subjects are presented with items that are related in some manner, I would expect some elaboration as the possible linkage between the attributes is processed. I used a mixed design for this experiment with 3 independent variables – spacing and attribute relatedness (within) and grouping (between).

In each condition, four unique brands were paired with three unique attributes. Two of the brands were paired with related attributes and two were paired with unrelated attributes. Attributes were pretested to determine whether subjects perceived them to be related in some way. In the dispersed condition, when items were massed subjects saw A1, A1, B4, B4, C7, C7, D10, D10, A2, A2, B5, B5, C8, C8, D11, D11, A3, A3, B6, B6, C9, C9, D12, D12 (Table A-4). When items were spaced they saw E13, F16, G19, H22, E14, F17, G20, H23, E15, F18, G21, H24, E13, F16, G19, H22, E14, F17, G20, H23, E15, F18, G21, H24. In both instances two brands possessed attributes that were related (e.g., attributes 1, 2, 3 and 13, 14, 15); while the other attributes were not (e.g., attributes 7, 8, 9 and 19, 20, 21). In the grouped condition, when items were massed subjects saw I25, I25, I26, I26, I27, I27, J28, J28, J29, J29, J30, J30, K31, K31, K32, K32, K33, K33, L34, L134, L35, L135, L36, L136. When items were spaced they saw M37, M38, M39, N40, N41, N42, O43, O44, O45, P46, P47, P48, M37, M38, M39, N40, N41, N42, O43, O44, O45, P46, P47, P48. The order of the presentation of brands with related or unrelated attributes was counterbalanced to control for order effects. As in Experiment 3, the assignment of conditions to product categories and the condition presentation order were counterbalanced.

Predictions

When unrelated attributes are presented, the design is similar to that used in Experiment 1, thus I should observe the same pattern of results – enhanced memory in the massed-grouped condition, and the typical spacing effect in the dispersed condition. However, when related attributes are presented, the R&R hypotheses would yield different predictions. I would expect a similar pattern of means in the massed condition for both related and unrelated attributes – massed-grouped demonstrating greater recall than massed-dispersed. However, when items are spaced, there should be additional elaboration in both the grouped and dispersed cases. Subjects would go through additional processing of the common thread connecting the different attributes. This would be facilitated to a greater extent in the grouped case (**M37, M38, M39**, N40, N41, N42, O43, O44, O45, P46, P47, P48, **M37, M38, M39**…) than in the dispersed case, where the lack of contiguous presentation would not lead to the same level of elaboration (**E13**, F16, G19, H22, **E14**, F17, G20, H23, **E15**, F18, G21, H24…).

Encoding variability theory would make different predictions. In the unrelated condition, I would expect similar predictions to those made for Experiment 1 - a main effect of grouping and a main effect of spacing. In the related condition I would also expect these results. Using semantically related attributes should give subjects another retrieval cue, namely, the feature shared by all the attributes. But this additional cue would have a positive effect on recall only in a free recall task. In a cued recall task the best cue is the brand or item presented at test, thus additional cues would have minimal impact (Kahana and Greene 1993).

Results

Seventy-one undergraduate students participated in the experiment for extra credit. A mixed design was used with two within subject variables - spacing and attribute relatedness and one between subjects variable – grouping. A repeated-measure MANOVA found no interaction of the brand name or condition order counterbalance factors with the spacing, grouping and attribute number manipulation al $F < 1.0$). A test for a three-way interaction of spacing, attribute relatedness and grouping was not significant ($F(1, 69) = 3.24$, $p > .05$). The test for a spacing by grouping interaction was not significant ($F(1, 69) = 0.31$, $p > .05$). However, for unrelated attributes the pattern of means did approximate that obtained in Experiment 1. In the dispersed condition, the percentage of attributes correctly recalled was significantly greater in the spaced condition ($\rho = .66$) than in the massed condition ($\rho = .52$; $F(1, 69) = 5.45$, $p < .05$). In the grouped condition, the percentage of attributes correctly recalled did not differ between the spaced condition ($\rho = .71$) than in the massed condition ($\rho = .64$; $F(1, 69) = 2.48$, $p > .05$). In the attribute related condition, when a dispersed presentation schedule was used, the percentage of attributes correctly recalled was significantly greater in the spaced condition ($\rho = .80$) than in the massed condition ($\rho = .51$; $F(1, 69) = 27.15$, $p < .05$). In the grouped condition, the percentage of attributes correctly recalled was also significantly greater in the spaced condition ($\rho = .90$) than in the massed condition ($\rho = .64$; $F(1, 69) = 32.07$, $p < .05$). There was higher recall when a grouped presentation schedule was used ($\rho = .72$) than a dispersed schedule ($\rho = .62$; $F(1, 69) = 12.78$, $p < .05$). Additionally, a greater number of related attributes ($\rho = .71$) were recalled than unrelated attributes ($\rho = .63$; $F(1, 69) = 11.79$, $p < .05$).

Discussion

These results provide additional support for the R&R hypotheses. The core assumption of these hypotheses is that enhanced memory for attributes results from greater elaboration at P1 or P2. Using a manipulation, such as relatedness of attributes, which would lead to greater elaboration, did lead to enhanced recall. Therefore, this result provides support for the memory accessibility characteristic of the R&R hypotheses. Encoding variability theory predicted a spacing effect, but did not predict differential recall for related vs. unrelated attributes when a cued recall task was used.

These results also have implications for advertising practice. I have shown that a grouped presentation schedule can help combat the interference generated when multiple attributes for a brand are presented. However, when related attributes are associated with a brand, then a spaced presentation schedule is preferred. In terms of ad scheduling, this would mean that a company (e.g., Volvo) presenting a unique positioning for a brand (e.g., safety), but using multiple related attributes (e.g., antilock brakes, side airbags, rear seatbelts) would generate better recall of the brand's attributes by using shorter ads (30 seconds) and presenting these ads in the same commercial block. Each of these ads would present a unique attribute related to safety. As the previous experiments demonstrated, when attributes are unrelated, a massed presentation schedule would be just as effective.

CHAPTER 7
GENERAL DISCUSSION

These four studies collectively provide strong support for the retrieval and the reconstruction hypotheses as appropriate explanations for the benefits of certain patterns of repetition and spacing. Both of these theories predict that repetition improves memory when the presentation schedule encourages elaboration. Elaboration can occur as a result of different manipulations. In Experiment 1, I showed that grouping of attributes enhanced elaboration primarily when attributes were massed, thus reducing interference. In Experiment 2, I showed that this strategy was not as effective in enhancing recall as a spaced-grouped presentation schedule when competing brands are advertising the same attributes. Experiments 3 and 4 examined possible problems associated with my hypothesis, where elaboration was a central component.

In Experiment 3, I showed that grouping enhances memory for individual attributes even when an increasing number of attributes is presented. Finally, in Experiment 4, I demonstrated that using a manipulation (relatedness of attributes) that would lead to greater elaboration at P1 or P2 enhances recall. All these findings were predicted by the retrieval and reconstruction hypotheses and not the attention or encoding variability hypothesis. This result should be of interest to consumer behavior researchers since encoding variability theory has been a dominant explanation of spacing effects within the consumer behavior literature (Schumann et al. 1990; Singh et al. 1994; Unnava

and Burnkrant 1991). These theories are well established in the verbal learning literature but have not been central in our efforts to understand repetition and advertising memory effects. Additionally, the dispersed conditions in my experiments were similar to the presentation of stimuli in traditional spacing experiments. Research findings in this area would indicate that dispersed presentations would be more effective at enhancing memory access. However, the additional massing that resulted from the grouping manipulation consistently generated greater recall across the four experiments in this dissertation. This, finding certainly is surprising given existing empirical findings.

These results have significant implications for advertising scheduling. Schedules that promote additional elaboration would lead to reduced interference and enhance recall of attributes. Scheduling different ads for the same brand in the same commercial block can actually help and not hurt recall of individual attributes. This finding runs counter to anecdotal advertising advice to limit the amount of attributes advertised for a brand. In addition to the presentation of multiple attributes for the same brand, interference can also occur when competing ads mention the same attribute. The results do indicate that a possible solution is to block a brand's advertisements on multiple attributes and schedule at different times than competitors' advertisements. Additionally, blocking of shorter commercials which present different, but related, attributes in each ad would also reduce interference and lead to optimal recall.

CHAPTER 8
LIMITATIONS AND FUTURE RESEARCH

Limitations

This dissertation makes a significant contribution towards identifying ways in which advertisers could reduce interference in a multi-attribute, multi-product environment and also towards our understanding of the underlying processes. However there are several issues that need further examination. First, the methods used limit the generalizability of the findings. For example, all of the studies used were restricted to shopping goods, (e.g., cameras, automobiles, televisions). However, a considerable amount of advertising spending is also done on ads for convenience goods (e.g., soda) and services (e.g., investment banking). This lack of different type of replicates limits the generalizability of the findings discussed in these studies. Another characteristic that limits the generalizability is the recall task used. The predictions are made relative to a cued recall task. However, consumers are sometimes faced with memory-based choice situations that, in an experimental context, would be better represented by a free recall task (Alba et al. 1991). In other words, cues related to a specific brand are not always available to consumers in choice situations; an issue that is not addressed in the four studies presented in this dissertation.

Finally, the stimuli and paired associate task used more closely resemble a strict verbal learning task than the type of task that is typically used in consumer behavior research. However, one of the objectives of this research was to identify the underlying

processes involved that lead to enhanced recall for brand attributes. In the few instances that the spacing effect was examined in marketing, ads were used (Singh et al. 1994, Unnava and Burnkrant 1991). Using these stimuli in this instance might have increased the noise in the experimental setting and not allowed us to develop differentiating predictions using the spacing effect theories.

Future Research

There are two potentially useful extensions of this research. As discussed in the limitations, sometimes consumers make choices without the benefit of cues related to a specific brand. Experiments using a free recall task would address this issue. Both the reconstruction and retrieval hypotheses are applicable in this experimental context and make predictions relative to free recall (Greene 1989, Rose 1984). Both theories state that memory would be enhanced in a free recall, as well as in a cued recall, environment. A second, and related, avenue of research is identifying possible dissociations between the reconstruction and the retrieval hypotheses. In a recent meta-analysis of ninety-seven studies both of these explanations were most consistent with the meta-analytic findings (Janiszewski, Noel, and Sawyer 2002). However, the retrieval hypothesis focuses on the study-phase retrieval of first occurrence information and predicts that recall of P1 should increase with lag; but central to the reconstruction hypothesis is the elaboration of stimuli at P2 (D'Agostino and DeRemer 1973, Jacoby 1978). This difference in the focal point of elaboration would enable us to make differentiating predictions for the two theories. However, one caveat to understanding the spacing effect in marketing is that we may not be able to identify a solitary theory that accounts for all instances where the effect is observed. Several studies have shown that some combination of the more promising

explanations is necessary to explain the spacing effect given its sheer ubiquity (Challis 1993, Greene 1989). Thus, any attempt to establish dissociations between the reconstruction and retrieval hypotheses and recommend one as a more appropriate explanation might only shed limited light on the underlying mechanisms behind this phenomenon.

APPENDIX A
STIMULI AND DESIGN

Table A-1. Experiment 1

Massed —Dispersed			Spaced —Dispersed			Massed —Grouped			Spaced —Grouped		
	Cue	**Attribute**		**Cue**	**Attribute**		**Cue**	**Attribute**		**Cue**	**Attribute**
A1	Gosen	Red-eye reduction	**E17**	Kunnan	Remote shutter	**I33**	Gamo	Viewfinder	**M49**	Harrows	Date-stamp
A1	Gosen	Red-eye reduction	**F21**	Avada	Digital	**I33**	Gamo	Viewfinder	**M50**	Harrows	Weatherproof
B5	Hale	Voice mail	**G25**	Jensen	Stereo sound	**I34**	Gamo	Zoom lens	**M51**	Harrows	Point-and-shoot
B5	Hale	Voice mail	**H29**	Volga	Daytime running lights	**I34**	Gamo	Zoom lens	**M52**	Harrows	6 ft. Flash range
C9	Adler	Closed caption	**E18**	Kunnan	Auto film rewind	**I35**	Gamo	Autofocus	**N53**	Prolon	Folding-case
C9	Adler	Closed caption	**F22**	Avada	3-way calling	**I35**	Gamo	Autofocus	**N54**	Prolon	Speed dial
D13	Lancia	Leather seats	**G26**	Jensen	Mute function	**I36**	Gamo	Wide-angle view	**N55**	Prolon	Roam warning
D13	Lancia	Leather seats	**H30**	Volga	4-wheel drive	**I36**	Gamo	Wide-angle view	**N56**	Prolon	One-touch redial
A2	Gosen	Rechargeable flash	**E19**	Kunnan	35mm film	**J37**	Lamber	Analog	**O57**	Aston	Parental control
A2	Gosen	Rechargeable flash	**F23**	Avada	Voice-activated dialing	**J37**	Lamber	Analog	**O58**	Aston	Remote locator
B6	Hale	Web browser	**G27**	Jensen	Flat screen	**J38**	Lamber	24-hr. battery	**O59**	Aston	Sleep timer
B6	Hale	Web browser	**H31**	Volga	V-8 engine	**J38**	Lamber	24-hr. battery	**O60**	Aston	32-inch screen
C10	Adler	HDTV model	**E20**	Kunnan	Focus lock	**J39**	Lamber	Car adapter	**P61**	Tatra	Paint protectant
C10	Adler	HDTV model	**F24**	Avada	Headset connector	**J39**	Lamber	Car adapter	**P62**	Tatra	Heated mirrors
D14	Lancia	CD-player	**G28**	Jensen	Second language signal	**J40**	Lamber	Caller id	**P63**	Tatra	Side air-bags
D14	Lancia	CD-player	**H32**	Volga	Heated seats	**J40**	Lamber	Caller id	**P64**	Tatra	Child seat
A3	Gosen	Light-weight	**E17**	Kunnan	Remote shutter	**K41**	Tillins	19-inch screen	**M49**	Harrows	Date-stamp
A3	Gosen	Light-weight	**F21**	Avada	Digital	**K41**	Tillins	19-inch screen	**M50**	Harrows	Weatherproof
B7	Hale	Vibrating alert	**G25**	Jensen	Stereo sound	**K42**	Tillins	Picture-in-picture	**M51**	Harrows	Point-and-shoot
B7	Hale	Vibrating alert	**H29**	Volga	Daytime running lights	**K42**	Tillins	Picture-in-picture	**M52**	Harrows	6 ft. Flash range
C11	Adler	Headphone jack	**E18**	Kunnan	Auto film rewind	**K43**	Tillins	Surround sound	**N53**	Prolon	Folding-case
C11	Adler	Headphone jack	**F22**	Avada	3-way calling	**K43**	Tillins	Surround sound	**N54**	Prolon	Speed dial
D15	Lancia	Power windows	**G26**	Jensen	Mute function	**K44**	Tillins	Universal remote	**N55**	Prolon	Roam warning
D15	Lancia	Power windows	**H30**	Volga	4-wheel drive	**K44**	Tillins	Universal remote	**N56**	Prolon	One-touch redial
A4	Gosen	Auto-film reload	**E19**	Kunnan	35mm film	**L45**	Horch	Anti-lock brakes	**O57**	Aston	Parental control
A4	Gosen	Auto-film reload	**F23**	Avada	Voice-activated dialing	**L45**	Horch	Anti-lock brakes	**O58**	Aston	Remote locator
B8	Hale	Paging function	**G27**	Jensen	Flat screen	**L46**	Horch	Power mirrors	**O59**	Aston	Sleep timer
B8	Hale	Paging function	**H31**	Volga	V-8 engine	**L46**	Horch	Power mirrors	**O60**	Aston	32-inch screen
C12	Adler	Channel block	**E20**	Kunnan	Focus lock	**L47**	Horch	Rust proofing	**P61**	Tatra	Paint protectant
C12	Adler	Channel block	**F24**	Avada	Headset connector	**L47**	Horch	Rust proofing	**P62**	Tatra	Heated mirrors
D16	Lancia	Keyless entry	**G28**	Jensen	Second language signal	**L48**	Horch	Air conditioning	**P63**	Tatra	Side air-bags
D16	Lancia	Keyless entry	**H32**	Volga	Heated seats	**L48**	Horch	Air conditioning	**P64**	Tatra	Child seat

Table A-2. Experiment 2

	Massed —Dispersed			Spaced —Dispersed			Massed —Grouped			Spaced —Grouped	
	Cue	**Attribute**		**Cue**	**Attribute**		**Cue**	**Attribute**		**Cue**	**Attribute**
A1	Gosen	Red-eye reduction	**E17**	Kunnan	Remote shutter	**I33**	Gamo	Viewfinder	**M49**	Harrows	Date-stamp
Q1	Trabant	Red-eye reduction	**F21**	Avada	Digital	**U33**	Willys	Viewfinder	**M50**	Harrows	Weatherproof
B5	Hale	Voice mail	**G25**	Jensen	Stereo sound	**I34**	Gamo	Zoom lens	**M51**	Harrows	Point-and-shoot
R5	Thulin	Voice mail	**H29**	Volga	Daytime running lights	**U34**	Willys	Zoom lens	**M52**	Harrows	6 ft. flash range
C9	Adler	Closed caption	**E18**	Kunnan	Auto film rewind	**I35**	Gamo	Autofocus	**N53**	Prolon	Folding-case
C9	Adler	Closed caption	**F22**	Avada	3-way calling	**U35**	Willys	Autofocus	**N54**	Prolon	Speed dial
D13	Lancia	Leather seats	**G26**	Jensen	Mute function	**I36**	Gamo	Wide-angle view	**N55**	Prolon	Roam warning
D13	Lancia	Leather seats	**H30**	Volga	4-wheel drive	**U36**	Willys	Wide-angle view	**N56**	Prolon	One-touch redial
A2	Gosen	Rechargeable flash	**E19**	Kunnan	35mm film	**J37**	Tillins	19-inch screen	**O57**	Aston	Parental control
Q2	Trabant	Rechargeable flash	**F23**	Avada	Voice-activated dialing	**J37**	Tillins	19-inch screen	**O58**	Aston	remote locator
B6	Hale	Web browser	**G27**	Jensen	Flat screen	**J38**	Tillins	Picture-in-picture	**O59**	Aston	Sleep timer
R6	Thulin	Web browser	**H31**	Volga	V-8 engine	**J38**	Tillins	Picture-in-picture	**O60**	Aston	32-inch screen
C10	Adler	HDTV model	**E20**	Kunnan	Focus lock	**J39**	Tillins	Surround sound	**P61**	Tatra	Paint protectant
C10	Adler	HDTV model	**F24**	Avada	Headset connector	**J39**	Tillins	Surround sound	**P62**	Tatra	Heated mirrors
D14	Lancia	CD-player	**G28**	Jensen	Second language signal	**J40**	Tillins	Universal remote	**P63**	Tatra	Side air-bags
D14	Lancia	CD-player	**H32**	Volga	Heated seats	**J40**	Tillins	Universal remote	**P64**	Tatra	Child seat
A3	Gosen	Light-weight	**S17**	Talbot	Remote shutter	**K41**	Lamber	Analog	**W49**	Lara	Date-stamp
Q3	Trabant	Light-weight	**T21**	Borgan	Digital	**V41**	Tucker	Analog	**W50**	Lara	Weatherproof
B7	Hale	Vibrating Alert	**G25**	Jensen	Stereo sound	**K42**	Lamber	24-hr. battery	**W51**	Lara	Point-and-shoot
R7	Thulin	Vibrating Alert	**H29**	Volga	Daytime running lights	**V42**	Tucker	24-hr. battery	**W52**	Lara	6 ft. flash range
C11	Adler	Headphone jack	**S18**	Talbot	Auto film rewind	**K43**	Lamber	Car adapter	**X53**	Scana	Folding-case
C11	Adler	Headphone jack	**T22**	Borgan	3-way calling	**V43**	Tucker	Car adapter	**X54**	Scana	Speed dial
D15	Lancia	Power windows	**G26**	Jensen	Mute function	**K44**	Lamber	Caller id	**X55**	Scana	Roam warning
D15	Lancia	Power windows	**H30**	Volga	4-wheel drive	**V44**	Tucker	Caller id	**X56**	Scana	One-touch redial
A4	Gosen	Auto-film reload	**S19**	Talbot	35mm film	**L45**	Horch	Anti-lock brakes	**O57**	Aston	Parental control
Q4	Trabant	Auto-film reload	**T23**	Borgan	Voice-activated dialing	**L45**	Horch	Anti-lock brakes	**O58**	Aston	Remote locator
B8	Hale	Paging function	**G27**	Jensen	Flat screen	**L46**	Horch	Power mirrors	**O59**	Aston	Sleep timer
R8	Thulin	Paging function	**H31**	Volga	V-8 engine	**L46**	Horch	Power mirrors	**O60**	Aston	32-inch screen
C12	Adler	Channel block	**S20**	Talbot	Focus lock	**L47**	Horch	Rust proofing	**P61**	Tatra	Paint protectant
C12	Adler	Channel block	**T24**	Borgan	Headset connector	**L47**	Horch	Rust proofing	**P62**	Tatra	Heated mirrors
D16	Lancia	Keyless entry	**G28**	Jensen	Second language signal	**L48**	Horch	Air conditioning	**P63**	Tatra	Side air-bags
D16	Lancia	Keyless entry	**H32**	Volga	Heated seats	**L48**	Horch	Air conditioning	**P64**	Tatra	Child seat

Table A-3. Experiment 3

Massed—Dispersed			Spaced—Dispersed			Massed—Grouped			Spaced—Grouped		
Cue		**Attribute**	**Cue**		**Attribute**	**Cue**		**Attribute**	**Cue**		**Attribute**
A1	Austin	21" monitor	**H13**	Morris	CD rom	**O25**	Bristol	10 gig hard-drive	**V37**	Dusen	256 mb ram
A1	Austin	21" monitor	**L17**	Prolon	Folding-case	**O25**	Bristol	10 gig hard-drive	**W38**	Kunnan	Auto-film rewind
E5	Hale	Voice mail	**N21**	Volga	Daytime running lights	**P26**	Willys	Viewfinder	**X39**	Kaiser	Wall mountable
E5	Hale	Voice mail	**I14**	Harrows	Date stamp	**P26**	Willys	Viewfinder	**Y40**	Stoewer	Water-resistant ink
G9	Lancia	Leather seats	**L18**	Prolon	Speed dial	**Q27**	Abarth	Speakerphone	**Z41**	Avada	3-way calling
G9	Lancia	Leather seats	**N22**	Volga	4-wheel drive	**Q27**	Abarth	Speakerphone	**Z42**	Avada	Digital
B2	Gamo	Zoom lens	**J15**	Morgan	2-way intercom	**R28**	Opel	5 pgs. per minute	**AA43**	Aston	Parental control
B2	Gamo	Zoom lens	**M19**	Jensen	Stereo sound	**R28**	Opel	5 pgs. per minute	**AA44**	Aston	Flat screen
E6	Hale	Web browser	**N23**	Volga	V-8 engine	**S29**	Lamber	24-hr. battery	**AB45**	Tatra	CD player
E6	Hale	Web browser	**K16**	Panhard	High-resolution color	**S29**	Lamber	24-hr. battery	**AB46**	Tatra	Heated mirrors
G10	Lancia	Paint-protectant	**M20**	Jensen	Mute function	**S30**	Lamber	Car adapter	**AB47**	Tatra	Air conditioning
G10	Lancia	Paint-protectant	**N24**	Volga	Heated seats	**S30**	Lamber	Car adapter	**AB48**	Tatra	Child seat
C3	Edsel	Surge protector	**H13**	Morris	CD rom	**T31**	Tillins	Picture-in-picture	**V37**	Dusen	256 mb ram
C3	Edsel	Surge protector	**L17**	Prolon	Folding-case	**T31**	Tillins	Picture-in-picture	**W38**	Kunnan	Auto-film rewind
F7	Adler	Closed caption	**N21**	Volga	Daytime running lights	**T32**	Tillins	Headphone jack	**X39**	Kaiser	Wall mountable
F7	Adler	Closed caption	**I14**	Harrows	Date stamp	**T32**	Tillins	Headphone jack	**Y40**	Stoewer	Water-resistant ink
G11	Lancia	Power windows	**L18**	Prolon	Speed dial	**U33**	Horch	Anti-lock brakes	**Z41**	Avada	3-way calling
G11	Lancia	Power windows	**N22**	Volga	4-wheel drive	**U33**	Horch	Anti-lock brakes	**Z42**	Avada	Digital
D4	Fortin	Inkjet	**J15**	Morgan	2-way intercom	**U34**	Horch	Power mirrors	**AA43**	Aston	Parental control
D4	Fortin	Inkjet	**M19**	Jensen	Stereo sound	**U34**	Horch	Power mirrors	**AA44**	Aston	Flat screen
F8	Adler	Channel block	**N23**	Volga	V-8 engine	**U35**	Horch	Rust proofing	**AB45**	Tatra	CD player
F8	Adler	Channel block	**K16**	Panhard	High-resolution color	**U35**	Horch	Rust proofing	**AB46**	Tatra	Heated mirrors
G12	Lancia	Keyless entry	**M20**	Jensen	Mute function	**U36**	Horch	Side airbags	**AB47**	Tatra	Air conditioning
G12	Lancia	Keyless entry	**N24**	Volga	Heated seats	**U36**	Horch	Side airbags	**AB48**	Tatra	Child seat

Table A-4. Experiment 4

Group 1						Group 2					
Massed—Dispersed			Spaced—Dispersed			Massed—Grouped			Spaced—Grouped		
	Cue	Attribute		Cue	Attribute		Cue	Attribute		Cue	Attribute
A1	Gamo	Digital.	**E13**	Lancia	Leather seats	**I25**	Gamo	Digital.	**M37**	Lancia	Leather seats
A1	Gamo	Digital.	**F16**	Gosen	Disposable	**I25**	Gamo	Digital.	**M38**	Lancia	CD player
B4	Horch	Side airbags	**G19**	Avada	3-way calling	**I26**	Gamo	Video output	**M39**	Lancia	Heated mirrors
B4	Horch	Side airbags	**H22**	Adler	Channel block	**I26**	Gamo	Video output	**N40**	Gosen	Disposable
C7	Lamber	Analog	**E14**	Lancia	CD player	**I27**	Gamo	4 mb memory	**N41**	Gosen	Lightweight
C7	Lamber	Analog	**F17**	Gosen	Lightweight	**I27**	Gamo	4 mb memory	**N42**	Gosen	Compact
D10	Tillins	19" screen	**G20**	Avada	Caller id	**J28**	Horch	Side airbags	**O43**	Avada	3-way calling
D10	Tillins	19" screen	**H23**	Adler	Mute function	**J28**	Horch	Side airbags	**O44**	Avada	Caller ID
A2	Gamo	Video output	**E15**	Lancia	Heated mirrors	**J29**	Horch	Anti-lock brakes	**O45**	Avada	Headset
A2	Gamo	Video output	**F18**	Gosen	Compact	**J29**	Horch	Anti-lock brakes	**P46**	Adler	Channel block
B5	Horch	Anti-lock brakes	**G21**	Avada	Headset	**J30**	Horch	Rear seatbelts	**P47**	Adler	Mute function
B5	Horch	Anti-lock brakes	**H24**	Adler	Closed caption	**J30**	Horch	Rear seatbelts	**P48**	Adler	Closed caption
C8	Lamber	24-hr. battery	**E13**	Lancia	Leather seats	**K31**	Lamber	Analog	**M37**	Lancia	Leather seats
C8	Lamber	24-hr. battery	**F16**	Gosen	Disposable	**K31**	Lamber	Analog	**M38**	Lancia	CD player
D11	Tillins	Surround sound	**G19**	Avada	3-way calling	**K32**	Lamber	24-hr. battery	**M39**	Lancia	Heated mirrors
D11	Tillins	Surround sound	**H22**	Adler	Channel block	**K32**	Lamber	24-hr. battery	**N40**	Gosen	Disposable
A3	Gamo	4 mb memory	**E14**	Lancia	CD Player	**K33**	Lamber	Car adapter	**N41**	Gosen	Lightweight
A3	Gamo	4 mb memory	**F17**	Gosen	Lightweight	**K33**	Lamber	Car adapter	**N42**	Gosen	Compact
B6	Horch	Rear seatbelts	**G20**	Avada	Caller id	**L34**	Tillins	19" screen	**O43**	Avada	3-way calling
B6	Horch	Rear seatbelts	**H23**	Adler	Mute function	**L34**	Tillins	19" screen	**O44**	Avada	Caller id
C9	Lamber	Car adapter	**E15**	Lancia	Heated mirrors	**L35**	Tillins	Surround sound	**O45**	Avada	Headset
C9	Lamber	Car adapter	**F18**	Gosen	Compact	**L35**	Tillins	Surround sound	**P46**	Adler	Channel block
D12	Tillins	Universal remote	**G21**	Avada	Headset	**L36**	Tillins	Universal remote	**P47**	Adler	Mute function
D12	Tillins	Universal remote	**H24**	Adler	Closed caption	**L36**	Tillins	Universal remote	**P48**	Adler	Closed caption

APPENDIX B
PREDICTIONS AND RESULTS

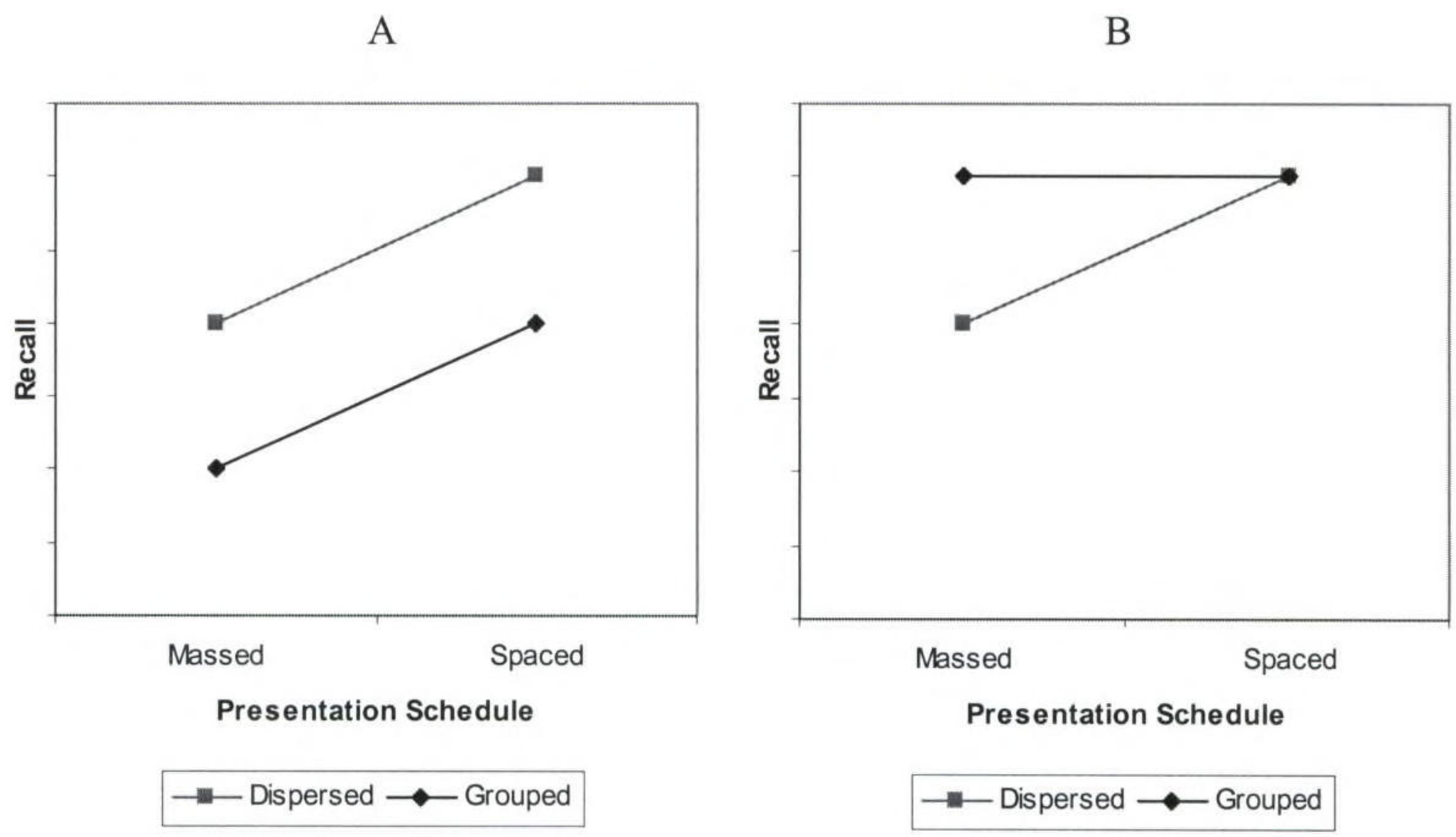

Figure B-1. Experiment 1 predictions. A) Encoding variability hypothesis. B) Reconstruction hypothesis

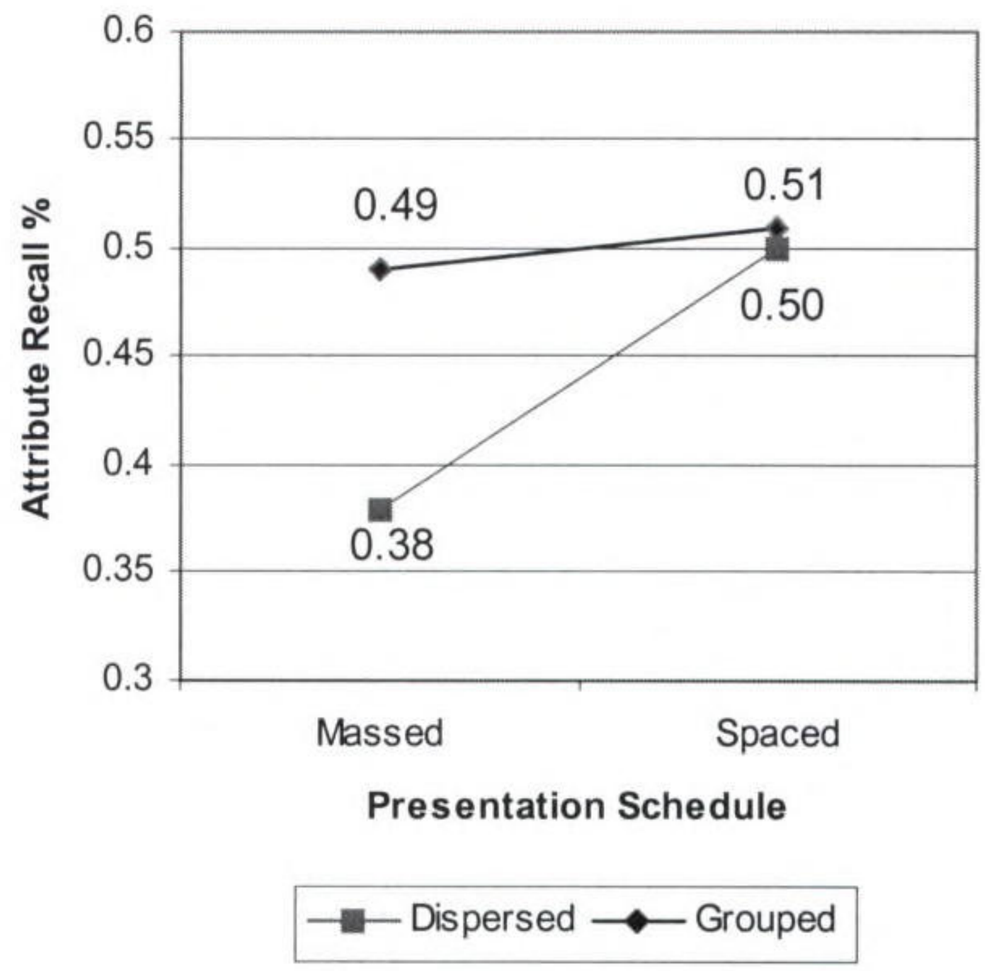

Figure B-2. Experiment 1 results

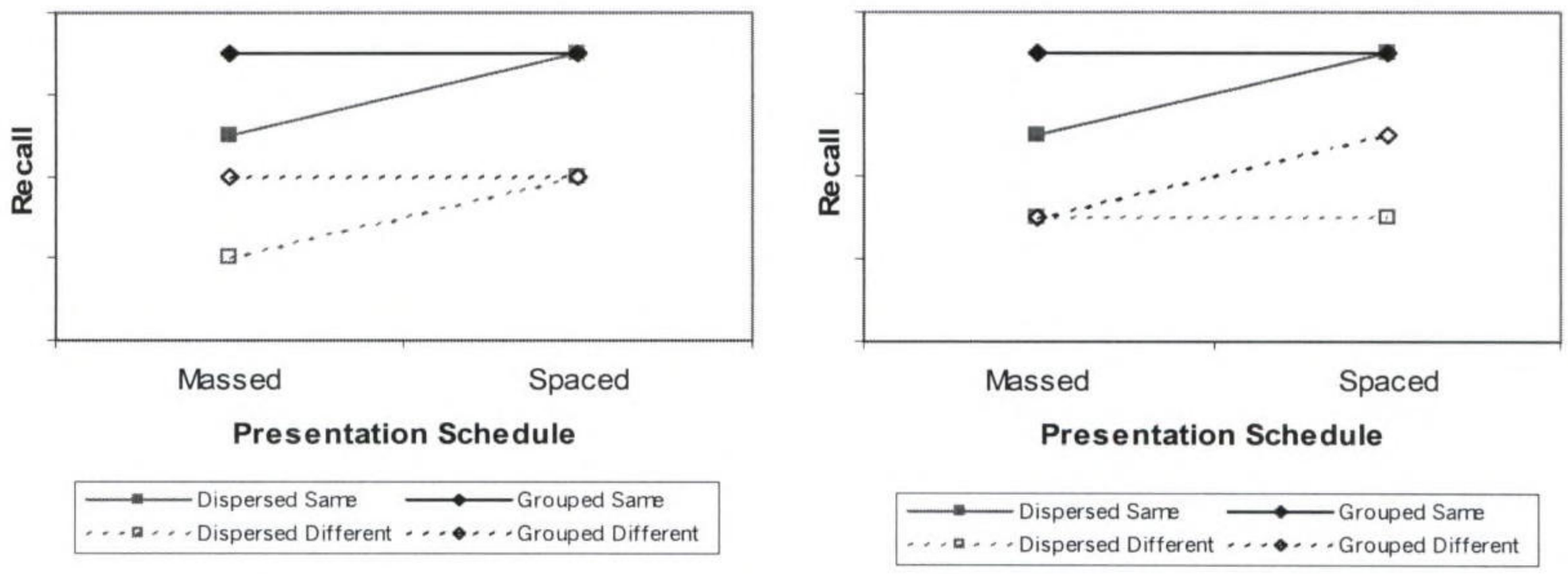

Figure B-3. Experiment 2 predictions. A) Voluntary attention hypothesis.
B) Reconstruction hypothesis

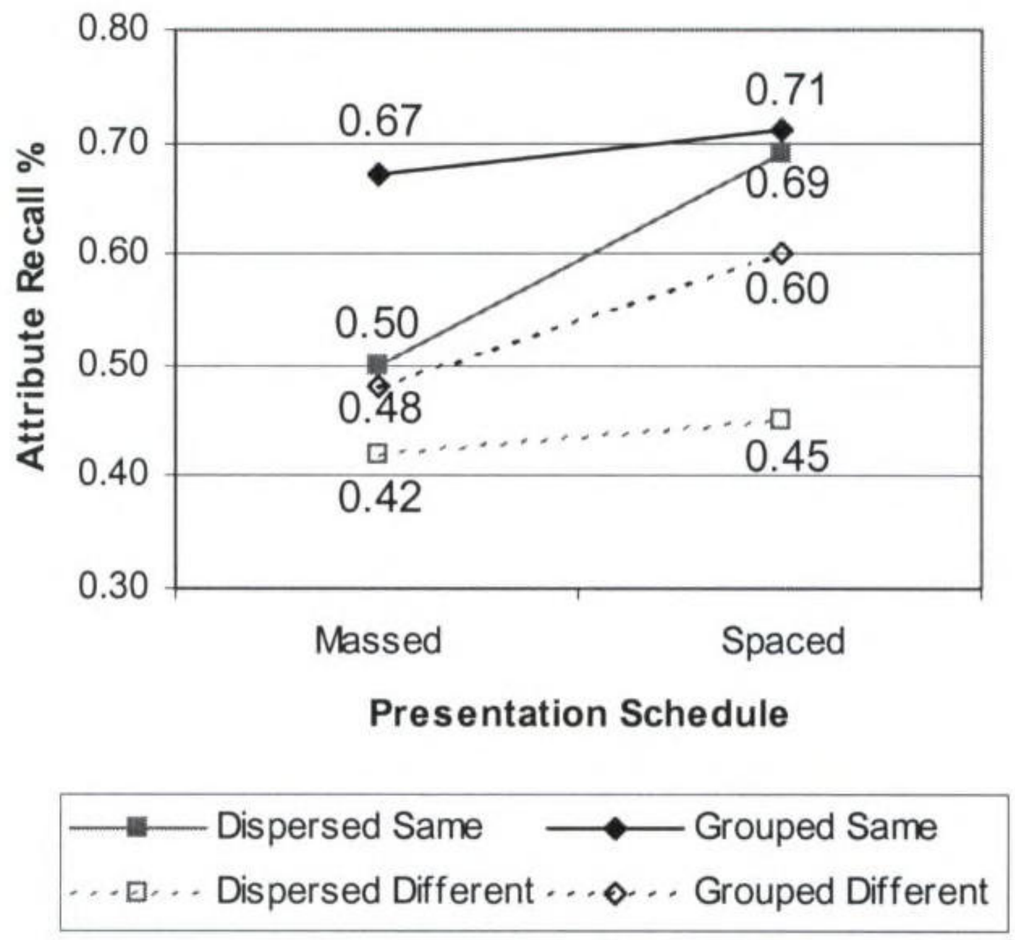

Figure B-4. Experiment 2 results

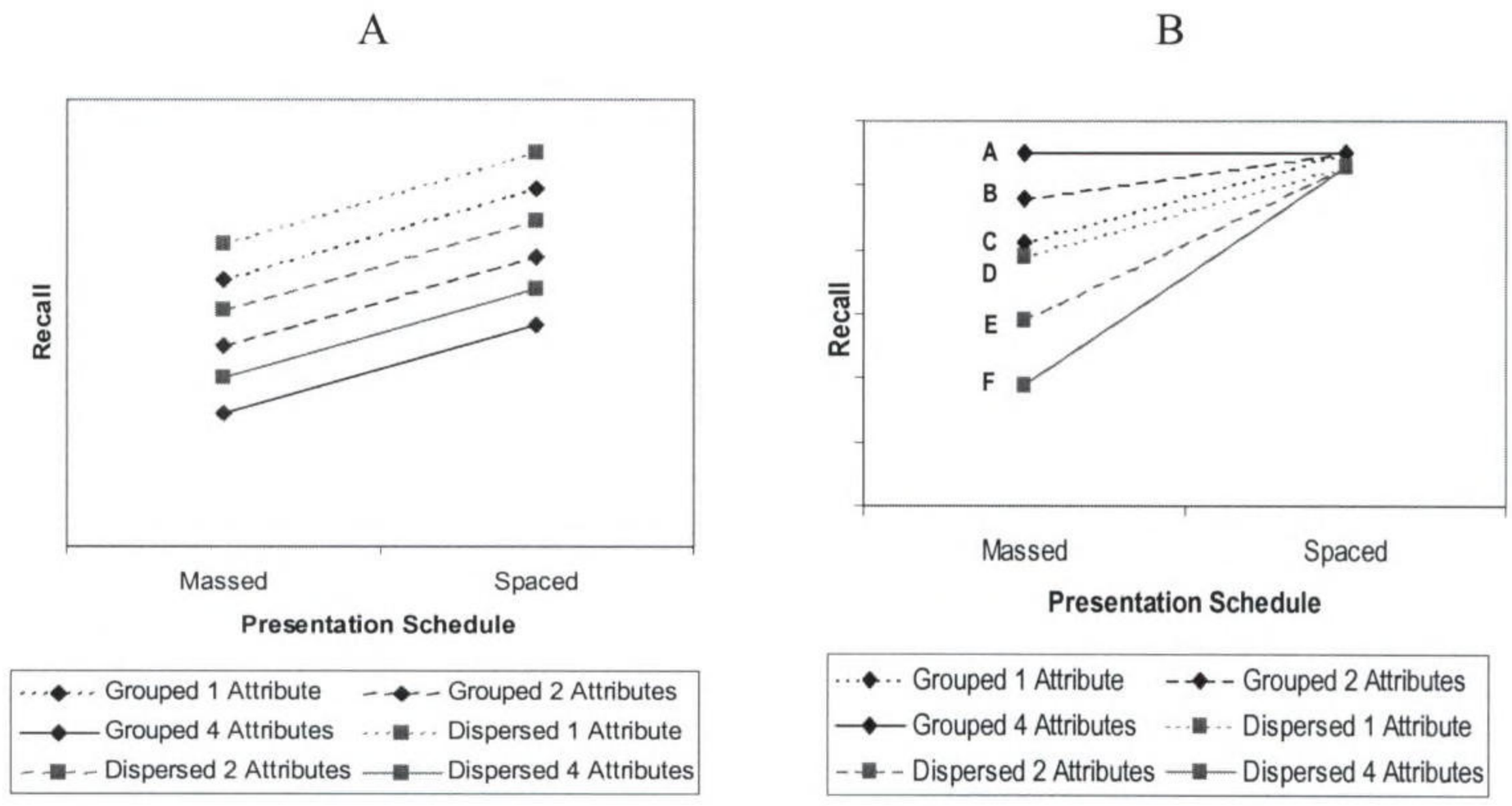

Figure B-5. Experiment 3 predictions. A) Encoding Variability hypothesis. B) Reconstruction hypothesis

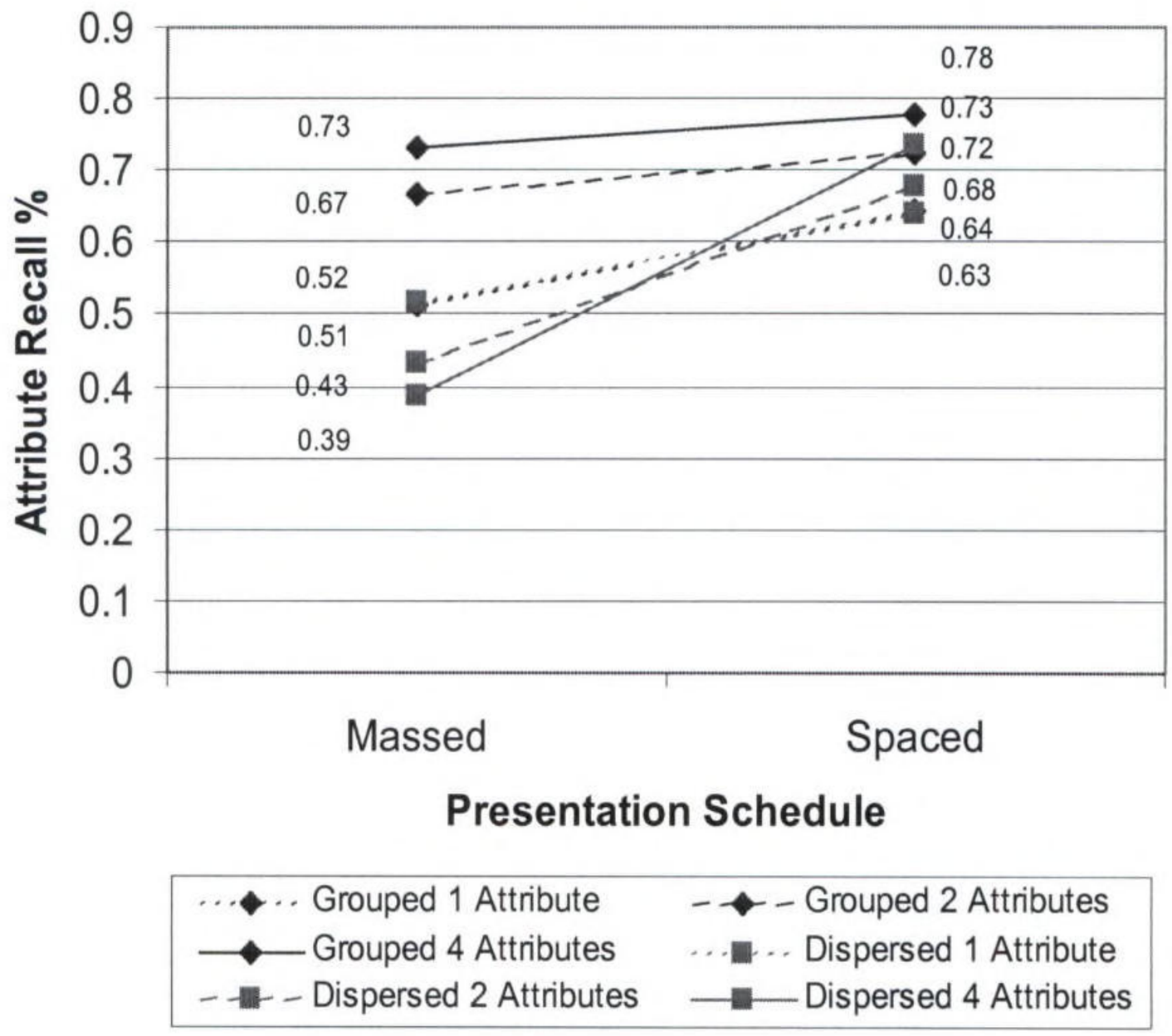

Figure B-6. Experiment 3 results

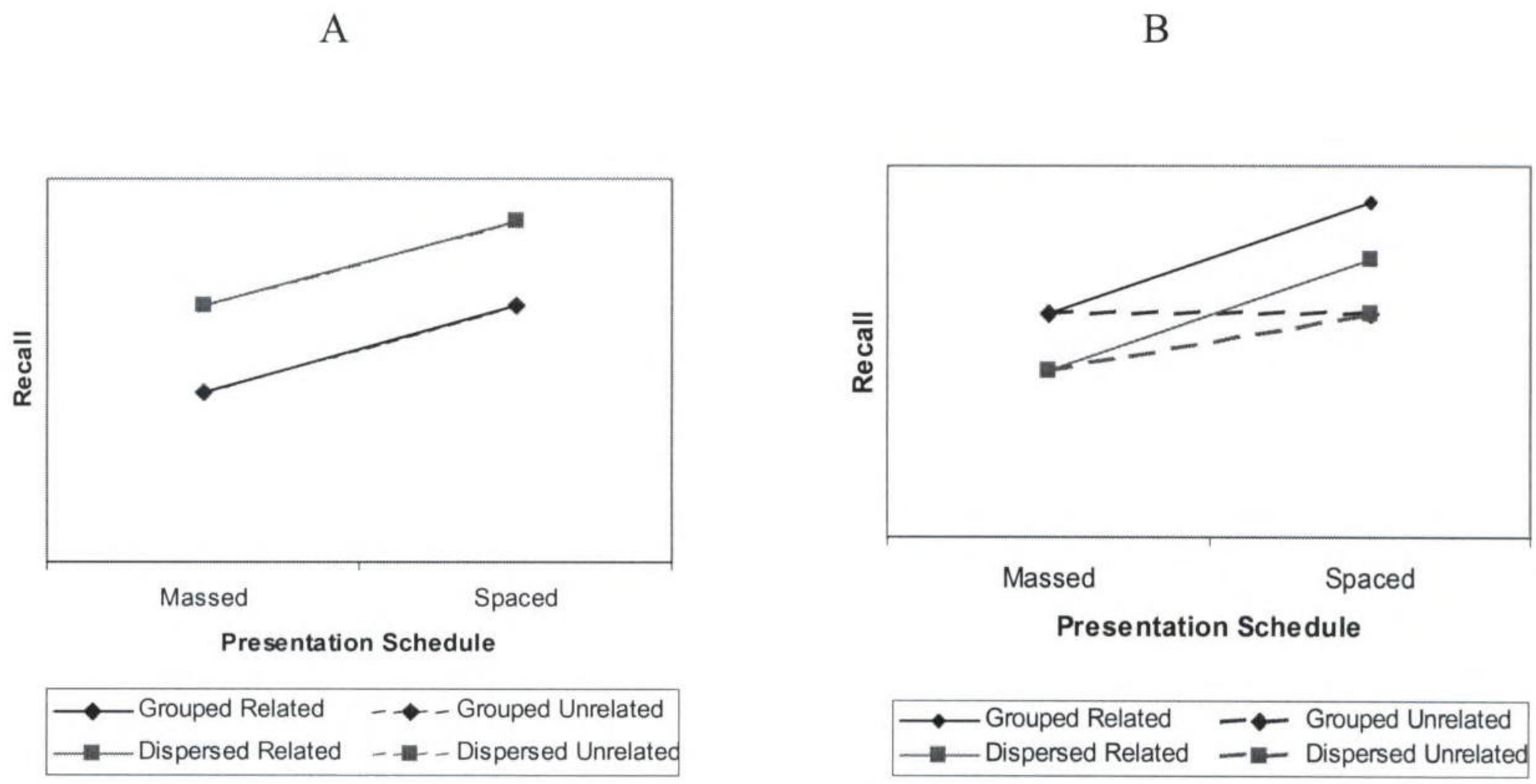

Figure B-7. Experiment 4 predictions. A) Encoding Variability hypothesis. B) Reconstruction hypothesis

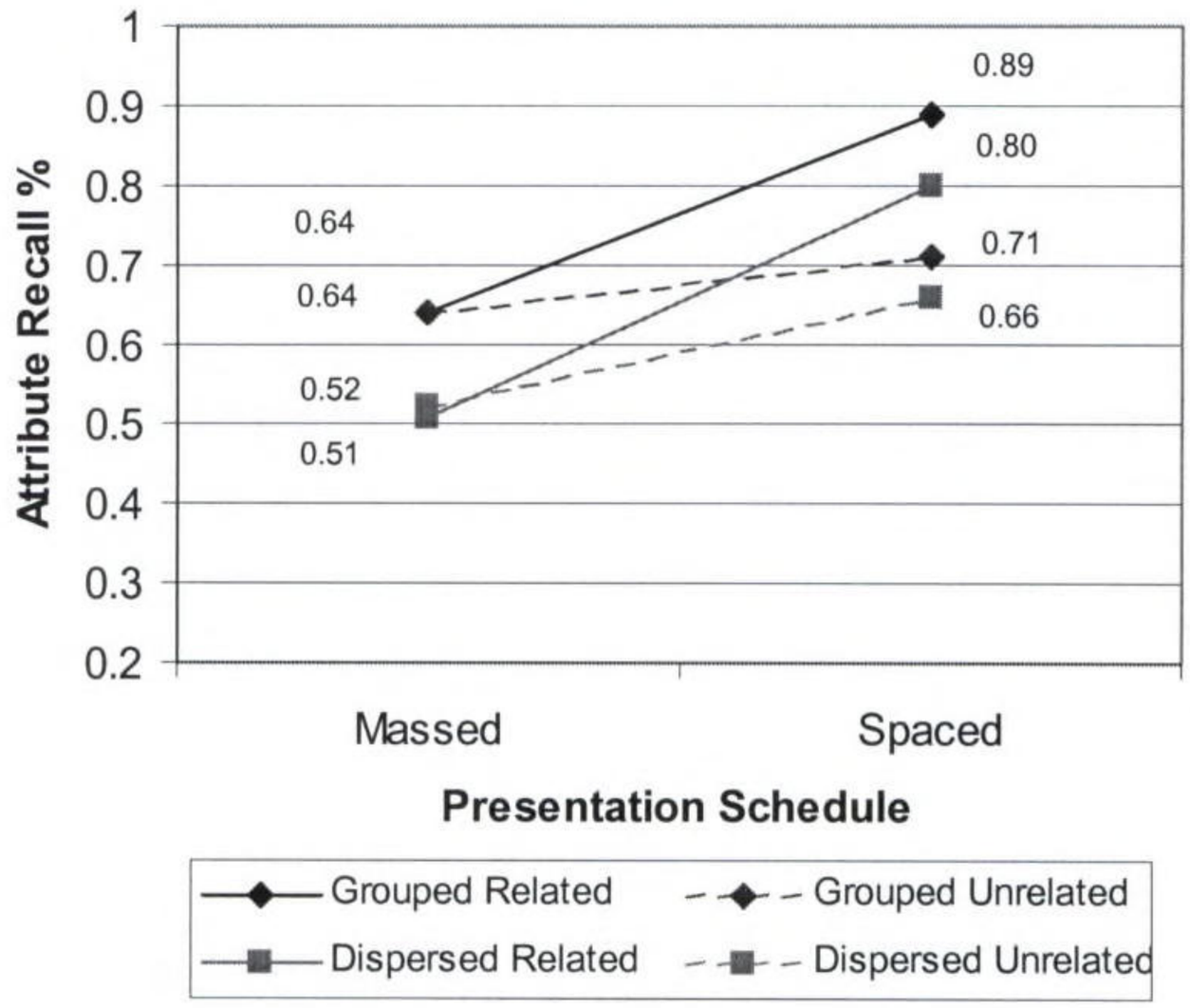

Figure B-8. Experiment 4 results

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BIOGRAPHICAL SKETCH

Hayden Noel was born in Port-of-Spain, Trinidad on February 12, 1964. He attended Richmond Street Boys E.C. School where his grandfather, Victor Noel, was principal. He then pursued his secondary education at Queen's Royal College in St. Clair Trinidad; a school that several generations of Noels attended – including his grandfather, his three uncles, his father and his elder brother. He obtained his bachelor's degree in Management and Economics in 1988 from the University of the West Indies in Mona, Jamaica. After working at Canadian Imperial Bank of Commerce in a managerial capacity, he completed a Master of Business Administration degree at Pace University in New York City. He then re-entered the corporate world for a stint in advertising at the Bozell Worldwide advertising agency. His time there spurred his curiosity and he became very interested in advertising research. He then left Bozell to pursue a Ph.D. in Marketing at the University of Florida. He completed his degree in December 2002 and accepted a position as an Assistant Professor at the Bernard M. Baruch School of Business, City University of New York.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Christopher A. Janiszewski, Chairman
Professor of Marketing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Joseph W. Alba
Distinguished Professor of Marketing

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December, 2002

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