BEST OF BOTH WORLDS? CONSUMER INFERENCES ABOUT THE BENEFITS OF HYBRID PRODUCTS

By

BALER BILGIN

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 FLORIDA

2007

To my family and beloved uncle

ACKNOWLEDGMENTS

I would first like to thank my advisor, Chris Janiszewski, for his sincere commitment to my development as a researcher. I am grateful to Chris not only because of his patient guidance of my doctoral work over the years, but also because of his unrelenting dedication to marketing research that will inspire me for the rest of my career as a marketing researcher. I would also like to express my gratitude to my committee members Joe Alba, Lyle Brenner, Robyn LeBoeuf, and Ira Fischler for their valuable advice on my work. I owe Lyle Brenner special thanks for his significant contribution to my training by being a supportive co-author and a good friend. I thank Alan Cooke for his insightful comments on my research proposals. I thank Gary Hunter and Steve Taylor who encouraged me to pursue a PhD at the University of Florida.

I am deeply indebted to my parents, Nurten and Bahri; and my sister, Bahar; who have not only wholeheartedly supported my decision to pursue a PhD in the U.S., but also have managed to make me feel at home despite the 5,000 miles that separated us. Finally, I would like to thank Kryslaine Lopes whose joyful presence brightened my days and motivated me to get back to work after disappointing experiments. It frightens me to think how miserable my PhD years would have been without her.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

BEST OF BOTH WORLDS? CONSUMER INFERENCES ABOUT THE BENEFITS OF HYBRID PRODUCTS

By

Baler Bilgin

August 2007

Chair: Chris Janiszewski
Major: Business Administration

A common form of product innovation involves combining two existing products to form a hybrid product. Hybrid products differ from other types of product innovations (e.g., incrementally new products, radically new products) in that they do not introduce novel benefits. Instead, a hybrid product portends to offer the best features of two existing constituent product categories, without the weaknesses of either. This research aims to identify conditions that influence a consumer's willingness to accept claims that the hybrid product will deliver a benefit that is characteristic of a constituent product category. Results from four experiments indicate that consumer acceptance of benefit claims about hybrid products depends on (1) the perceived distribution of attribute values within each constituent product category and, (2) the similarity between the constituent product categories.

CHAPTER 1
INTRODUCTION

A common form of product innovation involves combining two existing products to create a hybrid product. A hybrid product is appealing because it uses the benefits of one product to compensate for the deficits of the other product and vise-versa. For example, extended stay hotels combine a hotel (convenient location, uncomfortable living space) and an apartment (inconvenient location, comfortable living space) to create a product that has the convenience of a hotel and the comfort of an apartment.[1] Yet, not all hybrid products are successful. For example, the Ecomobile is a combination of a car and a motorcycle. The Ecomobile claims to combine the benefits of a car (e.g., weather protection) with the benefits of a motorcycle (e.g., low fuel consumption).[2] The Ecomobile is just one example of a hybrid product that has won an engineering award (others include BMW's C1, NCR's microwave bank), yet has experienced limited commercial success.

One source of a hybrid product's success may be the consumer's willingness to accept that the constituent categories' benefits can generalize to the hybrid product. Inferences about benefit generalization will influence the consumer's willingness to gather additional information (e.g., search, trial) about the hybrid product.[3] At present, our understanding of the factors that encourage benefit generalization is limited (but see Gregan-Paxton, Hoeffler, and Zhoa 2005). Understanding why certain category benefits generalize to a hybrid product, whereas others do not, might increase the manager's ability to screen hybrid product ideas. Such insight might also

[1] Other existing examples include toaster ovens, sofa beds and camera phones.

[2] Ecomobile is currently manufactured by the Swiss company Peraves (http://www.peraves.ch).

[3] The term "benefit generalization" will refer to a consumer's willingness to generalize the better one of two constituent category attribute values to the hybrid product.

aid in the development of promotional strategies that encourage the generalization of benefits from the constituent categories to the hybrid product.

This research investigates the potential influence of two processes that could determine the consumer's willingness to generalize benefits from the constituent categories to the hybrid product. *Category plausibility* (i.e., an assessment of the product category that is most likely to generate the hybrid product's performance) and *attribute value plausibility* (i.e., an assessment of the most likely hybrid attribute value given the distribution of attribute values in each constituent product category attribute) are both legitimate strategies for benefit generalization. Four studies show that attribute value plausibility guides benefit generalization. When there is a small amount of overlap in the attribute value distributions of the constituent product categories, one of these overlapping values is generalized to the hybrid product. When the overlap in the attribute values of the constituent product categories is not diagnostic (i.e., no overlap, considerable overlap), the perceived similarity of the constituent category distributions determines benefit generalization. Chapter 2 discusses how hybrid products differ from other types of new products, and how these differences may affect the processes underlying consumer inferences about hybrid products.

CHAPTER 2
NEW PRODUCTS

One of the most fundamental activities in marketing is the development and introduction of new products. A number of strategies have been proposed to facilitate the successful development of new product ideas. These strategies include brainstorming (Ulrich and Eppinger 1995; Srinivasan and Lovejoy 1997), morphological analysis (Urban and Hauser 1993), user observation (Leonard and Rayport 1997), lead user analysis (von Hippel 2005), visual imagery (Dahl, Chattopadhyay, and Gorn 1999), template application (Goldenberg, Mazursky, and Solomon 1999), analogical thinking (Dahl and Moreau 2002), and product combination (Gregan-Paxton et al. 2005).

Factors that influence the assessment of the value of a new product idea can be classified under three broad categories. First, managers assess the market potential for the hybrid product by considering consumer needs, as well as the size and growth rate of the target market. Second, managers assess the feasibility of the project from an engineering and marketing perspective. Can the product be produced and delivered at a price that the target market will find appealing? Is the technology required for production based on the firm's core competencies? Third, managers assess the feasibility of a project from a communication perspective. Can new product benefits be effectively communicated to consumers? Will the consumer be able to appreciate the benefits of the product? For example, the difficulty TiVo has experienced communicating its benefits to consumers, as indicated by its rather slow adoption rate, illustrates the importance of marketing communications in a new product's success (Wathieu and Zoglio 2005).

It can thus be reasonably concluded that helping consumers understand and accept the benefits of a new product is one of the largest obstacles to a successful new product introduction

(Hirshman 1980; Gatignon and Robertson 1985; Gregan-Paxton et al. 2002). This research focuses on the communication aspect of hybrid product benefits to consumers. Specifically, I investigate factors that marketers can use in their promotions to influence a consumer's expectation that a hybrid product will combine the best attributes of its constituent categories.

Communicating Hybrid Product Benefits

The effective communication of new product benefits is particularly difficult for products that are a hybrid of existing products. Hybrid products are often positioned as the aggregate benefits of the two existing products. Yet, the consumer's acceptance of this positioning claim requires a suspension of his/her beliefs about what defines one category or the other. For example, consider the air freshening light bulbs produced by Ozonelite (ozonelite.com) and Technical Consumer Products (www.fresh2.com). Consumers may find it difficult to believe that an air freshener could light a room or that a light could remove odors. What follows is a review of processes that have traditionally been used to explain consumer inferences about the benefits of hybrid products.

Structural Mapping

The structural-mapping perspective (Gentner and Markman 1994, 1997) is commonly used to predict how consumers will make inferences about the benefits of new products. The structural-mapping perspective assumes that inferences about the characteristics of a new product are made by drawing an analogy to a familiar, host category. Consumers access information related to a host category, map properties of the host category onto the target product, and make inferences about the target product's characteristics using a process of knowledge transfer (Gentner and Markman 1994, 1997; Gregan-Paxton and John 1997; Moreau, Markman, and Lehmann 2001). In general, people are more likely to map the properties of a

relational system that are relevant to the analogy (i.e., people map alignable features) (Gentner and Markman 1997; Gregan-Paxton et al. 2002).

The structural mapping perspective has been particularly effective at predicting consumer inferences about new-to-the-world products, which defy classification by virtue of offering novel benefits or new uses for existing benefits. For example, prior to its introduction, a digital camera was a radical innovation because consumers were not only unfamiliar with its benefits but also with the product itself, making it rather difficult to categorize it to an existing product category. In situations like these, consumers can make inferences about the benefits of new-to-the-world products via analogical reasoning (Figure 2-1). An analogous host category is often selected because it has benefit dimensions that align with the target product, hence the knowledge can be easily transferred (Moreau et al. 2001). Marketers can try to influence the inference process by suggesting a category (e.g., camera, scanner) that will encourage the most beneficial set of inferences about the new product (e.g., digital camera) (Moreau et al. 2001; Yamauchi and Markman 2000).

Host Category	→	Target Product
Benefit 1	→	?
Benefit 2	→	?

Figure 2-1. Structural mapping paradigm and product innovations introducing novel benefits.

The structural mapping perspective may be inappropriate for predicting consumer inferences about hybrid products. Hybrid products often combine two existing products with non-overlapping benefits, and thus do not involve introduction of new benefits nor new usage contexts for known benefits. For example, miles per gallon (mpg) is an important attribute for a car-motorcycle hybrid, yet consumers know this attribute well. Thus, the critical consumer process in understanding a hybrid product is not learning its benefits but making inferences about

its attribute values. What is peculiar about the inference process in a hybrid product context is that it requires reconciliation of contradictory information from the two constituent categories. As a result, the process is unlikely to be one where knowledge is transferred from a single host category to the target product. Instead, the process involves an inference about which of two conflicting values is more plausible for a given attribute (Figure 2-2). Take the car-motorcycle hybrid as an example. Cars perform poorly on the mpg attribute relative to motorcycles. The question the consumer needs to answer is which of these two conflicting mpg values (i.e., good or bad) the car-motorcycle hybrid will inherit.

Host Category A	→	Target	←	Host Category B
Benefit 1	→	?	←	Deficit 1
Benefit 2	→	?	←	Deficit 2
Deficit 3	→	?	←	Benefit 3
Deficit 4	→	?	←	Benefit 4

Figure 2-2. Categorization under uncertainty paradigm and hybrid products.

Two competing processes may be responsible for consumer inferences about hybrid product attribute values. First, it may be the case that consumers try to categorize the hybrid product into the more plausible of two constituent categories on a given attribute and infer the attribute value from the distribution of that category (i.e., *category plausibility* determines hybrid attribute values). This process is similar to structural mapping, but allows a consumer to choose the relevant constituent category for making inferences about each attribute. Second, it may be that consumers try to determine a value that is most plausible given the distribution of values in the two constituent categories (i.e., *attribute value plausibility* determines hybrid attribute values). What follows is a discussion of each of these processes.

Category Plausibility Determines Hybrid Attribute Values

Judgments about the attribute values of a hybrid product could depend on a categorization process. Evidence for this link comes from research in categorization under uncertainty (Rips 1989; Rips and Collins 1993; Smith and Sloman 1994; Sloman and Rips 1998). According to this literature, categorizing an ambiguous object as a member of category A or B is a judgment that depends on two sources of information: (1) the relative variability of each constituent category and (2) the similarity of the ambiguous object to each constituent category. Rips (1989) has found that people consider the relative variability of each constituent category to be the most diagnostic information for a categorization judgment. For example, consider the quarter category, the pizza category, and an ambiguous object that is three inches in diameter. The ambiguous object is more similar to the quarter category than to the pizza category. Yet, given the variability in quarter and pizza diameters, the ambiguous object is more plausibly a pizza. Smith and Sloman (1994) found that people use category variability, rather than similarity, to categorize ambiguous stimuli only when their verbal protocols showed awareness of differential variability across categories.

The impact of category variability on categorization judgments has also been studied in the perceptual domain. A notable study by Fried and Holyoak (1984) has revealed that people are sensitive to the relative variability of perceptual categories when they are making categorization judgments. They showed that participants classified some checkerboard patterns that were more similar to the prototypes (or mean) of the lower variability category as members of the high-variability category. In a subsequent study, Stewart and Chater (2002) identified a boundary condition for the use of variability-based categorization in perceptual classification. In their experiments, Stewart and Chater used outline circles each with a single solid dot somewhere on their circumference as their stimuli. The circles varied only in the position of the dot around the

circumference and this position was diagnostic of category membership. The low-variability category distribution had a standard deviation of 11° and the high- variability category had a standard deviation of 28°. The critical exemplar fell in between the nearest members of these two categories. Results showed that people used variability-based categorization to classify the critical exemplar when the experimental procedure sensitized them to differences in the variability of category members by presenting all members at the same time. When item presentation was sequential, on the other hand, participants failed to notice differences in the variability of the category members, making it impossible to use variability-based categorization. In this condition, participants used similarity-based categorization. This finding parallels Smith and Sloman's (1994) finding that variability-based categorization precedes similarity-based categorization when people notice differences in the relative variability of the candidate categories on a critical dimension.

Inferring the value of a hybrid product attribute is similar to the categorization of an ambiguous object with one caveat. In a typical categorization under uncertainty task, the features values of the to-be-categorized stimulus are known. Thus, the consumer can use these values to assess whether the stimulus was drawn from the distribution of objects that represent category A or B. In a hybrid product categorization task, the features values of the hybrid product are unknown. Thus, the consumer can not use these values to categorize. Instead, the variability of the distribution of objects that represent category A or B is potentially diagnostic. In line with previous research (e.g., Rips 1989; Stewart and Chater 2001), people should expect that the hybrid product attribute value is more likely to be drawn from the distribution of values in the

high variability category (Figure 2-3).[1] As such, the hybrid should take on the mean / modal value from this category.

H1a: When constituent product category variability is diagnostic, people are more likely to generalize the modal value of the higher variability category to the hybrid product.

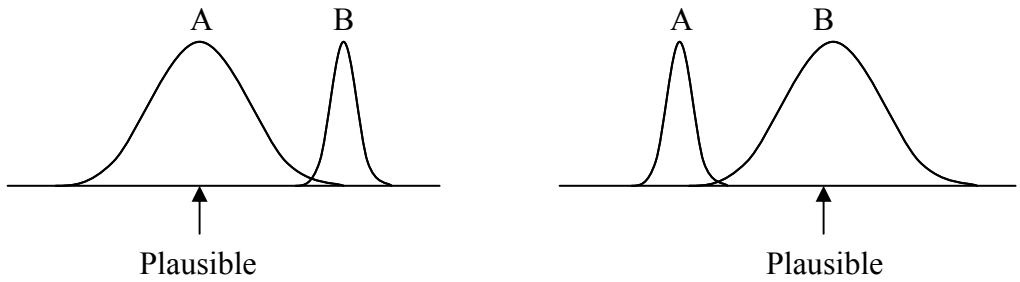

Figure 2-3. Category plausibility (variability-based) judgment.

When differences in the variability of the two constituent categories are similar or difficult to notice, differences in the category variability are not diagnostic for inferring hybrid product attribute values. In this situation, people should rely on similarity information, as has been shown by Smith and Sloman (1994; also see Stewart and Chater 2002). However, unlike a categorization task, there is no similarity between the hybrid product and a constituent product category because the hybrid product's values are not known. Thus, the similarity between the two constituent categories of a hybrid product becomes potentially diagnostic. As constituent product categories become more similar, it becomes more plausible that the hybrid product can bridge the benefit gap between the categories and provide the benefit (Figure 2-4).

[1] One could argue that people infer the average of the two constituent category values for the hybrid product on a given attribute. This averaging argument would not apply to discrete attributes, which require an inference of whether an attribute is present or not. Also, the appeal of hybrid products for marketers lies in their ability to combine the best attributes of two products in one product, and not so much in their ability to offer the average value of the attributes of their constituent categories. Hence, from a substantive standpoint, it is important to understand the factors that affect consumers' inferences regarding which of the two constituent category values the hybrid product is likely to inherit on a given attribute.

Similar types of plausibility judgments have been observed in the induction literature (e.g., Osherson, Smith, Wilkie, Lopez, and Shafir 1990). For example, people find it more plausible that an attribute of category A will generalize to category B as the perceived similarity between the two categories increases. Further evidence for the role of similarity on plausibility judgments comes from the conceptual combination literature. Wisniewski (1996, 1997) reported a number of experiments showing that as the similarity of constituents of a noun-noun compound increased (e.g., painter photographer), people tended to use a hybridization strategy to interpret the combination, in which two concepts are combined so that each acquires properties of the other. Wisniewski explained this finding using the alignment theory. That is, because highly similar constituents tend to have more alignable features, people are more willing to transfer multiple properties from both constituents when interpreting a compound (see Costello and Keane 1997, 2000 for an alternative account).[2] Attesting to the difficulty of encouraging people to adopt a hybridization strategy, several experiments have shown that participants rarely use this strategy (e.g., only about 3% of the word compounds were interpreted using hybridization (Wisniewski 1997)).

Consistent with prior research, people should become more likely to accept that the hybrid product's performance is consistent with the better performing category when the two constituent categories are perceived to be more similar.

H1b: When constituent product category variability is non-diagnostic, people are more likely to rely on the *similarity of the constituent categories* to make an inference about a hybrid product's performance. As similarity increases, people become

[2] Unlike Wisniewski who used different compounds to manipulate constituent similarity, the experiments reported here keep the constituent categories of a hybrid product constant and manipulate their similarity between subjects. By keeping constituent categories constant, these experiments control for the number of alignable attributes across different levels of similarity. Hence, alignability does not explain the reported pattern of findings.

more likely to generalize the mean (modal) value of the constituent category that has the highest performance level.

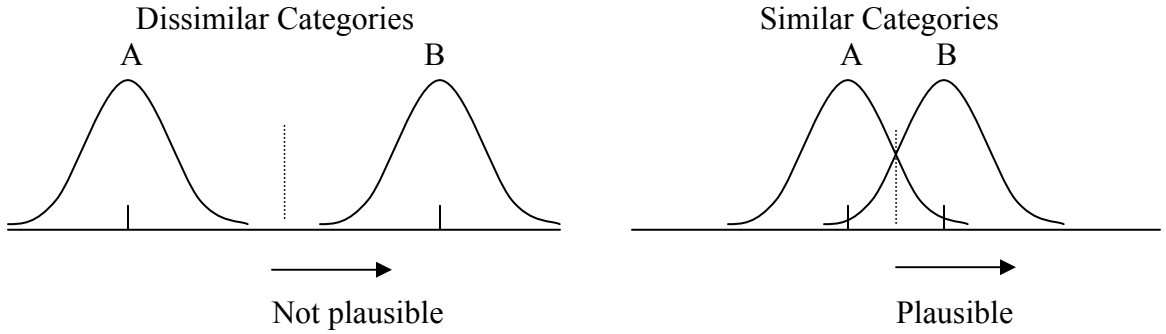

Figure 2-4. Distributions of a target attribute's values in two constituent categories with equal variability.

Attribute Value Plausibility Determines Hybrid Attribute Values

Judgments about the attribute values of a hybrid product could depend on an assessment of the plausibility of specific values. Consumers may assess the distributions of attribute values in each constituent category and, based on the overlap in these distributions, make an inference about the attribute value of the hybrid. Category distributions have been shown to influence people's stimulus estimates. For example, Huttenlocher, Hedges, and Vevea (2000) varied the distribution of stimuli in their experiments such that participants in one condition saw a uniform distribution while participants in another saw a normal distribution. Huttenlocher et al. then asked their participants to judge category membership for a new series of stimuli where the range of values was extended to include stimuli outside the range of the initial set. Their results showed that the probability of judging extreme values to be members fell off more rapidly for normal than uniform distributions of the same range. This was because participants considered the fact that there are fewer stimulus values near the tails of a normal vs. uniform distribution. This result replicated when participants were asked to reproduce a stimulus (e.g., fish) after seeing it. Participants' size estimations were more biased towards the category prototype when the

category distribution was uniform than normal. The authors argued that people use distributional information automatically when categorizing stimuli and predicting their values.

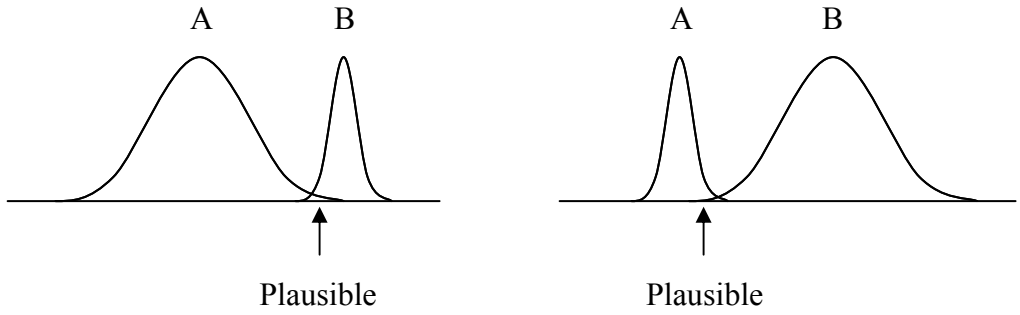

Figure 2-5. Value plausibility (distribution-based) judgment.

Based on the evidence that people use distributional information in various category judgments, I expect that constituent product category distributional information will be diagnostic when there is a small amount of overlap in distributions (Figure 2-5). In these cases, people should infer that the hybrid product will have the overlapping value, as it is most plausible. More specifically, for each attribute, people compare the existing distributions from the two constituents. When this comparison yields a small overlap (i.e., few observed attribute values common to both constituents), the overlap becomes diagnostic and overlapping attribute value is inferred to the hybrid product. For example, say, 99% of the cars possess airbags whereas 100% of motorcycles do not. Because the overlap in this example is in the deficit region (i.e., 1% of the cars and 100% of motorcycles do not possess airbags), people should infer "deficit" on this attribute for the hybrid product.

H2a: When constituent product category distributions are diagnostic (i.e., distributions marginally overlap), people are more likely to generalize the overlapping value.

When there is no overlap (i.e., no common attribute value), or significant overlap (i.e., numerous common attribute values) in constituent category distributions, then the overlap is not diagnostic. In this case, people should use the distance between the means of the two constituent

category distributions to infer the hybrid product attribute value. As the mean values become more similar, the differences between the means of the attribute distributions become smaller and it becomes more plausible that the hybrid product can bridge the benefit gap and provide the benefit. It is noteworthy that this hypothesis differs from Hypothesis 1b in that people must be able to compare distributions, not simply assess category similarity, for similarity to exert an influence on inferences about hybrid product attribute values.

H2b: When constituent product category distributions are not diagnostic (i.e., distributions do not overlap, distributions significantly overlap), people are more likely to rely on the *similarity of the distributions* to make an inference about a hybrid product's performance. As similarity increases, people become more likely to generalize the mean (modal) value of the constituent category that has the highest performance level.

These hypotheses are tested using four experiments. Experiment 1 is a direct test of whether *category plausibility* versus *attribute value plausibility* guides people's inferences about hybrid product benefits. Experiment 2 manipulates *constituent category similarity* and *the diagnosticity of the value distributions* independently to test the hypothesis that category similarity influences people's hybrid product inferences when the value distributions are not diagnostic. In Experiments 3A and 3B, accessibility of the distributional information is manipulated to examine whether people use constituent category similarity when the distributional information is inaccessible. Finally, Experiment 4 replicates findings from Experiment 3A studies in a more ecologically valid experimental context.

CHAPTER 3
EXPERIMENT 1

Experiment 1 was an initial investigation into the processes that determine consumer expectations about the attribute values of hybrid products. The challenge was to manipulate constituent category attribute value distributions in a way that (1) allowed participants to assess category plausibility (H1) and attribute value plausibility (H2) and (2) allowed each of these hypotheses to make unique predictions. With this constraint in mind, the experiment involved an independent manipulation of the perceived attribute value variability in the constituent category that provided the benefit and in the constituent category that did not provide the benefit. This allowed for independent manipulations of distribution variability and overlap.

Method

Design

The design was a deficit category variability (low, high) and benefit category variability (low, high) by replicate order counterbalance factor (fast food and casual restaurant, car and motorcycle, sports car and station wagon) by category order counterbalance factor (category named first when describing the hybrid product) mixed design with only the first factor manipulated within subjects. The order in which the four different combinations of deficit category variability (low, high) and benefit category variability (low, high) were presented was determined by a Latin square design, which is illustrated in Table 3-1.

Procedure

Participants entered a behavior lab and were seated at personal computers. The instructions stated that they would have to assess several new products (services) that were a combination of

two existing products (services).[1] Participants were warned that the new products might seem novel because these products were only recently introduced into the market. Then, a verbal description of the first hybrid product was introduced (e.g., "The new service is a combination of a fast food and a casual restaurant") followed by the presentation of the first attribute (e.g., fast service). Each constituent category attribute distribution was described side-by-side using a single sentence (e.g., "None of the casual restaurants have fast service."; "All of the fast food restaurants have fast service."). While this information remained on the screen, the participant was asked to predict the value of the hybrid product on this attribute by clicking on one of two options provided (e.g., Yes - No). After participants reported their predictions for the first attribute, they repeated the procedure for the second attribute. There were four attributes to be predicted for each hybrid product replicate, and participants had to predict all four of them before the next hybrid product was considered. The key dependent measure was the proportion of the four benefits generalized to the hybrid product.

The four treatment conditions were created by altering the order in which descriptions of the attribute value distributions of the constituent product categories was presented. For example, when attribute value variability was low in each constituent product category, it was indicated that "none" of the deficit category members had the benefit, whereas "all" of the benefit category members had the benefit (e.g., "None (all) of the casual (fast food) restaurants have fast service."). These descriptors where changed to "none" and "most", "few" and "all", and "few" and "most" for the subsequent attributes of the same replicate (Table 3-1).

[1] In the remainder of the paper, I will use the term product to refer to both hybrid product replicates (e.g., vehicles) and hybrid service replicates (e.g., restaurants).

Table 3-1: Experiment 1 design for the Casual Restaurant – Fast Food Restaurant replicate illustrating the order in which the constituent category variability information was presented in each of the four conditions.

	Constituent Category Variability Information			
	Casual Restaurant – Fast Food Restaurant Replicate			
Experimental Condition	Value-Priced	Fast Service	High Quality Food	Inviting Ambiance
A	None - All	None - Most	Few - All	Few - Most
B	None - Most	Few - All	Few - Most	None - All
C	Few - All	Few - Most	None - All	None - Most
D	Few - Most	None - All	None - Most	Few - All

Stimuli

The hybrid products and their attributes were selected based on a series of pretests, which resulted in a total of nine hybrid product replicates that varied in the similarity of their constituents to each other. These nine replicates were divided into three groups, each containing three replicates, based on the degree of similarity between their constituents. In all experiments except Experiment 4, three hybrid product replicates were used whose constituent categories were moderately similar to each other. This would help reduce the chance of a floor or ceiling effect when perceived similarity was manipulated in subsequent experiments. Second, pretests were used to select the sets of attributes used to test consumer inferences about the hybrid product. Pretest participants listed the first five benefits that came to mind for each constituent category. These lists were used to identify three benefits for each constituent category that (1) ranked high in popularity (i.e., listed frequently), (2) were an expected benefit in one of the constituent categories but not the corresponding category. Two of these three benefits were used in Experiment 1, which were selected randomly, due to design restrictions.[2] All three attributes

[2] The Latin square design employed in experiment 1 dictated that one attribute corresponded to each of the four distribution description conditions (i.e., “none”-“most”, “few”-“most”, “few” -“all”, “none” – “all”), limiting the number of attributes to four for each hybrid product replicate.

were used in the subsequent experiments that employed a different design. The hybrid product replicates and benefits used in the experiments are listed in the Appendix.[3]

Predictions

Although the experiment is a two-by-two factorial design, the predictions of the category plausibility hypothesis and the attribute value plausibility hypothesis do not align with main effect or interaction tests. The category plausibility hypothesis (H1) predicts that benefits should be more likely to generalize to the hybrid when the benefit category has more variability than the deficit category, as opposed to vise-versa. Thus, there should be more benefit generalization in the "none" / "most" condition than in the "few" / "all" condition. The attribute value plausibility hypothesis (H2) predicts that benefits should be more likely to generalize to the hybrid when the overlap in constituent product categories is in the benefit domain. Thus, there should be more benefit generalization in the "few" / "all" condition than in the "none" / "most" condition.

The category plausibility hypothesis and value plausibility hypothesis make similar predictions when constituent category variability is not diagnostic (i.e., "none" / "all" and "few" / "most" conditions). Benefit generalization should depend on the similarity of the distributions. Because constituents with distributions of "few" / "most" have means closer to each other than do constituents with distributions of "none" / "all," there should be more benefit generalization in the "few" / "most" condition than in the "none" / "all" condition. Ninety undergraduate students participated in the experiment in return for class credit.

[3] A final pretest showed that all 12 attributes had different constituent attribute values for at least 75% of the participants and that 10 of the 12 attributes had different constituent attribute values for at least 75% of the participants. Further refinement of the attributes was limited by concerns about using unimportant benefits.

Results

The means for the generalization scores by condition are reported in Table 3-2. These means were computed by averaging the proportion of benefits generalized in each of the four category variability descriptions, collapsing over participants. Consistent with attribute value plausibility hypothesis, participants generalized more benefits in the “few” / “all” ($M = .87$) condition than in the “none” / “most” condition ($M = .69$, $t\,(179) = 6.25$, $p < .001$). Consistent with both hypotheses, participants generalized more benefits in the “few” / “most” ($M = .83$) condition than in the “none” / “all” condition ($M = .70$, $t\,(179) = 4.47$, $p < .001$). Supplemental analyses showed that the replicate factor did not interact with any of the critical tests. The presentation order of the constituent product categories in the hybrid product description (e.g., “a combination of a fast food and casual restaurant” versus “a combination of a casual and fast food restaurant”) also did not interact with any of the critical tests.

Table 3-2: Experiment 1 means: The influence of constituent category attribute value variability on benefit generalization.

Constituent category descriptions		
Deficit category	Benefit category	Results
"None"	"All"	0.70
"None"	"Most"	0.69
"Few"	"All"	0.87
"Few"	"Most"	0.83

Discussion

Experiment 1 provides an initial test of the category plausibility hypothesis and the attribute value plausibility hypothesis. The results are more consistent with the attribute value plausibility hypothesis. People infer that a hybrid product will have a value that is common to the overlap in the distributions of the constituent product categories. Experiment 1 also suggests that people are sensitive to two types of distributional information. People use the overlap in distributions to infer hybrid values when the overlap is diagnostic (i.e., small), but rely on the

similarity of the distributions when the overlap is not diagnostic (i.e., no overlap or significant overlap).

The results of the first experiment are inconsistent with part of the category plausibility hypothesis (H1a), but not the entire category plausibility hypothesis (H1b). The category plausibility hypothesis contends that (1) constituent category attribute value variability is diagnostic of hybrid attribute values and (2) when attribute value variability is not diagnostic, constituent category similarity is diagnostic. This hypothesis could be amended to argue that category similarity is diagnostic for all benefit generalization judgments. For example, it may have been the case that a “none” / “most” description of constituent category distributions resulted in a perception of less category similarity than a “few” / “all” description of constituent category distributions. As a consequence, the “few” / “all” condition resulted in more benefit generalization.

CHAPTER 4
EXPERIMENT 2

Experiment 1 used distributional descriptors (e.g., “none” / “most”) to manipulate the distributional properties of the constituent product categories that comprise the hybrid product. These distributional descriptors also created a concurrent manipulation of the similarity of the constituent product categories that comprise the hybrid product. To determine whether the similarity of the constituent product categories could be solely responsible for benefit generalization, or whether attribute value plausibility is also diagnostic, Experiment 2 manipulated *category similarity* and *the diagnosticity of the value distributions* independently.

Method

Design

The design was an attribute value diagnosticity (diagnostic, not diagnostic) by constituent category similarity (low, high) by hybrid product replicate (fast food and casual restaurant, car and motorcycle, sports car and station wagon) by category order counterbalance factor mixed design with only the replicate factor being manipulated within-subject. The order in which the hybrid product replicates was presented was randomized. The attribute value diagnosticity manipulation was the “none” / “most” (diagnostic) and “few” / “most” (non-diagnostic) conditions. The “none” / “most” condition was diagnostic because it entails a small distributional overlap in the deficit region. The “few” / “most” condition was non-diagnostic because the distributional overlap is large and could be framed as either in the deficit or benefit region. The constituent category similarity manipulation encouraged participants to perceive the constituent product categories as more similar or different prior to making the benefit generalization judgments.

Procedure

The procedure was similar to that of Experiment 1 with two exceptions. First, there was a similarity manipulation. Before expressing expectations about the hybrid product, participants in the low and high similarity conditions completed a categorization task that involved organizing four categories into two pairs. Two of the four categories presented were the constituent categories for the hybrid product while the other two were decoy categories. The two decoy categories in the low similarity condition were selected so that they would be paired with one of the constituent categories, thus reducing the perceived similarity between the constituents. For example, in the fast food – casual restaurant hybrid, the two decoy categories in the low similarity condition were a sandwich restaurant and an upscale restaurant. If the fast food restaurant is paired with the sandwich restaurant and the casual restaurant is paired with an upscale restaurant, then the fast food restaurant and casual restaurant categories should be rated less similar. The two decoy categories in the high similarity condition were a bakery and a coffee shop. In this context, the fast food restaurant should be paired with the casual restaurant and the categories should be rated more similar. After pairing the four categories, participants were asked to explain in detail why they paired the specific items together. Participants then rated the similarity of the constituent categories to each other.

The other change in the procedure involved the presentation of the constituent product category attribute value distribution information. First, unlike Experiment 1, there were three rather than two attributes for each constituent category. Second, in Experiment 1, each constituent category attribute distribution was described using a single sentence. These sentences were presented in pairs, one attribute at a time (e.g., “None (All) of the casual (fast food) restaurants have fast service.”). Since constituent category similarity was manipulated before the attribute presentation in this experiment, the attribute value distribution description procedure

needed to be more efficient to maximize the effect of the similarity manipulation on participants' predictions. Thus, in Experiment 2, all six attributes that had to be predicted were presented on the same page (Table 4-1 illustrates the attribute presentation in Experiment 2).

After completing the categorization task used to manipulate constituent category similarity, and before expressing expectations about the hybrid product, participants in the diagnostic attribute value condition saw:

"Below, you see a distribution of the values of several attributes for two constituent product categories. A "Most" means that most products sampled from the corresponding category possess the attribute, while "None" means that none of the products sampled from the corresponding category possess the attribute."

The respondents then saw a listing of the six attributes along with two column headings that were the constituent product category names. Each entry in the column was "most" or "none". For example, in the fast food - causal restaurant replicate, the *fast service*, *value-priced*, and *drive-through service* attributes were listed as "most" in the fast food category and "none" in the casual restaurant category. Similarly, the *inviting ambiance*, *high quality food*, and *attentive service* attributes were listed as "none" in the fast food category and "most" in the casual restaurant category. The non-diagnostic value condition differed from the diagnostic value condition only in the substitution of "few" for "none". Thus, each attribute was listed as "most" for one constituent category and "few" for the other constituent category. Participants indicated whether or not a hybrid product would possess each of the attributes while this information remained on the screen. One hundred ninety-six undergraduate students participated in the experiment in return for class credit.

Table 4-1: Illustration of attribute presentation in the non-diagnostic condition of Experiment 2 for the Fast Food Restaurant – Casual Restaurant replicate.

Attributes	Constituent Categories	
	Fast Food Restaurant	Casual Restaurant
Fast service	Most	Few
Value-priced	Most	Few
Drive-through service	Most	Few
Inviting ambiance	Few	Most
High quality food	Few	Most
Attentive Service	Few	Most

Results

Manipulation Check

The responses of those participants who paired the four categories in the expected fashion for all three replicates were included in the analysis (n = 120). The constituent category similarity ratings differed significantly for the low and high similarity conditions (M_{low} = 3.05; M_{high}= 3.92, $F(1, 118) = 23.50$, $p < .001$).

Analysis

The means for the generalization scores by condition are reported in Figure 4-1. The predicted interaction between attribute value diagnosticity and constituent category similarity was significant ($F(1, 116) = 4.07$, $p < .05$). When the constituent category value distributions were diagnostic, participants were insensitive to the category similarity manipulation (M_{low} = .69; M_{high} = .71, $F(1, 119) = .15$, $p = .69$). When the constituent category value distributions were non-diagnostic, participants increased their willingness to generalize benefits as constituent category similarity increased from low to high (M_{low} = .64; M_{high} = .76, $F(1, 119) = 10.00$, $p < .01$). Supplemental analyses showed that the order of constituent category presentation did not exhibit a main effect ($F(1, 112) = .00$, $p = .98$) or interact with similarity ($F(1, 112) = .05$, $p = .82$), attribute value diagnosticity ($F(1, 112) = 3.21$, $p = .08$), or a combination of the two ($F(1, 112) = .10$, $p = .75$).

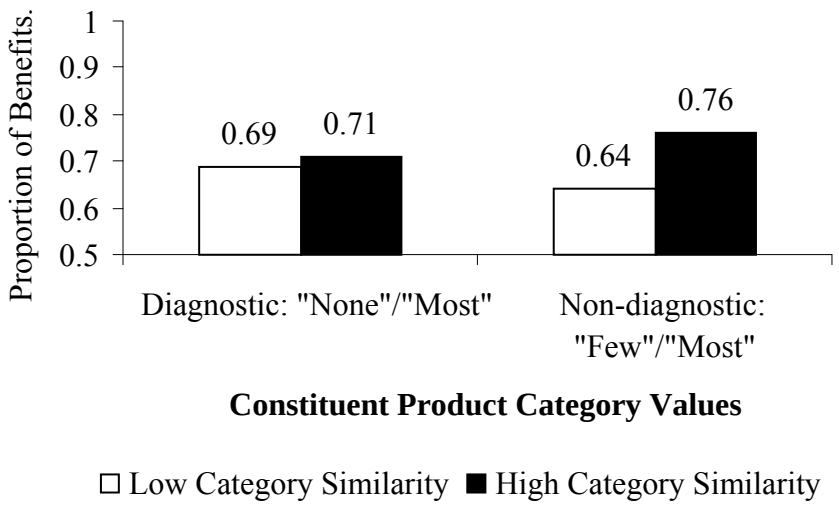

Figure 4-1. Experiment 2 results: The influence of constituent category similarity and distribution diagnosticity on expectations of constituent benefits in a hybrid product.

Discussion

The results of Experiment 2 provide further evidence that expectations about the benefits of a hybrid product depend on the attribute values of the constituent categories. When the attribute value distributions of the constituent categories had a diagnostic overlap, the common value was generalized to the hybrid product. Importantly, this generalization process was not sensitive to category similarity. When the attribute value distributions of the constituent categories had a non-diagnostic overlap, participants relied on the similarity of the constituent categories. Taken together, the first two experiments suggest that people anticipate hybrid product performance by assessing the plausibility that a particular level of performance could be achieved.

CHAPTER 5
EXPERIMENT 3A

If consumers are using information about the target attribute distributions of the constituent product categories to make inferences about the performance of a hybrid product, then benefit generalization judgments should be sensitive to the accessibility of the distributional information. This prediction also follows from existing research that shows that people use distributional information in a categorization task when they are aware of differences in the variability across categories (Smith and Sloman 1994).

Experiments 1 and 2 used distributional information descriptors to ensure that participants were cognizant of the distributional information (i.e., accessibility was guaranteed). In Experiment 3, the salience of the distributional information was manipulated. In one condition, participants experienced the "few" / "most" non-diagnostic condition procedure of Experiment 2. In a second condition, participants saw the benefits of each constituent category product, but these benefits were not accompanied by distribution information. Consistent with Hypothesis 2b, similarity should only exert an influence on benefit generalizations when the distributional information is salient.

Method

Design and Stimuli

The design was a distributional information accessibility (inaccessible, accessible) by constituent category similarity (low, medium, high) by hybrid product replicate (fast food and casual restaurant, car and motorcycle, sports car and station wagon) by category order counterbalance factor (two orders) mixed design with the replicate factor manipulated within-subject. The order in which the hybrid product replicates was presented was randomized. A

medium similarity condition (i.e., no constituent category similarity manipulation) was included in the design as an additional control condition.

Procedure

The procedure was identical to Experiment 2. The distributional information accessibility manipulation was achieved by altering the "few" / "most" non-diagnostic condition procedure of Experiment 2 (i.e., accessible condition) to create the inaccessible condition. Participants in the inaccessible distribution information condition were told, "Below you see the attributes of two constituent categories." Each category listed the three attributes. For example, the fast food category listed the fast service, value-priced, and drive-through service benefits. The casual restaurant category listed the inviting ambiance, high quality food, and attentive service benefits. The benefit lists were displayed side-by-side to discourage participants from thinking about distributional information in each of the constituent product categories.

The accessible condition used the "few" / "most" non-diagnostic condition procedure of Experiment 2. One hundred ninety-eight undergraduate students participated in the experiment in return for class credit.

Constituent Categories	
Fast Food Restaurant	Casual Restaurant
Attributes	
Fast service	Inviting ambiance
Value-priced	High quality food
Drive-through service	Attentive Service

Figure 5-1. Experiment 3A procedure: Illustration of attribute presentation in the inaccessible distributional information condition.

Results

Manipulation Check

The responses of those participants who paired the four categories in the expected fashion for all three replicates were included in the analysis (n = 145). The constituent category similarity ratings were significantly different by similarity condition (M_{low} = 3.03; M_{medium} = 3.33, M_{high}= 4.12, $F(2, 142) = 12.39$, $p < .001$). Planned contrasts showed that the low and medium similarity conditions did not differ ($F(1, 142) = 1.96$, $p = .16$), but that the medium and high similarity conditions did differ ($F(1, 142) = 13.43$, $p < .001$).[1] The similarity rating did not depend on the accessibility of the distributional information ($F(1, 133) = 0.01$, $p > .05$) or an interaction of the accessibility and category similarity information ($F(2, 133) = .56$, $p > .05$).

Analysis

The means for the generalization scores by condition are reported in Figure 5-1. The predicted interaction between similarity and distributional information accessibility was significant ($F(2, 139) = 4.40$, $p < .02$). When distributional information was inaccessible, participants did not increase their willingness to generalize attribute benefits as constituent category similarity increased from low (M_{low} = .70) to medium (M_{medium} = .74; ($F(1, 139) = 1.60$, $p = .21$) and from medium (M_{medium} = .74) to high (M_{high} = .71, $F(1, 139) = .78$, $p = .38$). When distributional information was accessible, participants increased their willingness to generalize attribute benefits as constituent category similarity increased from low (M_{low} = .61) to medium (M_{medium} = .69, $F(1, 139) = 4.50$, $p < .04$) and from medium (M_{medium} = .69) to high (M_{high} = .77,

[1] It is possible that the lack of a difference between the low and medium similarity conditions arose because of the wording of the manipulation check question. Asking respondents in the low similarity condition to assess the similarity of the constituent product categories may have encouraged them to focus on similarities, rather than the dissimilarities they just considered.

$F(1, 139) = 6.26$, $p < .02$). Supplemental analyses showed that the order of constituent category presentation did not exhibit a main effect ($F(1, 133) = 1.19$, $p = .28$) or interact with similarity ($F(2, 133) = .22$, $p = .80$), alignability ($F(1, 133) = .12$, $p = .73$), or a combination of the two ($F(2, 133) = 2.98$, $p = .06$). Finally, there was no difference between the accessibility conditions in the moderate similarity condition ($M_{\text{inaccessible}} = .74$, $M_{\text{accessible}} = .69$; $F(1, 144) = 1.91$, $p > .05$). This suggests that the accessibility manipulation did not alter the participants' implicit assumptions about the constituent category distributions.

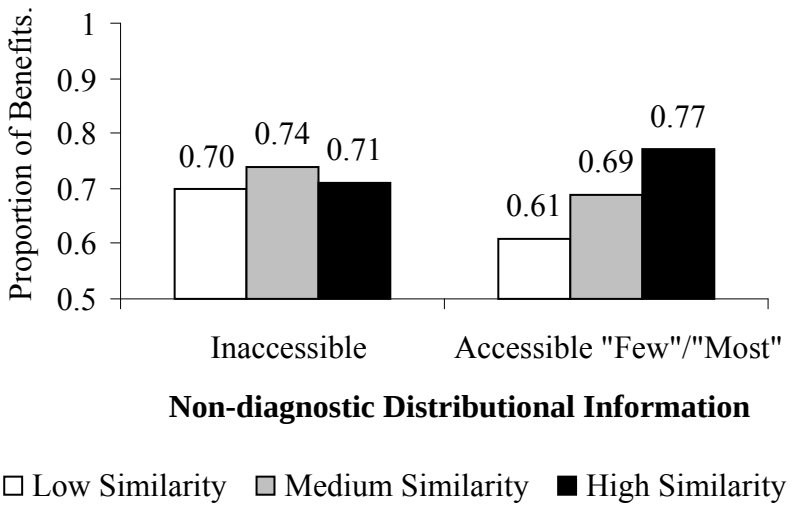

Figure 5-1. Experiment 3A Results: The accessibility of constituent category distributional information moderates the influence of category similarity on benefit generalization.

Discussion

The results of Experiment 3A suggest that consumers rely on constituent category similarity to infer the value of a hybrid product attribute value when distributional information is accessible, but not diagnostic. Unlike Experiment 2, in which salient but nondiagnostic distributional information encouraged the use of constituent category similarity, participants were not sensitive to the perceived similarity of the constituent product categories when distributional information was not salient. These results provide further evidence that inferences

about hybrid product performance are sensitive to the attribute value distributions of the constituent product categories.

One might be concerned that the side-by-side presentation of the product attributes in the inaccessible distribution information condition encouraged participants to assume that the distribution for the constituent categories was “none – all” for the product attributes. If this is indeed the case, then explicitly presenting the distribution information of “none – all” should not change the pattern of results observed in the inaccessible distribution information condition. If, however, the side-by-side presentation of the stimuli successfully reduced the salience of the distributions in Experiment 3A, then explicitly presenting the nondiagnostic “none – all” distributional information should encourage participants to use constituent similarity in accordance with Hypothesis 2b.

CHAPTER 6
EXPERIMENT 3B

In this study, the distributional information accessibility manipulation was achieved by explicitly providing the “none” / “all” non-diagnostic distribution information. This explicit distribution presentation should encourage participants to rely on constituent category similarity when making inferences about the hybrid product given the accessible but nondiagnostic nature of the distribution information.

Method

Design and Stimuli

The design was a constituent category similarity (low, medium, high) by hybrid product replicate (fast food and casual restaurant, car and motorcycle, sports car and station wagon) by category order counterbalance factor (two orders) mixed design with the replicate factor manipulated within-subject.

Procedure

The procedure was identical to the accessible distribution information condition in Experiment 3A except that the “few” / “most” non-diagnostic category variability description was replaced with the “none” / “all” non-diagnostic category variability description. Ninety-two undergraduate students participated in the experiment in return for class credit.

Results

Manipulation Check

The responses of those participants who paired the four categories in the expected fashion for all three replicates were included in the analysis (n = 70). The constituent category similarity ratings were significantly different by similarity condition ($M_{low} = 2.72$; $M_{medium} = 3.34$, $M_{high} = 3.79$, $F(2, 67) = 8.11$, $p < .001$). Planned contrasts showed that the low and medium similarity

conditions did differ ($F(1, 67) = 6.37$, $p < .02$), and that the medium and high similarity conditions differed marginally ($F(1, 67) = 13.43$, $p = .06$).

Analysis

The means for the generalization scores by condition are reported in Figure 6-1. The predicted main effect of similarity was significant ($F(2, 64) = 3.73$, $p < .03$). As constituent similarity increased from low ($M_{low} = .67$) to medium ($M_{medium} = .72$) to high ($M_{high} = .78$), people became more willing to generalize attribute benefits to the hybrid product. Supplemental analyses showed that the order of constituent category presentation did not exhibit a main effect ($F(1, 64) = .04$, $p = .85$) or interact with similarity ($F(2, 64) = .59$, $p = .56$).

Cumulatively, the results of Experiments 3A and 3B furnish further support for the hypothesis that non-diagnostic but accessible distribution information encourages participants to rely on constituent category similarity when inferring hybrid product benefits.

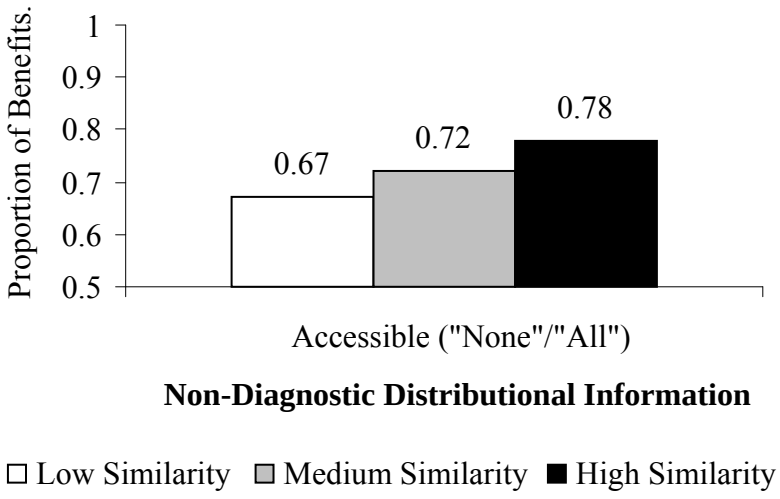

Figure 6-1. Experiment 3B Results: The accessibility of constituent category distributional information moderates the influence of category similarity on benefit generalization.

A question that the results reported here do not address pertains to the informational inputs people use when distributional information is inaccessible. For example, what information did

the participants in the inaccessible distribution information condition in Experiment 3A use to infer hybrid product benefits? Although several processes may underlie these inferences, Experiment 4 explored whether people's theories about new product success in the marketplace govern their predictions in the absence of distribution information.

CHAPTER 7
EXPERIMENT 4

Experiments 2 and 3 manipulated the perceived similarity of the constituent product categories independently of the categories themselves. This procedure was necessary so as to unconfound the similarity and the attribute value distributions of the two constituent product categories. A more ecologically valid approach to investigating these factors is to select hybrid products that vary with respect to their constituent categories' similarity to each other. Replicating the results of Experiment 3A, benefit generalization should increase as similarity increases when distributional information is accessible, but not when distributional information is inaccessible.

Method

Design

The design was a distributional information accessibility (inaccessible, accessible) by level of constituent category similarity (low, medium, high) by hybrid product replicate (three replicates per level of similarity) by category order counterbalancing factor (two levels) mixed design with the constituent category similarity and replicate factors manipulated within-subject. The order in which the nine hybrid product replicates was presented was randomized.

Procedure and Stimuli

The procedure was the same as in Experiment 3A, except that constituent product category similarity was manipulated using different hybrid product replicates. After a series of pretests explained in Experiment 1, three hybrid products expected to have low constituent category similarity (e.g., light bulb and air freshener, pen and calculator, restaurant and movie theater), moderate constituent category similarity (e.g., fast food and casual restaurant, car and motorcycle, sports car and station wagon), and high constituent category similarity (e.g., jet ski

and snowmobile, mountain bike and road race bike, TiVo service and Movies-on-Demand) were selected. A pretest confirmed that the similarity (1= not similar at all, 7= very similar) of the categories varied as intended ($F(2, 38) = 52.40$, $p < .001$). The difference between the low similarity ($M_{low} = 2.17$) and moderate similarity ($M_{mod} = 3.65$; $F(1, 19) = 35.3$ $p < .001$) and the moderate similarity and high similarity ($M_{high} = 4.82$, $F(1, 19) = 21.8$, $p < .001$) pairs was significant. The same set of pretests was also used to select the sets of attributes used to test inferences about the hybrid product (see the Appendix for the complete list of hybrid product replicates and their attributes).

Results

Ninety-two undergraduate students participated in the experiment in return for class credit. The data were analyzed using a repeated measure MANOVA with similarity as a within-subject factor and distributional accessibility as a between-subject factor. The means for this analysis are reported in Figure 8-1. The predicted interaction between distributional information accessibility and similarity was significant ($F(2, 180) = 3.12$, $p < .05$). When distributional information was inaccessible, participants did not increase their willingness to generalize the benefits as constituent category similarity increased from low ($M = .70$) to moderate ($M = .72$; $F(1, 41) = 0.85$, $p = .36$), but did increase their willingness to generalize benefits as constituent category similarity increased from moderate ($M = .72$) to high ($M = .82$; $F(1, 41) = 25.06$, $p < .001$). When distributional information was accessible, participants increased their willingness to generalize benefits as constituent category similarity increased from low ($M = .65$) to moderate ($M = .74$; $F(1, 49) = 14.44$, $p < .001$) and from moderate ($M = .74$) to high ($M = .82$; $F(1, 49 = 13.65$, $p < .001$). The order of constituent category presentation did not have a main effect ($F(1, 88) = 2.16$, $p = .15$) or interact with constituent category similarity ($F(2, 176) = .11$, $p = .90$),

distributional information accessibility ($F(1, 88) = 0.48$, $p = .49$), or a combination of the two ($F(2, 176) = 0.0$, $p = .99$).

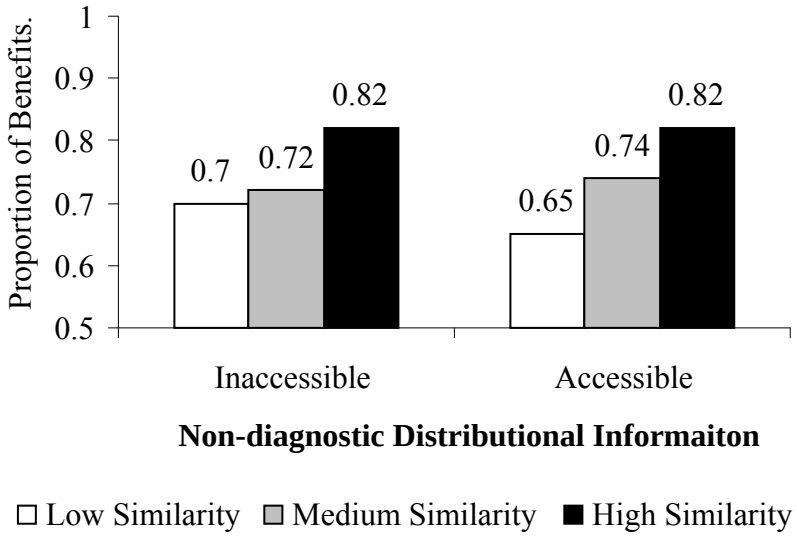

Figure 8-1. Experiment 4 Results: The accessibility of constituent category distributional information moderates the influence of category similarity on benefit generalization.

Discussion

Experiment 4 offers additional support for the attribute value plausibility hypothesis. When attribute value distributional information was accessible, but not diagnostic, an increase in constituent product category similarity resulted in an increase in the likelihood of generalizing the benefits from the constituent categories. When attribute value distributional information was not accessible, an increase in constituent product category similarity did not result in an increase in the likelihood of generalizing the benefits from the constituent categories at low to moderate levels of similarity. The unexpected finding in the high similarity condition may be an artifact of the hybrid product replicates (e.g., jet ski and snowmobile, mountain bike and road race bike, TiVo service and Movies-on-Demand) used in this condition. Alternatively, it may be that highly similar constituent categories make distributional information easy to access. In other words, the

information presentation format in the inaccessible condition can discourage the access of attribute value distribution information, but it can not prevent access to this information.

CHAPTER 8
GENERAL DISCUSSION

Marketing research on new products has mainly focused on two types of product innovations: enhancement and new-to-the-world products. This focus has been accompanied by an emphasis on knowledge transfer as the process underlying the consumer's learning of the novel benefits that these product innovations introduce. Because knowledge transfer facilitates consumer learning of novel product benefits by utilizing consumers' existing product knowledge, it is an efficient and effective marketing tool to communicate the novel benefits of new products.

Not all new products offer novel benefits to consumers, however. For example, hybrid products combine two existing products with known benefits to create a new product that offers the best features of these two products, without the weaknesses of either. Because consumers already know about the benefits of a hybrid product (e.g., mpg in the car-motorcycle hybrid), knowledge transfer is unlikely to assist in their understanding of a hybrid product. The consumer's challenge with hybrid products is to determine which of the two conflicting constituent category values to accept on an attribute. This research provides evidence for the hypothesis that an attribute plausibility judgment resulting from a comparison of constituent distributions drive people's hybrid product attribute value predictions. People compare the existing distributions from the two constituents each time an attribute has to be predicted. If there is a small distributional overlap, then people generalize the overlapping attribute value for the hybrid product, which is the most plausible value for a distribution resulting from a combination of the two constituent distributions. When there is no overlap, or significant overlap in constituent category distributions, then the overlap is not diagnostic. In this case, people compare the constituent category distributions to judge their similarity: the more similar the constituent category distributions are, the more likely the hybrid product is to bridge the attribute gap and

generalize the benefit. Experiments 3A and 3B demonstrate that distributional information must be salient in order for people to use attribute plausibility or distribution similarity in their benefit generalization judgments. Experiment 4 uses real world hybrid products to manipulate constituent category similarity and provides evidence supporting the *attribute plausibility hypothesis*.

Theoretical Implications

There are at least two important streams of psychology research that can shed light on how consumers evaluate hybrid products: the categorization under uncertainty literature (e.g., Rips 1989; Smith and Sloman 1994; Murphy and Ross 1994) and the conceptual combination literature (e.g., Costello and Keane 1997, 2000; Wisniewski 1997). Results reported here corroborate findings from the categorization literature that people use distributional information as input to their judgments only when they are aware of it (Smith and Sloman 1994) or when it is made salient (Stewart and Chater 2002). In the current experiments, only when the experimental procedure highlighted distributional information did participants in the current studies take it into consideration when making inferences about the hybrid product.

Another set of findings from the categorization literature has shown that people exhibit a strong tendency to base their inferences and predictions on a single category when faced with categorization ambiguity (Malt, Ross, and Murphy 1995; Murphy and Ross 1994, 1999A; Ross and Murphy 1996). Only under rare circumstances are people shown to use information from more than one candidate category to make inferences about an ambiguous object (i.e., multiple category strategy; Moreau et. al. 2001; Gregan-Paxton et. al. 2005). For example, in marketing, Moreau et al.'s (2001) participants used a multiple category strategy to make inferences about a new product (digital camera) only when they were explicitly informed of the relationship between the digital camera and the two candidate categories (film-based camera and a scanner).

In the context of the experiments reported here, a single category strategy would predict that participants would generalize the benefit to the hybrid product only half the time since a given constituent category performs better than the other only on half of the attributes. If benefit generalization exceeded 50%, this would provide evidence for the multiple category strategy. Because participants generalized benefits to the hybrid product more than half the time across all experiments, current studies provide evidence for the use of multiple category strategy when making inferences about the hybrid product. How can this finding be reconciled with the robustness of the single category strategy in the literature?

One procedural aspect common to studies finding single category strategy is that the presentation of one of the candidate categories precedes that of the other. For example, Moreau et al. (2001) found that their participants used only the first category cued when making predictions about the performance of the new product, thereby ignoring the alternative category cued subsequently. The order of category presentation had an important influence on new product evaluations even when explicit mappings from the two candidate categories were provided. Specifically, 57% of subjects who saw the camera ad first categorized the new digital camera as a camera, compared to 31 % of subjects who saw the scanner ad first. In another study, Ross and Murphy (1996) presented participants with a story containing a reference to a person whose identity was uncertain. The text of the story (e.g., realtor) cued the person's identity, but an alternative identity was also subsequently cued (e.g., burglar). Participants were asked to predict the probability that the ambiguous person would engage in certain category-consistent and inconsistent behaviors (e.g., for burglar, pay attention to the sturdiness of the doors). Results showed that the impact of the alternative category cued later in the text was limited to only those

questions highly associated with that category. That is, significant contextual support was necessary to induce multiple category strategy.

The implication is that cuing alternative categories sequentially impedes people's ability to use multiple category strategy by allowing them to structure the ambiguous object according to a single category. Once an initial representation of an object is formed based on the first category cued, restructuring it to include new category information becomes a challenging task. It is possible that simultaneous representation of the constituent categories in the current experiments discouraged participants from forming an early representation of the hybrid product according to one of the constituent categories. This observation is supported by the finding that changing the order in which constituent categories was presented did not influence the proportion of benefit generalization in the current studies. Further evidence for this proposition comes from Gregan-Paxton et al. (2005) who showed their participants the category cues at the same time and observed multiple category strategy use.

Current results have implications for the conceptual combination literature as well. Several models of conceptual combination have been recently proposed (e.g., Costello and Keane 2000; Murphy 1988; Wisniewski 1997). Wisniewski's (1997) dual process model is one of the more prominent of these models. An important pillar of Wisniewski's (1997) model is that combining two concepts (e.g., cactus carpet) involves a structural alignment process by which people compare the two concepts. According to this model, structural alignment underlies interpretations of combinations whose concepts are highly similar to each other. Because highly similar concepts tend to be more alignable than dissimilar concepts (Gentner and Markman 1997), they highlight the alignable differences that subsequently govern the combination's interpretation. Consistent with this contention, Wisniewski (1997) showed that people are more

willing to transfer multiple properties from both constituents (i.e., hybridization) when the constituents are highly similar to each other.

Given Wisniewski's results, the impact of constituent category similarity on hybrid product evaluation evinced by the current set of experiments may come as no surprise. What is intriguing, however, is that the between subjects manipulation of constituent category similarity in the experiments reported here controls for the degree of alignability between the constituent categories. In other words, the degree of alignability between the constituent categories cannot account for the increased benefit generalization at higher levels of similarity unless one argues that the between subjects similarity manipulation affected the degree of alignability between the constituent categories in a consistent way. The implication is that although alignability is an important determinant of hybridization, similarity between constituent categories may influence the interpretation of the combination via a route other than alignability. The findings reported here support the contention that similarity affects hybrid product evaluation by bringing its constituent categories' distributions closer to each other. That is, because means of two categories approach to one another on a given attribute as their perceived similarity increases, it becomes more plausible that the hybrid product can successfully offer that attribute. This differential route is plausible in a hybrid product context in which technical plausibility (i.e., whether it is technically feasible for the hybrid product to overcome the trade-off on an attribute) interacts with conceptual plausibility (i.e., whether it is easy to imagine the hybrid product possessing a given attribute) to influence hybrid product evaluations.

One intriguing finding was that participants used constituent category similarity to make inferences about the hybrid product only when the procedure made category distributional information salient. It is possible that there are other, perhaps more pervasive mechanisms than

constituent category similarity that people employ when making inferences about hybrid product benefits. Unless its use is encouraged, as the current studies do by cuing distributional information, constituent category similarity may be dominated by other sources of inputs to the hybrid product inference process. One such mechanism can be people's intuitive theories about the marketplace (Chernev and Carpenter 2001). Further research is needed to identify possible mechanisms consumers may employ when distributional information is not salient.

Limitations

This research is subject to a limitation common to almost all consumer behavior research, which is using an undergraduate student subject pool in experiments. Because this is a relatively homogeneous group and not representative of the typical American consumer, it is difficult to assess the generalizability of the reported results to the population.

Another limitation involved the dichotomous nature of the dependent variable employed in the current experiments. Participants indicated whether or not the hybrid product would have certain attributes of its constituent categories. This served to force participants to generalize the value of either one of the constituent categories to the hybrid product, which allowed me to directly analyze the impact of the independent variables on the choice of which constituent category would drive hybrid product inferences. However, this aspect of the procedure possibly limited the generalizability of the results in the following way. By forcing inferences, the dependent measure may overstate the degree to which consumers in real life engage in spontaneous inferences about hybrid product attributes. This concern is less valid for experiential attributes whose value can only be inferred before one actually uses the product (e.g., how *thrilling* it will be to ride a car-motorcycle hybrid) than for search attributes whose value is easier to assess through search. Although the set of attributes used in the current experiments contained experiential attributes, there were search attributes as well. This was an outcome of the criteria

employed that guided the selection of attributes in the pretest. Specifically, only those attributes listed most frequently for each constituent category by pretest subjects were selected to ensure that the attributes used were important enough to encourage inference making in the real world. The downside of using the most important attributes was that the final attribute list contained both search and experiential attributes.

The extent of this limitation in generalizability is mitigated by the following factors. First, consumer inferences about the hybrid product that occur prior to information search can affect the likelihood of actually engaging in such search. Positive inferences about hybrid product attribute values, for example, can increase the consumer's willingness to gather additional information about the product. Such initial inferences can also serve as expected performance criteria for the hybrid product against which its real performance can be judged, which in turn influences the consumer's overall evaluation of the product. Finally, there may be search attributes that managers may be unwilling to advertise to consumers due to hybrid product's low performance on these attributes. It may be advantageous to have consumers infer the values of these attributes for the hybrid product.

Furthermore, since the current experiments employed a dichotomous dependent measure, one should be cautious in generalizing the findings to continuous attributes. As will be discussed in the Future Research section, alternative processes may be available to consumers to infer the value of a hybrid product on a continuous attribute.

Managerial Implications

From the manager's perspective, hybrid products will be successful to the extent that consumers are willing to generalize benefits from both constituents to the hybrid product. Prior research has shown that only in rare circumstances do consumers transfer knowledge from multiple categories (e.g., Moreau et al. 2001). The implication is that encouraging consumers to

transfer knowledge from both constituent categories is a highly risky managerial proposition in the case of hybrid products. Furthermore, such a promotional strategy may be ineffective with hybrid products since they do not involve the learning of novel product benefits. A better promotional strategy can thus be designed by exploiting the factors identified in this work that affect consumers' inferences at the attribute level, which cumulatively determine the evaluation of the hybrid product.

One such factor is constituent category similarity. Emphasizing the similarity between the constituents of a hybrid product increases favorable inferences about it. As such, although it may be tempting for hybrid product managers to promote the technical appeal of the hybrid product by emphasizing how it combines two very *dissimilar* existing products, this research and development focus in promotion may not induce the desired consumer response. Furthermore, product communications should also involve attempts to increase the perceived similarity of the constituent categories to each other. For example, juxtaposing the constituent products in print ads (e.g., a car and a motorcycle) showing them perform the same function (e.g., transportation) may increase favorable inferences about their combination. Put differently, using super-ordinate category labels in product promotions that encompass both constituent categories may increase the perceived similarity of the constituent categories to each other, resulting in more favorable inferences about the hybrid product.

As the current experiments indicate, the role of constituent similarity is not straightforward. Category distributional information must be salient for similarity to influence hybrid product evaluations. Thus, it is important for hybrid managers to include such information in their promotions. In order to do so, phrases that may cue distributional information such as the

ones used in current experiments (e.g., few, most, some) may be utilized in product communication to convey attribute information (e.g., some motorcycles have airbags).

The second factor that affects benefit generalization is the degree of overlap of the constituent categories on important attributes. The managerial implication is that those important product attributes on which the two constituent categories have overlap in the benefit category should be advertised to encourage benefit generalization. Again, the degree of overlap can be emphasized using phrases that cue distributional information.

Finally, although not tested directly in this research, current results and existing research provide sufficient evidence to suggest that advertising the constituent products simultaneously (e.g., in a print ad) may increase the use of information from both constituent categories (i.e., multiple category strategy), resulting in more favorable inferences about the hybrid product.

Future Research

Existing marketing research paints a very broad brush of new products in general by failing to consider the characteristics of new products that have conceptual implications for how consumers evaluate them. By focusing on peculiar aspects of hybrid products, this research shows that processes underlying the consumer evaluation of hybrid products are different from those underlying other types of product innovations that have hitherto been investigated. Future research will benefit from identifying peculiar aspects of different types of product innovations, which will lead to a more nuanced and effective approach to studying the consumer evaluation of new products.

One interesting extension of the current findings is examining whether simultaneous presentation of category cues encourages a multiple category strategy. It is also worthwhile investigating how the length of time after structuring a new product representation on the basis of one category can influence people's propensity to use multiple category strategy. Existing

research shows that people ignore the second category cued a few minutes after the first category cue. Will this strong tendency to use single category strategy become more or less pronounced over time (e.g., presenting the second category cue one day after the presentation of the first one)?

Additionally, the Theoretical Implications section distinguished between technical and conceptual plausibility in the hybrid product concept. Conceptual plausibility is necessary but not sufficient to understand consumer inferences about hybrid products. That is, it may be conceptually plausible for a hybrid product to have a certain feature (e.g,. a motorcycle with retractable wheels that can be used when slowing or stopping) yet not technically plausible to effectively offer it (e.g., whether retractable wheels will work effectively). Results from the current studies support this distinction by showing that it is possible to influence technical plausibility while keeping attribute alignability constant, a factor that has been shown to influence conceptual plausibility (Wisniewski 1997). More research is needed however to establish that these two plausibility judgments indeed rely on different processes.

As mentioned before, current experiments employed a dichotomous dependent measure. It is possible that this limited the processes available to consumers when evaluating hybrid products. It will be interesting to investigate alternative processes that may underlie consumer inferences when the dependent measure is a continuous attribute. It is plausible that an averaging model may approximate people's inferences in this case (Anderson 1967). Given two constituent categories, consumers may simply average the mean values of the two categories on an attribute to predict the value for their combination. The interesting question is under what circumstances will consumers diverge from this effortless yet possibly error prone averaging strategy? What factors will encourage the use of a weighted average model in which the two constituent

categories differentially contribute to what the hybrid product's value will be on a given attribute? Given the theoretical and managerial importance of how consumers evaluate hybrid products, I believe these questions warrant further research.

APPENDIX
EXPERIMENTAL STIMULI

Low Constituent Category Similarity Hybrid Products					
Pen / Calculator (2.25)		Light bulb / Air freshener (2.00)		Restaurant / Movie theater (2.25)	
Pen	Calculator	Light bulb	Air freshener	Restaurant	Movie theater
Disposable	Programmable	Lasts about 5000 hours ^	Can be refilled	Gourmet food	Dark
Inexpensive	Graphing feature	Provides pure light	Circulates fragrance	Easy to converse	Stadium seating
Super-fine tip	Has memory	Reveals natural colors	Consistent frag. delivery	Wide selection of food	Outstanding sound system
Medium Constituent Category Similarity Hybrid Products					
Fast food / Casual restaurant (3.85)		Car / Motorcycle (3.55)		Sports car / Station wagon (3.55)	
Fast food	Casual restaurant	Car	Motorcycle	Sports car	Station wagon
Value-priced[1]	*High quality food*	*Weatherproof*	*Low fuel consumption*	*Aerodynamic*	*Ample trunk space*
Fast Service	*Inviting ambiance*	*Airbag*	*High parking convenience*	*Low weight*	*Low engine noise*
Drive-through service	Attentive service	Air-conditioning	Low Emissions	Fast	Family Car
High Constituent Category Similarity Hybrid Products					
Jetski / Snowmobile (4.4)		Mountain bike / Race bike (5.15)		TiVo / Movies-on-Demand (4.9)	
Jetski	Snowmobile	Mountain bike	Race bike	TiVo	Movies-on-Demand
Rides on water	Heated seats	All-terrain	Fast ^	Pause broadcasts	New releases
Life jacket compartment	Head and tail lights ^	Rugged	Weight ^	Records shows	Pay-per-view ^
360º spins in its own length ^	Snow beams	Shock absorbers	Aerodynamic ^	Many hours of recording time	Instant access to movie library

^ Over 25% of respondents thought both constituents possessed benefit.

[1] Only the attributes in italics were used in experiment 1.

LIST OF REFERENCES

Anderson, Norman H. (1967), "Averaging Model Analysis of Set-Size Effect in Impression Formation," *Journal of Experimental Psychology*, 75 (October), 158-165.

Chernev , Alexander and Gregory S. Carpenter (2001), "The Role of Market Efficiency Intutions in Consumer Choice: A Case of Compensatory Inferences," *Journal of Marketing Research*, 38 (August), 349-361.

Costello, Fintan J. and Mark T. Keane (1997), "Polysemy in Conceptual Combination: Testing the Constraint Theory of Combination," in *Nineteenth Annual Conference of the Cognitive* Science Society, Hillsdale, NJ: Erlbaum.

Costello, Fintan J.and Mark T. Keane (2000), "Efficient Creativity: Constraint Guided Conceptual Combination," *Cognitive Science*, 24 (April/June), 299-349.

Dahl, Darren W. and Page Moreau (2002), "The Influence and Value of Analogical Thinking During New Product Ideation," *Journal of Marketing Research*, 39 (February), 47-60.

Dahl, Darren W., Amitava Chattopadhyay, and Gerald J. Gorn (2001), "The Importance of Visualisation in Concept Design", *Design Studies*, 22 (January), 5-26.

Fried, Lisbeth S. and Keith .J. Holyoak (1984), "Induction of Category Distributions: A Framework for Category Learning," *Journal of Experimental Psychology: Learning, Memory and Cognition*, 10 (April), 234-257.

Gatignon, Hubert and Thomas S. Robertson (1985), "A Propositional Inventory for New Diffusion Research," *Journal of Consumer Research*, 11 (March), 849-867.

Gentner, Dedre and Arthur B. Markman (1994), "Structural Alignment in Comparison: No Difference without Similarity," *Psychological Science*, 5 (May), 152-158.

Gentner, Dedre and Arthur B. Markman (1997), "Structure Mapping in Analogy and Similarity," *American Psychologist*, 52 (January), 45-56.

Goldenberg, Jacob, David Mazursky, and Sorin Solomon (1999), "Toward Identifying the Inventive Templates of New Products: A Channeled Ideation Approach," *Journal of Marketing Research*, 36 (May), 200-210.

Gregan-Paxton, Jennifer and Deborah Roedder John (1997), "Consumer Learning by Analogy: A Model of Internal Knowledge Transfer," *Journal of Consumer Research*, 24 (December), 266-284.

Gregan-Paxton, Jennifer (2001), "The Role of Abstract and Specific Knowledge in the Formation of Product Judgments: An Analogical Learning Perspective," *Journal of Consumer Psychology*, 11 (3), 141-158.

Gregan-Paxton, Jennifer, Jonathan D. Hibbard, Frédéric F. Brunel, and Pablo Azar (2002), "'So That's What That Is': Examining the Impact of Analogy on Consumers' Knowledge Development for Really New Products," *Psychology and Marketing*, 19 (June), 533-550.

Gregan-Paxton, Jennifer, Steve Hoeffler, and Min Zhao (2005), "When Categorization is Ambiguous: Factors that Facilitate the Use of a Multiple Category Inference Strategy," *Journal of Consumer Psychology*, 15 (2), 127-140.

Gregan-Paxton, Jennifer and Page Moreau (2003), "How Do Consumers Transfer Existing Knowledge? A Comparison of Analogy and Categorization Effects," *Journal of Consumer Psychology*, 13 (4), 422-430.

Hirshman, Elizabeth (1980), "Innovativeness, Novelty Seeking, and Consumer Creativity," *Journal of Consumer Research*, 7 (June), 283-295.

Huttenlocher, Janellen, Larry V. Hedges, and Jack L. Vevea, (2000), "Why Do Categories Affect Stimulus Judgment?" *Journal of Experimental Psychology: General*, 129 (June), 220-241.

Leonard, Dorothy and Jeffrey F. Rayport (1997), "Spark Innovation through Empathic Design," *Harvard Business Review*, 75 (November/December), 102-113.

Malt, Barbara C., Brian H. Ross, and Gregory L. Murphy (1995), "Predicting Features for Members of Natural Categories When Categorization is Uncertain," *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21* (May), 646-661.

Moreau, C. Page, Arthur Markman, and Donald R. Lehmann (2001), "'What Is It?' Categorization Flexibility and Consumers' Responses to Really New Products," *Journal of Consumer Research*, 37 (March), 489-498.

Murphy, Gregory L. (1988), "Comprehending Complex Concepts," *Cognitive Science, 12* (4), 529-562.

Murphy, Gregory L. and Brian H. Ross (1994), "Predictions from Uncertain Categorizations," *Cognitive Psychology*, 27 (October), 148-193.

Murphy, Gregory L. and Brian H. Ross (1999), "Induction with Cross-Classified Categories," *Memory & Cognition*, 27 (November), 1024-1041.

Murphy, Gregory L. and Brian H. Ross (2005), "The Two Faces of Typicality in Category-Based Induction," *Cognition*, 95 (March), 175-200.

Osherson, Daniel N., Edward E. Smith, Ormond Wilkie, Alejandro López, and Eldar Shafir (1990), "Category-Based Induction", *Psychological Review*, 97 (April), 185-200.

Park, Whan C. and Daniel C. Smith (1989), "Product-Level Choice: A Top-Down or Bottom-Up Process," *Journal of Consumer Research*, 16 (December), 289-299.

Rips, Lance J. (1989), "Similarity, Typicality, and Categorization", in S. Vosniadou & A. Ortony (Eds.), *Similarity and Analogical Reasoning*, 21-59. Cambridge, MA: Cambridge University Press.

Rips, Lance J. and Allan Collins (1993), "Categories and Resemblance," *Journal of Experimental Psychology: General*, 122 (December), 468-486.

Ross, Brian H., and Gregory L. Murphy (1996), "Category-Based Predictions: Influence of Uncertainty and Feature Associations," *Journal of Experimental Psychology: Learning, Memory and Cognition*, 22 (May), 736-53.

Sloman, Steve A. and Lance J. Rips (1998), "Similarity as an Explanatory Construct," *Cognition*, 65 (January), 87-101.

Smith, Edward E., and Steven A. Sloman (1994), "Similarity- versus Rule-Based Categorization," *Memory & Cognition,* 22 (June), 377-386.

Srinivasan, V. and William S. Lovejoy (1997), "*Journal of Marketing Research*, 34 (February), 154-163.

Stewart, Neil and Nick Chater (2002), "The Effect of Category Variability in Perceptual Categorization, "*Journal of Experimental Psychology: Learning, Memory, and Cognition*, 28 (September), 893-907.

Takashi, Yamauchi and Arthur B. Markman (2000), "Inference Using Categories," *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 26 (May), 776-795.

Ulrich, Karl T. and Steven D. Eppinger (1995), Product Design and Development. New York: McGraw-Hill Book Company.

Urban, Glen L. and John R. Hauser (1993), *Design and Marketing of New Products*, 2nd edition, Englewood Cliffs, NJ: Prentice Hall.

Verde, Michael F., Gregory L. Murphy, and Brian H. Ross (2005), "Influence of Multiple Categories on the Prediction of Unknown Properties," *Memory & Cognition*, 33 (April), 479-487.

Viswanathan, Madhubalan and Terry L. Childers (1999), "Understanding How Product Attributes Influence Product Categorization: Development and Validation of Fuzzy Set-Based Measures of Gradedness in Product Categories," *Journal of Marketing Research*, 36 (February), 75-94.

von Hippel, Eric (2005), *Democratizing Innovation*, Cambridge, MA: MIT Press.

Wathieu, Luc and Michael Zoglio (2005), Harvard Business School Case Study, October, (No: 9-501-038).

Wisniewski, Edward J. (1996), "Construal and Similarity in Conceptual Combination," *Journal of Memory and Language*, 35 (June), 434-453.

Wisniewski, Edward J. (1997). "When Concepts Combine", *Psychonomic Bulletin and Review*, 4 (December), 167-183.

BIOGRAPHICAL SKETCH

Baler Bilgin earned his bachelor degree in political science and international relations from Bogazici University in Istanbul, Turkey. In 2000, he moved to the United States to pursue a Master of Business Administration at the Illinois State University in Normal-Bloomington. After completing his MBA, Baler entered the Ph.D. program in marketing at the University of Florida. He joined the University of California-Riverside as an Assistant Professor of marketing in July 2007.