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Michael Gerhard Luchs

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**THE UNITY OF FORM AND FUNCTION:  
MAKING SENSE OF PRODUCT DESIGN  
FROM A CONSUMER'S POINT OF VIEW**

**Committee:**

---

**Vijay Mahajan, Co-supervisor**

---

**Rajagopal Raghunathan, Co-supervisor**

---

**Julie Irwin**

---

**Arthur Markman**

---

**Violina Rindova**

**THE UNITY OF FORM AND FUNCTION:  
MAKING SENSE OF PRODUCT DESIGN  
FROM A CONSUMER'S POINT OF VIEW**

by

**Michael Gerhard Luchs, B.A.; B.S.E.; M.B.A.; M.S.**

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## **Dedication**

I dedicate this dissertation to my family, especially to my wife, Ivonne, and our three sons: Andrew, Matthew and Ethan. Ivonne's belief in me and support of my efforts made this work possible. The energy and enthusiasm of our young sons gave me the perspective and motivation needed to succeed in this work.

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FROM A CONSUMER'S POINT OF VIEW**

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Co-supervisors: Vijay Mahajan, Rajagopal Raghunathan

This research demonstrates that the perceived unity of product form and function has a significant effect on consumers' product evaluations, where unity refers to the perception that the form and function share common associations, or meanings. Findings from three experiments suggest that beyond the independent effects of product form and function, consumers like unified products more than they like disunified products. This effect is demonstrated in an abstract context as well as in the product contexts of consumer packaged goods and durables. In addition to demonstrating the positive effect of form-function unity on product evaluations, this research shows that this effect is mediated by the perception that unified products make more sense than disunified products. This research further shows that this effect is moderated by consumers' involvement and product knowledge. While consumers like unified (vs. disunified) products more in general, consumers high in the combination of involvement and product

knowledge like disunified products equally due to their perceived greater attribute value. These results are of significance both to academicians and practitioners concerned with understanding consumers' responses to products.

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## CHAPTER ONE: INTRODUCTION

Given advances in technology and concerns about the environment, few observers of the automobile industry have been surprised by the ongoing shift towards “alternative energy” automobiles in general and hybrid engine technology automobiles in particular. What is newsworthy, however, is the dramatically different levels of success experienced by early entrants to this burgeoning segment – especially given the similarity of the technology platforms and product performance levels.

Consider the case of two of the most visible early proponents of hybrid technology, Toyota and Honda, with their respective Prius and Civic small car hybrids. While both vehicles were introduced with the clear functional distinction of hybrid engine technology, Toyota chose to introduce the Prius with a unique form that was quickly associated with this unique technology, while Honda chose to introduce the Civic using a pre-existing form (i.e. that of the “standard” Civic). While the Civic form certainly had significant market equity, arguably an advantage over the Prius, it did not convey anything about the Civic’s underlying functional uniqueness – that of being a hybrid. Many consumers noted this difference between the forms of the Civic and Prius as illustrated in a series of interviews conducted by Heffner, Kurani and Turrentine (2007). As an example, consider Ron and Jill who purchased a Prius and were “critical of visually less distinctive hybrid electric vehicles such as the Honda Civic that they feel do not communicate meanings as effectively as the Prius.” The Prius has since become the poster-child of successful hybrid engine technology. Honda, meanwhile, has struggled to

build sales for its hybrid Civic and is working towards replacing it with the introduction of a new “purpose-built hybrid...that will take on the Prius,” (Zimmerman 2007).

While several other factors likely contributed to these very different outcomes, our research focuses on an intriguing possibility: did the relatively higher “unity” of the Prius positively influence consumers’ evaluations of the Prius (vs. the Civic)? More generally, does the unity of form and function (hence form-function unity) influence consumers’ evaluations of products? Prior research could predict either a greater liking of unified (vs. disunified) products, or a greater liking of disunified (vs. unified) products. For example, since people “delight in order” (Koffka 1935), they may prefer unified products that, presumably, appear more orderly. These products may simply make more sense to consumers. On the other hand, unified products may not be stimulating enough. Prior research suggests a preference for moderate incongruity (Meyers-Levy and Tybout 1989). Therefore, a disunified product, presumably relatively incongruous, might be liked more than a unified product. It is possible that either of these results may emerge, depending upon specific conditions. Thus, in addition to understanding whether consumers express either a greater liking of unified or disunified products, we seek to understand why and when either effect emerges. Answers to these questions would contribute to gaps that others have identified in research on consumer responses to products (Hauser et al. 2006; Henard and Szymanski 2001). In addition, this research could support firms and managers who continue to struggle with high product failure rates (Goldenberg et al 2001; Golder and Tellis 1993; Urban and Hauser 1993).

Our research, therefore, seeks to address the following three questions.

1. Do consumers like products more when the form and function are perceived to be unified (vs. disunified)?
2. If so, what mediates the greater liking of unified (vs. disunified) products?
3. When and why might consumers not exhibit a greater liking of unified (vs. disunified) products?

## CHAPTER TWO: BACKGROUND

Both form and function have been established as important determinants of consumers' evaluations of products (related to form, see: Bloch 1995; Hoegg and Alba 2005; Reber, Schwarz and Winkielman 2004; related to function, see Ajzen and Fishbein 1974; Bettman, Luce and Payne 1998). Most of this research, however, has treated product form and function independently. There has been relatively little research on the interactive effect of form and function on product evaluations, with some notable exceptions. Chitturi, Raghunathan and Mahajan (2007), for example, studied the differential weighting of form and function in product evaluations and show that function is weighted more than form up to a certain threshold of functional performance, at which point form is weighted more than function. Note, however, that this prior research (also see Page and Herr 2002; Rindova and Petkova 2007) addresses form and function as discrete determinants of product evaluations. For example, while a positive evaluation of the form could positively bias the evaluation of the function (cf. Thorndike 1920), the overall evaluation is still based on some combination of the individual evaluations of the form and the function. Our research instead focuses on a holistic property of form and function, i.e. the representation of the object (form-function pair) as an entire whole rather than as a representation of individual parts (see Hoegg and Alba 2005 for a review).

To illustrate, consider the two automobiles depicted conceptually in Figure 1. Prior research has demonstrated that form and function can each convey meaning (Durgee and Stuart 1987; McCracken 1986; Mick, Burroughs, Hetzel and Brannan 2004) and that

unique meanings can be conveyed by the form and function of the same product (Bloch 1995; Hoegg and Alba 2005; Loken 2006; Norman 1988)<sup>1</sup>. In the case of Automobile A, for example, the meaning conveyed by the form is “powerful” and the meaning conveyed by the function is “fast.”

The meanings conveyed by either form or function can be conceptualized as discrete nodes of information stored in memory and can include facts (e.g. categories) and types of events (Medin, Ross and Markman 2005). These nodes are connected by links that denote the strength and type of relationship between nodes (Anderson 1976). Therefore, while some nodes are connected in memory by stronger links (e.g. Automobile A, with the associations of a powerful form and a fast function), others are connected by relatively weak links, or even characterized by a relative dissociation (e.g. Automobile B, with the associations of a powerful form and a fuel efficient function). Given that the form and function of a product can convey different meanings, the fundamental question we address is whether the relative similarity (difference) of the meanings conveyed by a product’s form and by its function has any effect on product evaluations. Specifically, we focus on the holistic property of form-function unity where unity refers to the perception that the form and function share common associations, or meanings. Further, we conceptualize form-function unity as the strength of the relationship between the associations conveyed by the form and the function. We have employed the term “unity” here given its specificity and use in highly related research (e.g. see Veryzer and

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<sup>1</sup> While form and function can each convey multiple meanings (Holbrook and Hirschman 1993) which can be obtained from a variety of sources, and meaning can exist at various levels within a product context, e.g. the product form can provide symbolic meaning and/or communicate information about product attributes (Creusen and Schoormans 2005), we are concerned with the relative similarity (difference) of the meanings conveyed by form and function and not the specific nature or source of these meanings.

Hutchinson 1998). While other terms could have been used (e.g. congruity), we have avoided these given their broad usage and our desire for a term with a more focused interpretation (e.g. congruity is used with respect to many types of relationships such as person-object relationships, person-person relationships and product-category relationships).

Returning to Figure 1, the fundamental question we address is whether consumers, independent of their liking of the form and function, would like the automobile with the holistic property of form-function unity (Automobile A) more than they like the automobile with form-function disunity (Automobile B). Prior theory could predict a greater liking of either unified or disunified products. We begin with theories that would predict a greater liking of unified products.

## CHAPTER THREE: THEORY AND HYPOTHESES

### *Greater Liking of Unified Products*

Two general streams of research can be used to predict a greater liking of unified (vs. disunified) products. The first stream considers theories of perception that address both the features of objects that people find appealing as well as the specific mechanisms responsible for these preferences. According to Gestalt theory, people delight in order (Koffka 1935). As such, their product preferences are guided by features such as symmetry, unity and harmony (Bloch 1995; Veryzer and Hutchinson 1998). Given this, we would expect that a greater liking of unified (vs. disunified) products will emerge. The prediction that stimuli with positive Gestalt-like qualities will be better liked is supported by research within psychology that could explain this effect as a consequence of processing fluency. Reber, Schwarz and Winkielman (2004) review many of the consistent findings within research on aesthetic response, such as a preference for figural goodness, figure-ground contrast, stimulus repetition, symmetry, and prototypicality, and argue that they are all mediated by processing fluency, i.e. the ease with which the stimuli are processed (see also Lee and Labroo 2004). Thus, to the degree that unified products are processed more easily, we would expect them to be liked more than disunified products. There is good reason to expect that unified products will, indeed, be processed more easily. Banks, Clark and Lucy (1975) demonstrated that people evaluate pairs of stimuli that are “semantically congruent” faster than pairs that are disunified.

Collectively, then, we would expect unified products to also be processed more easily and, therefore, to be liked more than disunified products.

The second major stream of research that could predict a greater liking of unified (vs. disunified) products focuses on the role of expectations. Prior research has demonstrated the positive effect of expectation confirmation (for a review, see Brown et al 2008; Oliver 1976, 1977; Olson and Dover 1979) as well as the more general need for consistency (for examples, see Swann 1984). Simply put, objects (including products) that are consistent with expectations are liked more than objects that are inconsistent with expectations. Therefore, we would expect consumers to like products more when they are either consistent with their prior expectations and/or internally consistent (i.e. consistent form and function). This prediction is related to Mandler's (1982) notion of "fit" such that "whenever the analysis of an event fits an existing structural description (a schema) then the stage is set for a primitive positive evaluation." Further, this prediction is related to the notion of psychological essentialism (Medin and Ortony 1989). People often assume that objects have an underlying essence or nature. This underlying nature manifests itself in both how the object appears (i.e. its form) as well as what the object does (i.e. its function). Medin, Ross and Markman (2005) suggest that this heuristic is very often correct for human artifacts as well (e.g. cars, computers and camping stoves) because "structure and function tend to be correlated." Therefore, a car that looks fast and is described as being fast (i.e., is unified) will be consistent with the intuition that the car has an underlying essence of being fast. Combined with the aforementioned research suggesting that products that meet expectations are better liked in general, we would expect this car to also be liked more than a disunified car.

Within the context of artifact objects, people may also make inferences about the constraints faced by designers (Bloch 1995) where a given product form represents “one solution to a set of design goals and constraints acted on by the designer and approved by management.” Consistent with the popular maxim that form-follows-function, people assume that either the function of a given product defines or constrains the form or that the designer chooses to reflect their “design stance” in the form of the product (Dennett 1987; Matan and Carey 2001). Thus, consumers may expect form and function to be unified given expectations about the intentions of designers and/or the constraints they face – with “met expectations” leading to greater liking.

Finally, expectations about the function of the product given the form could also influence evaluations. Several experiments suggest that visual information will be processed before verbal information (MacInnis, Moorman and Jaworski 1991; Page and Herr 2002). To the degree that the form (visual information) is processed before the function (most often represented verbally, e.g. Bettman, Luce and Payne 1998), it can create an expectation of the function; this expectation, if met, will lead to a relatively more favorable evaluation. Therefore, given the evidence provided by prior research related to perceptions and expectations, we hypothesize the following:

**H1:** Consumers like unified products more than they like disunified products.

In addition, we propose that the greater liking of unified products is mediated by the extent to which unified products make more sense to consumers than do disunified products (see Figure 2). According to Woodside (2001), “Sense making is defined as

meaning creation based on current and prior interpretations of thoughts generated from three sources: external stimuli, focused retrieval from internal memory, and seemingly random foci in working memory.” Therefore, whether or not an object “makes sense” (the outcome of “sense making”) depends upon retrieval of related information from memory and subsequent interpretations of the object based upon prior memories, or associations. Consider the aforementioned conceptual model of memory as a network of nodes of information connected by links denoting the strength and type of relationship between nodes. Given that form and function can activate discrete nodes of information stored in memory, consumers’ ability to make sense of a product will depend upon their ability to find meaning in the relationship of these discrete nodes; at the extreme, the meanings may even overlap (i.e. be the same). This relationship between the meaning conveyed by the form and by the function may be strong (as in the case of a car with a “powerful” form and “fast” function), or weak (as in the case of a car with a “powerful” form and an “efficient” function). As the strength of the relationship between these nodes increases, consumers are better able to interpret the product as one that makes sense. If the meanings of the form and function actually overlap, then the relationship of the form and function can be viewed as one that fully “makes sense.”

As such, the prediction that consumers will like products more when they make sense is consistent with the Gestalt concept that people delight in order; a stimulus that exhibits orderliness presumably “makes sense.” Reber et al.’s (2004) proposition that processing fluency mediates liking is also consistent with the idea that a product that “makes sense” will be liked; the fact that a stimulus has been processed implies that it has been “made sense of.” Similarly, the aforementioned theories related to expectancy confirmation

suggest that stimuli that are consistent with expectations also make more sense, whether they are expectations of what a product should be in general or expectations of the function given the form. Therefore, we hypothesize the following:

**H2:** How much a product “makes sense” mediates the greater liking of unified (vs. disunified) products.

### *Greater Liking of Disunified Products*

While there are many reasons to expect that consumers will like unified products more, there are also reasons to expect just the opposite, i.e. that consumers might like disunified products or at least be ambivalent towards unified and disunified products. First, products whose form and function are disunified may be more favorably evaluated if they are perceived to offer greater value (i.e. consumption utility). Consider again the disunified car whose form conveys the meaning of power and whose function conveys the meaning of being fuel efficient. This car may be highly valued given the combination of the attributes of power and fuel efficiency. While the car’s function is not described as powerful, the powerful form may be valued on its own and may also invite inferences about the power of the car despite its professed fuel efficiency.

Whether or not a consumer perceives greater value in a disunified product, however, will depend on whether that consumer evaluates the individual attributes of the product. In particular, only those consumers who elaborate on the attributes are likely to value disunified products. Prior research suggests that product knowledge will be a critical moderator of consumers’ ability to appreciate disunity. Sujan (1985) discussed two

fundamentally different evaluation strategies that can be employed: category based affect transfer or piece-meal processing of attributes. When information about a product is discrepant, i.e. when it does not easily fit the category it is identified with, relative experts are more likely than novices to process analytically with final evaluations based more on constructed, attribute based evaluations. As such, while knowledgeable consumers will still be positively influenced by the holistic property of form-function unity, their evaluations will also be positively influenced by the value derived from the specific and different attributes of disunified products.

In addition to the effect of knowledge, involvement is also likely to moderate the greater liking of unified products. Evidence for the role of involvement is obtained from Celsi and Olson (1988) who introduced the concept of felt involvement and describe it as having two sources: individual and situational involvement. As an example of the former, consider that product categories vary in the degree to which they increase felt involvement. Some categories, such as shampoo, induce little felt involvement, whereas others, such as automobiles, induce relatively higher levels of felt involvement. The level of felt involvement, however, also depends on the individual – some people care more about cars than others do. Celsi and Olson (1988) suggest that as product category involvement increases, so does the number of thoughts in response to the information, as well as the proportion of product-related thoughts and product-related inferences relative to the total number of thoughts. Simply put, consumers high in involvement are also more likely to notice and, potentially, to appreciate the duplicity of meaning that can be provided by disunified products.

The joint impact of knowledge and involvement on elaboration was demonstrated by MacInnis and Jaworsky (1989). While they studied consumer responses to advertisements, we would expect the processes related to evaluations of products to be similar. Controlling for the opportunity to process information, they suggest that it is the combination of involvement (motivation) and knowledge (ability) that leads to the greatest elaboration. Therefore, we expect that consumers who are relatively high in the combination of involvement and product knowledge will exhibit a greater liking of disunified products than consumers relatively low in involvement and knowledge. As such, we hypothesize the following.

**H3:** The greater liking of unified (vs. disunified) products decreases as a consumer's combined product knowledge and involvement increases.

**H4a:** The decrease in the greater liking of unified (vs. disunified) products as a consumer's combined product knowledge and involvement increases is due to the greater perceived value of disunified (vs. unified) products.

In addition, products whose form and function are disunified may be more favorably evaluated if they are perceived to be more mentally stimulating. Berlyne (1971, 1974) was one of the earliest scholars to argue that there is an ideal balance between Gestalt preferences for unity, for example, and a need for some optimum level of arousal, or mental stimulation, due to factors such as novelty and complexity. Likewise, Csikzentmihalyi (1975) argued that activities that provide a balance between the boredom of the familiar and the anxiety of the unfamiliar are experienced as more satisfying and fulfilling. As such, consumers might like products more when their form and function are disunified as long as they are not so extreme as to be incredible or overly complex.

Further, to the extent that a disunified product could be viewed as relatively incongruous with respect to the product's parent category, a greater liking of disunified (vs. unified) products may emerge (cf. Meyers-Levy and Tybout 1989). The appeal of the mental stimulation provided by disunified products may, once again, depend upon consumers' involvement and product knowledge. Loken (2006) argues that consumers need to have stable representations of objects and events in memory that can be used for interpreting and evaluating objects and events in their environment. For disunified products, these category representations require the flexibility that greater knowledge affords (Loken 2006; Mitchell and Dacin 1996). Thus, only those consumers who are sufficiently involved to notice and sufficiently knowledgeable to resolve the novelty and/or complexity of disunified products will appreciate the mental stimulation that they provide. As such, we hypothesize the following:

**H4b:** The decrease in the greater liking of unified (vs. disunified) products as a consumer's combined product knowledge and involvement increases is due to the greater mental stimulation provided by disunified (vs. unified) products.

The relationship of these hypotheses is illustrated in Figure 3 in which the greater liking of unified (vs. disunified) products (H1) is mediated by the variable "makes sense" (H2). As illustrated, the effect of form-function unity is hypothesized to be moderated by the combination of product knowledge and involvement (H3) due to the greater value and/or mental stimulation provided by disunified products (H4a,b).

## *Overview of Experiments*

In order to answer the three questions identified in the introduction, we conducted three experiments at a major southwestern university. Experiment participants received extra credit in exchange for their participation. The primary objective of the first two experiments was to determine whether the form-function unity effect could be demonstrated in an abstract context using shape-word pairs (experiment 1) and in a product context (experiment 2) using packaged goods and consumer durables. We also sought to determine whether the effect could be explained by the hypothesized mediator of “makes sense.” In experiment 3, we sought to further replicate the findings from experiments 1 and 2 in an additional product context, cars, as well as provide evidence for boundary conditions of the main effect. Specifically, we sought to determine 1) whether the combination of involvement and product knowledge would attenuate, or even reverse, the greater liking of unified (vs. disunified) products and 2) whether this result was due to either the perceived greater value and/or mental stimulation provided by disunified products.

## **CHAPTER FOUR: EXPERIMENT 1 - SHAPE-WORD PAIRS**

The objective of experiment 1 was to establish robust support for a prediction of greater liking of unified (vs. disunified) objects, mediated by the variable “makes sense,” in a context in which alternative explanations could most effectively be addressed. While our ultimate intention was to demonstrate the form-function unity effect in a product context, such a context presents several challenges. First, product forms and functions are each likely to exhibit significant variability in their degree of “likeability” given the richness of associations they evoke. Our belief was that individual shapes and words would exhibit relatively less variability in their likeability, allowing us to focus on the degree to which the perceived unity of the meanings conveyed by the shapes and words influenced evaluations. Second, product form and function combinations are likely to vary in both how much sense they make together as well as how believable they are. For example, while a bright yellow Hearse may not make much sense, it is believable that one could be produced. There is much less basis for differences in believability in the current context, allowing us to more easily control for this potential confound. In addition, our predictions are conceptually appropriate to other, non-product contexts in which consumers evaluate objects consisting of both visual and verbal information. We will discuss this further in the General Discussion.

As such, in experiment 1 we used shape-word pairs as an initial experimental context in which to test for the main effect (H1), and mediation (H2), of the greater liking of unified (vs. disunified) products. Each shape and word was chosen such that it would convey specific and unique meanings, making it possible to manipulate the degree to

which a shape-word pair would be perceived as unified (vs. disunified). In this and all subsequent experiments, we conducted a pretest to identify appropriate stimuli. We begin with a description of the pretest method and selection of stimuli, followed by a description of the experiment procedure and results.

## Pretest

Our objective for this pretest was to identify shapes and words whose perceived meanings would be unambiguous and consistent across participants. To accomplish this task, we identified two possible themes for implied meanings, both of which overall would be positively evaluated; the meanings we chose were “strong” and “flexible.” Forty-nine participants evaluated 10 shapes and 13 words along the dimension of the meaning “strong (vs. weak).” Another forty-nine participants evaluated the same stimuli along the dimension of “flexible (vs. inflexible).” Based on the analysis of the data, we chose the stimuli depicted in Figure 4. In addition to consistently conveying a meaning of “strong” or “flexible” respectively (while not conveying the alternative meaning of “flexible” or “strong”), selection of these stimuli also minimized differences in how liked each stimulus was on its own and how typical each was perceived to be.

## Experiment Participants and Procedure

Two hundred and fifty-six undergraduate students participated in experiment 1. This experiment used a within 4 (strong shape 1, strong shape 2, flexible shape 1, flexible

shape 2) x 4 (2 synonyms of strong, 2 synonyms of flexible) design. Using a Latin Squares design, each participant evaluated four of the possible 16 shape-word pairs (hence, objects). We used two shapes and two words within each category of meaning (strong vs. flexible) so that each participant would see the full possible set of pairings based on perceived meanings, i.e. *strong* (shape) + *strong* (word), *strong* (shape) + *flexible* (word), *flexible* (shape) + *flexible* (word), *flexible* (shape) + *strong* (word), while only seeing a given shape or word used once.

To provide a context for the experiment, we told participants that a company was considering use of these various objects “as designs on products like t-shirts, packaging, advertising, coasters etc.” Participants evaluated each of the four objects presented to them along several dimensions on a scale of 1 (low) to 9 (high), beginning with how much they liked each object (or focal dependent variable). In addition, they rated how interesting each object was, how novel, how much sense it made to them and whether the paired stimuli appeared to fit well together. Finally, participants rated their liking for each word and shape on its own, the typicality of each shape and word on its own, and their comprehension of the words. These various measures were elicited for use as covariates in our analysis.

## Results

We calculated the liking rating of objects that were unified (disunified) as the sum of the liking ratings for the two unified (disunified) objects. These ratings were treated as a repeated measures factor to determine whether the objects were liked more when the

meanings of the shape and word were unified (vs. disunified). Our results provided conceptual support for H1; participants liked the objects whose visual and verbal elements were perceived to be unified ( $M_{\text{unified}} = 3.57$ ) more than objects that were disunified ( $M_{\text{disunified}} = 3.17$ ),  $F(1, 255) = 16.4, p < .0001$ . As seen in Figure 5, participants liked objects more when shapes that connoted strength (flexibility) were paired with synonyms of strength (flexibility).

Next, we performed similar analyses to determine whether there were differences in ratings of the unified vs. disunified objects along the dimensions of interestingness and novelty (related to “mental stimulation”), “making sense” and “fitting.” While there was no difference in how interesting the unified objects were (vs. the disunified objects),  $F(1, 255) = 0, p = \text{ns}$ , nor in how novel they were perceived to be,  $F(1, 255) = 2.0, p = \text{ns}$ , the unified objects were indeed perceived to make more sense than the disunified objects,  $F(1, 255) = 274.1, p < .0001$ , and were also perceived to be a better fit,  $F(1, 255) = 802.6, p < .0001$ . Next, given the finding that unified objects made more sense than disunified objects, we conducted a test of mediation to confirm whether the variable “makes sense” mediated the difference in liking scores. The test of mediation (Baron and Kenny 1986) confirmed that “makes sense” fully mediated the higher liking scores for unified objects compared with disunified objects, (Sobel t-statistic = 5.4,  $p < .0001$ ), conceptually supporting H2<sup>2</sup>.

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<sup>2</sup> Whether or not the unified objects seemed to fit better than the disunified objects also fully mediated the effect, (Sobel t-statistic = 3.0,  $p < .01$ ). While “makes sense” and “fit” are correlated ( $r = .46$ ), “makes sense” appears to be the better measure of mediation. When both “makes sense” and “fit” were included in a model predicting the difference in liking scores, “makes sense” was still significant,  $F(1, 253) = 14.7, p < .001$ , but “fit” was not,  $F(1, 253) = 1.2, p = \text{ns}$ .

## Discussion

Results from experiment 1 provide conceptual support for H1; participants liked objects more when the visually and verbally depicted elements were perceived to be unified (vs. disunified) in the meanings they conveyed. In addition, the data show that how much the objects made sense mediated the greater liking of unified (vs. disunified) objects, providing conceptual support for H2. Further, we provided evidence that other factors, such as perceived novelty, were not responsible for this result.

While not the focus of our research, demonstrating these results in the abstract context of shape-word pairs suggests that the form-function unity effect may be applicable to other marketing contexts in which visual and verbal information are simultaneously evaluated. While the results provide conceptual support for H1 and H2, the next step was to explore the same phenomena in a consumer product context, which was the objective of experiment 2.

## **CHAPTER FIVE: EXPERIMENT 2 - CONSUMER PACKAGED GOODS AND DURABLES**

The objective of experiment 2 was to replicate our findings from experiment 1 in a consumer product context. Specifically, we sought to determine whether the form-function unity effect could also be found in both packaged goods and consumer durables product contexts, and whether this effect could be explained by the hypothesized mediator of “makes sense.”

### Pretest

This experiment was preceded by a pretest of stimuli, similar to the one used in experiment 1, in order to identify product forms (pictures) and functions (verbal descriptions) that would convey specific and unique meanings to consumers. Based on this pretest, we chose four product categories. Two of the product categories were chosen to represent consumer packaged goods (non-alcoholic beverages and dishwashing detergent) and two were chosen to represent durable goods (air purifiers and vacuums). For example, as shown in Figure 6, within the beverage category the unique meanings identified were “fruit beverage” vs. “energy drink” and within the air purifier category, the unique meanings identified were “quiet” vs. “powerful”.

## Experiment Participants and Procedure

One hundred and forty-eight undergraduate students participated in experiment 2. The experiment used a 2 (form 1 vs. form 2) x 2 (function 1 vs. function 2) x 2 (consumer packaged good vs. consumer durable) x 2 (product category) design. Product category was the only between participants factor such that participants evaluated all form-function combinations within two of the four categories. For example, participants evaluated an air purifier with a “quiet” form paired with a “quiet” function and evaluated the same form paired with a “powerful” function. We counterbalanced order of presentation of the categories, as well as the specific form-function pairs within each category.

The experiment began with participants rating how much they liked each product (all ratings were provided on a scale of 1{low} to 9{high}). Next, participants provided ratings for potential mediators including how much sense each product made to them and how believable each product was. As discussed earlier, we thought that the measure of believability was important in a product context given that we wanted to demonstrate that “makes sense” was a mediator while controlling for believability. This is a somewhat subtle but important point given our prior theoretical discussion and hypothesis development. If we found that a disunified product was liked less than a unified product, two competing explanations could be argued. First, as we have argued, a disunified product may make less sense to consumers and will therefore be liked less than a unified product. In addition, it is possible that a disunified product will be liked less because it is not believable. A consumer may not believe, for example, that a relatively powerful

looking car could also be fuel efficient. Thus, believability is an important potential confound that we explicitly controlled for in the current product context.

## Results

Similar to our approach with experiment 1, we calculated the liking rating of the products that were unified (disunified) as the sum of the liking ratings for the various unified (disunified) products. These ratings were treated as a repeated measures factor to determine whether the products were liked more when the form and function were unified (vs. disunified). Our results provided additional support for H1. As depicted in Figure 7, participants liked the products that were unified ( $M_{\text{unified}} = 5.4$ ) significantly more than they liked products that were disunified ( $M_{\text{disunified}} = 4.9$ ),  $F(1, 147) = 31.1, p < .0001$ .

We performed similar analyses to determine whether the unified (vs. disunified) products made more sense and whether they were more believable. As expected, the unified (vs. disunified) products made more sense,  $F(1, 147) = 314.3, p < .0001$  and were also more believable,  $F(1, 147) = 452.6, p < .0001$ . Importantly, the unified products made more sense even when controlling for their believability,  $F(1, 146) = 4.2, p < .05$ , consistent with our expectation that the meaningful sense derived from unified products is distinct from the simple believability of the products.

Next, we sought to determine whether participants' greater liking of unified products was mediated by the degree to which the unified (vs. disunified) products made more sense. Supporting H2, the greater liking of unified (vs. disunified) products was

mediated by how much more sense these products made (Sobel  $t = 4.6, p < .0001$ ). This result held even when controlling for the believability of the products (Sobel  $t = 1.7, p = .09$ ). Further, when including both “makes sense” and “believability” in the model predicting the greater liking of unified (vs. disunified) products, while “makes sense” was statistically significant as a predictor,  $F(1, 145) = 3.0, p < .01$ , “believability” was not,  $F(1, 145) = .2, p = ns$ .

## Discussion

Experiment 2 replicated the results from experiment 1 within a product context. These results support our hypotheses that consumers like unified products more than they like disunified products (H1) and that this effect is mediated by consumers’ perception that unified products make more sense (H2). We also provided evidence that while “makes sense” and “believability” are somewhat related, the greater liking of unified products is a function of the former. This distinction is important given our theoretical argument that the liking of unified products is due to consumers’ ability to perceive the form and function as a unified whole by virtue of the similar associations evoked by each. In addition, differences in liking as a function of believability would be less relevant from a practical point of view given that products launched into the marketplace are almost always, by definition, believable (since they can be produced). We would argue that the market is full of products that, while believable, have disunified forms and functions. Our findings thus far suggest that these products likely differ with respect to how much

sense they make to consumers and that this has a significant impact on their relatively likeability.

## CHAPTER SIX: EXPERIMENT 3 - CARS

In experiment 3, we sought to further replicate the findings from experiments 1 and 2 as well as provide evidence for a boundary condition of the greater liking of unified (vs. disunified) products. Specifically, we sought to determine whether the combination of involvement and product knowledge would decrease the greater liking of unified (vs. disunified) products (H3). In addition, we sought to determine whether this result, if found, could be explained by the perceived greater value and/or mental stimulation provided by disunified products (H4a, H4b). For this experiment, we used the product category of cars. We believed that this category would provide a sufficient range of both participant involvement and product knowledge to enable testing of our hypothesized boundary condition.

### Pretest

We used a similar pretest procedure as the one used in experiments 1 and 2 to identify car forms that would convey a meaning of powerful (efficient) yet not a meaning of efficient (powerful). In order to minimize the potential for confounds, all of the car forms included in the pretest were selected based in part on their lack of availability in North America (in this case, forms limited to Australia and Europe). Based on the results from the pretest, we chose the stimuli depicted in Figure 8 to represent form-function unity and form-function disunity.

## Experiment Participants and Procedure

One hundred and forty-two undergraduate students participated in experiment 3. The design and method were similar to those used in experiment 2. Analogous to the use of two different yet similarly valued attribute meanings used in prior experiments, we chose the perceived meanings of “powerful” and “fuel efficient.” Thus, this experiment used a within 2 (powerful form vs. fuel efficient form) x 2 (powerful function vs. fuel efficient function) design.

First, each participant evaluated all four of the cars. The order of presentation of the cars was counterbalanced. For each car, they were asked to rate how much they liked the car (unless noted otherwise, all ratings were provided on a scale of 1 {low} to 9 {high}). Next, participants rated each car’s perceived fuel efficiency and power. These measures combined (fuel efficiency and power) were intended to capture the value that participants perceived in each car. Next, participants rated each car along a series of dimensions related to the concept of “mental stimulation,” including how interesting, how novel and how complex each was. Following these ratings, participants rated how much each product made sense as well as how believable each product was. After all stimuli specific ratings were captured, participants took a test of car product knowledge<sup>3</sup>. Finally, participants completed Cacioppo and Petty’s (1982) scale of need for cognition (NFC). This construct was measured given our interest in the role of mental stimulation in the current experiment, though we had no related a priori hypotheses.

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<sup>3</sup> This test of objective car knowledge was developed and refined in a separate pretest. Ten multiple-choice questions addressed both knowledge of car terminology (e.g. ABS, AWD, roadster etc.) as well as knowledge of specific cars (e.g. “A Toyota Matrix is an example of a {crossover}.”).

## Results

As a first step in the analysis, we identified participants who failed the manipulation check, in other words those who did not perceive differences in meaning in the various stimuli (e.g. if they did not rate the form identified as “powerful” in the pre-testing as more powerful than the form identified as “fuel efficient.”). Ten participants were removed from the analysis based on this manipulation check, leaving 132 participants. One additional participant was dropped from the analysis given their rating of 2 on a scale of 9 for how seriously they took the experiment (e.g. “read directions carefully”), leaving a total of 131 participants for analysis.

Next, similar to prior experiments, we calculated the rating for liking of cars that were unified (disunified) as the sum of the liking ratings for the two unified (disunified) cars. These ratings were treated as a repeated measures factor to determine whether the cars were liked more when the form and function were perceived to be unified (vs. disunified). As depicted in figure 9, our results provided additional support for H1; participants overall liked the unified cars ( $M_{\text{unified}} = 5.34$ ) more than they liked the disunified cars ( $M_{\text{disunified}} = 5.17$ ),  $F(1, 130) = 6.6, p = .01$ .

Next, we sought to determine whether the greater liking of unified (vs. disunified) cars was mediated by participants’ ability to make sense of the cars. As expected, the unified cars made more sense to participants than the disunified cars,  $F(1, 130) = 337.2, p < .0001$ . Importantly, the unified cars made more sense even when controlling for believability,  $F(1, 129) = 11.0, p = .001$ , supporting our assertion that the meaningful sense derived is distinct from the simple believability of the given cars.

In the current experiment, however, the greater liking of unified (vs. disunified) cars was not predicted by “makes sense” on its own,  $F(1, 129) = .5, p = ns$ . There are at least two possible reasons for this result. First, the current experiment was conducted in a high involvement product category: cars. As such, it is possible that only those participants especially likely to process elaboratively would be sufficiently influenced by the degree to which the various cars made sense. In addition, the relatively complex attribute meanings used in the current experiment, power and fuel efficiency, might also have placed additional processing demands on participants. In both cases, then, we might expect that the role of the variable “makes sense” would depend upon participants’ need for cognition (Cacioppo and Petty 1982). Per Cohen (as cited in Cacioppo and Petty), the need for cognition can be described as “a need to structure relevant situations in meaningful, integrated ways.” Therefore, given the greater processing demands of the car evaluations, it is plausible that the mediation by “makes sense” depended upon relatively high levels of NFC. In other words, participants had to devote some level of effort to seek “meaningful integration” for “makes sense” to have any effect<sup>4</sup>. Indeed, further analysis suggests that the greater liking of unified (vs. disunified) cars did depend upon the interaction of “makes sense” and participants’ need for cognition (NFC),  $F(1, 127) = 2.9, p = .09$ . Specifically, participants’ greater liking of unified cars increased as both the unified cars made more sense (than disunified cars) and participants’ NFC increased. Thus, while the form-function unity effect is once again explained by participants’ propensity to derive greater sense from unified (vs. disunified) products, it is

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<sup>4</sup> As evidence, consider that while the stimuli in experiment 2 (low involvement categories) were viewed for about 6 seconds on average before being evaluated, the cars in the current experiment were viewed for over 10 seconds each on average before being evaluated.

qualified in the current high involvement product category context as being dependent on participants' NFC.

While these results provide additional evidence for the form-function unity effect and the role of the variable "makes sense" in explaining this effect, the focus of the current experiment was on understanding moderators of the effect. Recall that we argued that relative product liking would depend upon participants' combined involvement and product knowledge. Consistent with this expectation, and in support of H3, the greater liking of unified (vs. disunified) cars does decrease as a consumer's combined product knowledge and involvement increases,  $F(1, 129) = 4.2, p = .04$ . As illustrated in Figure 10, we identified a "low group" and a "high group" using a median split of the combination of objective knowledge and involvement. While participants in the low group did like the unified (vs. disunified) cars more,  $F(1, 64) = 8.7, p < .01$ , those in the high group liked unified and disunified cars equally, (i.e. no difference in liking,  $F(1, 65) = .9, p = ns$ ).

Finally, we wanted to determine whether the decrease in the greater liking of unified (vs. disunified) products as a participant's combined product knowledge and involvement increases is due to the greater perceived value and/or mental stimulation provided by disunified (vs. unified) products (H4a and H4b respectively). As illustrated in Figure 11, the disunified cars were perceived to be more powerful,  $F(1, 130) = 6.8, p = .01$ , and more fuel efficient,  $F(1, 130) = 8.6, p < .01$ . In addition, the disunified cars were perceived to be more novel,  $F(1, 130) = 36.3, p < .0001$ , more complex,  $F(1, 130) = 44.7, p < .0001$ , and marginally more interesting,  $F(1, 130) = 2.8, p = .10$ .

To test H4a, we combined the scores for ratings of power and fuel efficiency to create a total score of perceived attribute value. A test of mediation (Baron and Kenny 1986) suggested that the decrease in the greater liking of unified (vs. disunified) cars was due to perceptions of greater value of the disunified (vs. unified) cars (Sobel  $t = 2.2, p = .03$ ). In other words, while the liking of unified (vs. disunified) cars depended on the combination of involvement and product knowledge,  $F(1, 129) = 4.2, p = .04$ , and perceptions of value also depended upon the combination of involvement and product knowledge,  $F(1, 129) = 10.2, p < .01$ , when both “involvement and product knowledge” and “value” were included in a model predicting liking of unified (vs. disunified) cars, the former was not significant,  $F(1, 128) = 1.5, p = ns$ ; “value,” however, was still significant,  $F(1, 128) = 9.2, p < .01$ .

There was, however, no strong evidence to suggest that any of the factors related to mental stimulation (novelty, interestingness and complexity) explained the moderating effect of the combination of involvement and product knowledge. While the perception of a difference in novelty between the unified and disunified cars did depend on the combination of involvement and product knowledge,  $F(1, 129) = 7.7, p < .01$ , novelty was not a statistically significant mediator (Sobel  $t = 1.5, p = .14$ ). Neither differences in how interesting nor how complex the unified cars were perceived to be depended on the combination of involvement and product knowledge, therefore neither of these factors qualified as a potential mediator of the effect of the combination of involvement and product knowledge.

Thus, while participants in general like unified (vs. disunified) products more, this effect diminishes as the combination of involvement and product knowledge increases

such that those participants relatively high in involvement and knowledge like both unified and disunified products equally. Apparently, the greater sense derived from unified products is compensated by the greater value perceived in the disunified products. However, only those participants relatively high in the combination of involvement and product knowledge perceive greater value in the disunified products, supporting H4a (value), but not H4b (mental stimulation). These findings are consistent with our argument that the effect of a holistic property, like form-function unity, will be a relatively general effect. However, the detailed attribute processing of the different elements of a product (i.e. form and function) by those with sufficient involvement and product knowledge may lead to similar liking of unified and disunified products, albeit for different reasons (i.e. “makes sense” vs. “value”).

## Discussion

Experiment 3 replicated our central finding from experiment 2, i.e. that consumers like unified products more than they like disunified products (H1). Further, we provided additional evidence for the role of the variable “makes sense” in explaining the form-function unity effect (H2). There were, however, some important differences in the current, high involvement category based experiment. First, the role of the variable “makes sense” in explaining the form-function unity effect was dependent on the need for cognition (NFC). Second, in addition to supporting findings from our earlier experiments, the current experiment demonstrated a boundary condition of the main effect. Our results suggest that involvement and product knowledge do indeed

collectively moderate the effect of form-function unity. While, overall, consumers like unified (vs. disunified) products more, consumers with relatively high involvement and product knowledge like unified and disunified products equally. Our results suggest that this is not due to mere indifference (indeed, their liking scores were higher on average than those relatively low in involvement and product knowledge), nor that the greater sense that the unified products made did not have an effect. Rather, our results suggest that while the degree to which a product “makes sense” positively influences all consumers, those consumers relatively high in involvement and product knowledge also notice and appreciate the greater value derived from the duplicity of meaning inherent in the disunified products. In other words, some consumers like both unified and disunified products, but for different reasons.

## CHAPTER SEVEN: GENERAL DISCUSSION

Do consumers like products more when the form and function are perceived to be unified (vs. disunified)? This was the fundamental question that our research addressed. While prior research has demonstrated how and when form and function can independently influence consumers' product evaluations, our research demonstrates that the holistic property of form-function unity also has an effect on consumers' product evaluations. All else equal, our research suggests that consumers will like products more when the form and function are perceived to be unified in the meanings that each independently evokes.

The form-function unity effect was demonstrated across a variety of product contexts including both low involvement consumer packaged goods and consumer durables, as well as within a high involvement product context (cars). A summary of the theoretical contribution of this research, practical implications, limitations and opportunities for further research follows.

### *Overview of Findings and Theoretical Contribution*

The thesis of the current research, supported by the evidence from our experiments, is that consumers like products more when the form and function are perceived to be unified (vs. disunified) which we operationalized along the dimension of associations, or perceived meanings. More generally, our research suggests that people like objects when their visual and verbal elements are unified in the meanings that each independently

conveys. While we focused primarily on consumer products, results from experiment 1 suggest that this phenomenon may have broad applicability to other contexts in which consumers evaluate both visual and verbal information simultaneously, such as branding (e.g. logos and tag lines), advertising and package design<sup>5</sup>.

We also endeavored to understand both why and when consumers express this greater liking of unified (vs. disunified) products. In the first two experiments, we demonstrated the overall greater liking of unified (vs. disunified) objects and products and showed that this effect is mediated by how much more sense unified products make to consumers than disunified products. In the third experiment, we provided additional evidence of the main effect and the role of the variable “makes sense” in explaining this effect. Importantly, however, we also show that this effect is moderated by the combination of consumers’ product knowledge and involvement. While in general consumers liked unified (vs. disunified) products more, consumers high in the combination of product knowledge and involvement liked unified and disunified products equally – at least in relatively higher involvement product categories such as cars. This last point is important in that it demonstrates just how pervasive the form-function unity effect may be. Further, we provide evidence that this apparent indifference is best understood as an equivalent appreciation of both unified and disunified products; while unified products do make more sense to those high in product knowledge and involvement, the disunified products are perceived to offer more value. We find no evidence, however, that the mental

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<sup>5</sup> While prior research has investigated consumer responses to the simultaneous presentation of visual and verbal information, often within an advertising context (e.g. Edell and Staelin, 1983; Houston et al, 1987; Janiszewski and Meyvis, 2001; Shapiro, 1999) we are aware of no other research that has specifically studied consumer preferences for unified vs. disunified objects or products.

stimulation provided by disunified products explains the moderating role of the combination of product knowledge and involvement.

The results of the current research might at first seem at odds with research that demonstrates that consumers like products more when they are moderately incongruent (Meyers-Levy and Tybout 1989; Peracchio and Tybout 1996). Given this prior research, one might not expect that a unified product (presumably congruent) would be liked more than a disunified product (potentially moderately incongruent). Indeed, a variety of researchers have provided evidence for very different effects including a preference for novelty and variety seeking (for a review, see Veryzer and Hutchinson 1998). To somewhat reconcile these apparently conflicting findings, it is critical to consider the context of study and the manipulations employed. In the case of Meyers-Levy and Tybout's research, incongruity refers to the product with respect to its category ("schema-congruity"), and their manipulations are all verbal – there is no manipulation of the product form. In the case of Veryzer and Hutchinson, where preferences for both prototypicality and unity are demonstrated, the manipulations are entirely visual (i.e. product aesthetics, or form). The current research, however, investigates the relationship of form and function and suggests that consumers like products more when the form and function are perceived to be unified (vs. disunified)<sup>6</sup>. Our results are conceptually closest to (and consistent with) those of Veryzer and Hutchinson given that both address within-product relationships.

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<sup>6</sup> While we found no evidence that the relative novelty of the products significantly influenced evaluations, our intent was not to study the influence of perceived novelty and it is possible that there was insufficient variance in this variable to do so in the current research.

### *Practical Implications*

There are several important practical implications that follow from the current research. While our focus has been on understanding consumer evaluations of unified (vs. disunified) products, it is important to also consider our findings as they relate to new product success rates, firm growth and profitability, the role of marketing managers in the design process, as well as design strategy decisions across market segments and along product lifecycles. Before discussing each of these, we begin with an historical perspective that may, we hope, clarify a popular yet often misunderstood maxim of product design.

While we believe our research is unique in its detailed study of the holistic property of form-function unity, designers in a variety of fields have actively debated the relationship of form and function for years. While this topic is highly relevant to the practice of consumer product “industrial design,” it has a longer history within the domain of architecture. Indeed, the popular maxim that “form-follows-function” has been attributed to architect Louis Sullivan (1896). Sullivan’s maxim articulated the belief that the form of an object, such as a building, is self-evident in its function. Often cited examples of the form-follows-function maxim in practice include early 19th century “tall buildings” (skyscrapers), bridges and airplanes – all good examples of objects whose form was derived from and/or constrained by their function (e.g. the need for a bridge to have trusses or for an airplane to be aerodynamic).

Krippendorff (2006) observed that this so-called functionalist school of design was essentially technology (or function) centric. He argued that the focus of design instead

should be on the user/consumer of the object (and, by extension, less focused on process and more focused on outcome). As an example, Krippendorff offered the nearly ubiquitous personal computer whose form is increasingly driven by the needs of users given the highly interactive nature of the product. Indeed, with the development of micro-computer technology, there is virtually no basis for a function or technology driven form, even if one adopted a form-follows-function perspective. Thus, while the intuition behind the maxim that form-follows-function has some merit, it is most appropriately viewed as a design process option. Regardless of whether the function precedes the form in the design process, or vice-versa, the key insight we provide is that the perceived relationship of the final product's form and function matters to consumers<sup>7</sup>.

From a practical and managerial point of view, there are important implications from the current research related to new product success rates and subsequent financial performance. We have demonstrated that the relationship of product form and function significantly influences consumers' evaluations of products. In general, consumers like products more when form and function are unified (vs. disunified). Returning to the example of the Toyota Prius and Honda Civic hybrids, it is likely that decisions about the different forms of these cars, with respect to their functional distinction as hybrid vehicles, had a significant impact on their initial success rates. These very different short term outcomes may, in turn, influence the profit and growth trajectories of their next generation successors for years to come. Thus, there may be longer term competitive and

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<sup>7</sup> In practice, the form and function of a product are often iterated throughout the development process, i.e. neither truly follows the other, though one may provide the original impetus for the design process to begin.

financial implications of form-function design decisions beyond the initial consumer responses to these products.

There are also implications related to the role of marketing managers in the product development process. While it is fairly common for firms to “outsource” their “industrial design” work to professional design firms (e.g. IDEO, Ziba, etc.), or to “insource” this work to internal design “experts,” marketing managers need to be responsible for making sure that the relationship of the form and function is explicitly considered. To do so, however, marketing managers must first understand what specific meanings are conveyed by the forms and by the functional descriptions of the various product concepts and prototypes being evaluated. Therefore, in addition to the typical pre-launch consumer research that seeks to identify which product concepts are most liked, marketing managers should also conduct research to find out what meanings are conveyed by the various forms and functional descriptions under consideration. Overall, then, while employees typically involved in product design, such as industrial designers, have traditionally approached the product function as a constraint on form from an engineering point of view (e.g. making parts fit) – this perspective clearly needs to be expanded by marketing managers to include the psychological constraints on design as well.

While the form-function unity effect appears to be quite robust, it has its limits. Within higher involvement product categories, many consumers with sufficient product knowledge may find unified and disunified products equally appealing, assuming that the disunified products offers sufficient value. This last point is critical – disunity for the sake of mere difference (e.g. novelty) may not be appreciated by even these consumers. If the disunified product offers sufficient value, however, the differentiation of these

products as well as the likelihood that they will be more noticed and better remembered, can provide a market advantage (e.g. consider the successful, \$100,000 Tesla electric sports car). Thus, decisions about form and function must also consider the target market as well as competitive set.

Managers should also think about the relevance of form-function unity throughout the product lifecycle. First, aesthetic design (form) decisions made early on tend to constrain subsequent generations of products and are, therefore, especially important. Second, we know that different types of consumers purchase products at different stages of the product lifecycle (Rogers 1995). Given that early adopters are more likely to have both higher product knowledge and involvement, firms can consider the potential benefits of disunified designs early in the lifecycle. Disunified designs may offer an advantage in gaining attention and being memorable (Heckler and Childers 1992; Viswanathan and Childers 1999), whereas unified designs will become more critical as the lifecycle evolves and products attempt to “cross the chasm” (Moore 1991) to the mass market. Given the aforementioned comments about the importance of early design decisions, however, firms must carefully consider the transitions to subsequent designs. The point is to consider the relevance of the form-function relationship across the lifecycle as well as across market segments.<sup>8</sup>

Finally, while these findings are consequential to firms in developed markets, they apply equally to emerging markets, which represent an enormous potential for growth

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<sup>8</sup> One might question whether the Honda Civic hybrid’s disunity, as we have characterized it, was appropriate given the relatively early lifecycle of hybrid automobiles. Recall, however, that while disunity is appealing to some consumers, it is only appealing if form and function each offer sufficient value on their own. It is possible that while the Civic’s familiarity would have been appealing to the average consumer, it offered little value, symbolic or otherwise, to more knowledgeable and involved consumers who likely were predominant at this stage of the hybrid car’s lifecycle.

(Mahajan and Banga 2006). On the surface, our results suggest that the form-function unity effect will be relatively global – and it is, conceptually at least. Practically speaking, however, consumers in different regions and cultures may have very different ideas about what meanings are conveyed by various product forms, for example, and will therefore have different ideas about which products are unified and which are not. Thus, in a quest to grow globally, firms must be sensitive both to the global effect of form-function unity, yet also be sensitive to what forms and functions are considered unified (or disunified) at a local level.

#### *Limitations and Future Research*

There are several limitations of the current research, each presenting opportunities for further research. To begin with, we have not determined whether the effect of form-function unity is conscious or relatively non-conscious. If consumers are unaware of their greater liking of unified (vs. disunified) products, this could result in an apparently paradoxical difference between the ideal products they define vs. products they choose. This finding would have both theoretical implications as well as implications for managers interested in the relatively new trend of product co-creation with customers.

Further, while we have demonstrated an effect with respect to initial liking judgments, we have not followed the effect of form-function unity throughout the cycle of judgment, decision making, use and satisfaction. In addition, while experimental research affords great control, we have not demonstrated the effect in a naturalistic setting. Future research could endeavor to study the effect of form-function unity

throughout the cycle of a consumer's experience as well as demonstrate and quantify the full linkage between form-function unity through innovation success to firm profitability and growth.

Next, we have demonstrated this effect within both an abstract context (experiment 1's shape-word pairs) and within a product context (both low and high involvement product categories). While we believe that this effect is likely to hold in other marketing contexts in which consumers are presented with both visual and verbal information (e.g. branding {logos and tag lines) and advertising {images and text}), we have yet to study the effect in these contexts. In addition, we operationalized form-function unity along the dimension of associations, or perceived meanings. It would be valuable to explore the effect of form-function unity on other dimensions along which product form and function can vary, such as perceived novelty and perceived complexity.

Finally, while not described in the current research given space constraints, we found some evidence for individual level variance in consumers' sensitivity to form-function unity. This individual difference also had an effect on product liking. Establishing an individual difference scale along this dimension will require significant additional testing to demonstrate internal and external validity, uniqueness of the construct etc.

Nonetheless, this and the aforementioned ideas present several opportunities for future research aimed at more fully understanding the nature and scope of the greater liking of unified products and, more generally, of the visual and verbal elements of other consumer and marketing relevant objects.

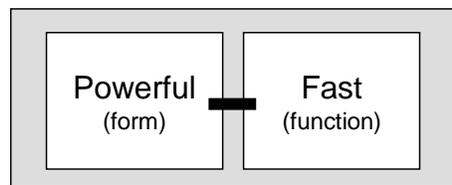
## **FIGURES**

FIGURE 1

CONCEPTUAL MODEL OF AUTOMOBILES WITH UNIFIED (Vs. DISUNIFIED)

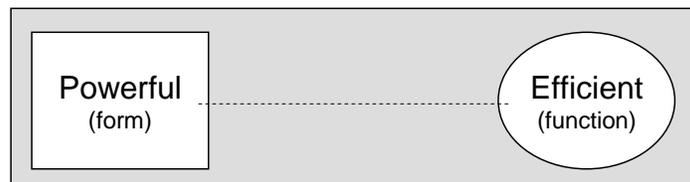
FORM AND FUNCTION

**Form-function Unity**



Automobile **A**

**Form-function Disunity**



Automobile **B**

FIGURE 2

INFLUENCE OF FORM-FUNCTION UNITY ON CONSUMER RESPONSES TO  
PRODUCTS

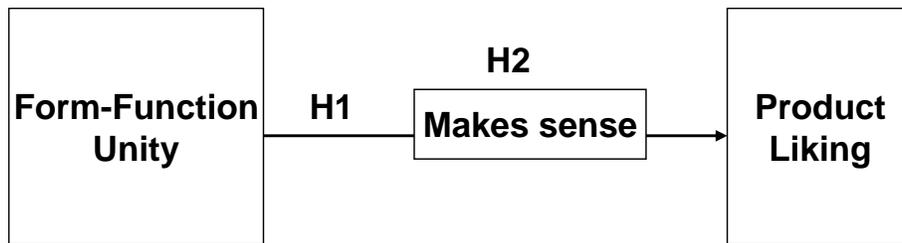


FIGURE 3

FULL CONCEPTUAL MODEL OF THE EFFECTS OF FORM-FUNCTION  
UNITY ON CONSUMER RESPONSES TO PRODUCTS

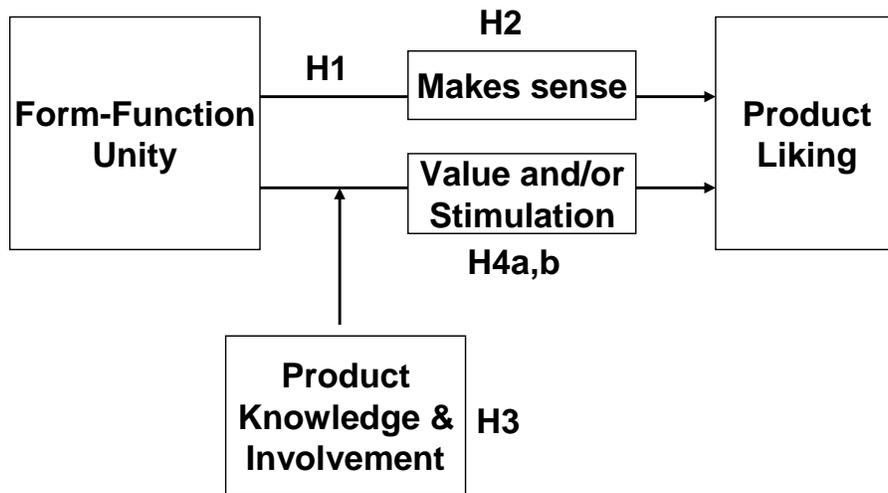


FIGURE 4

EXPERIMENT 1 STIMULI

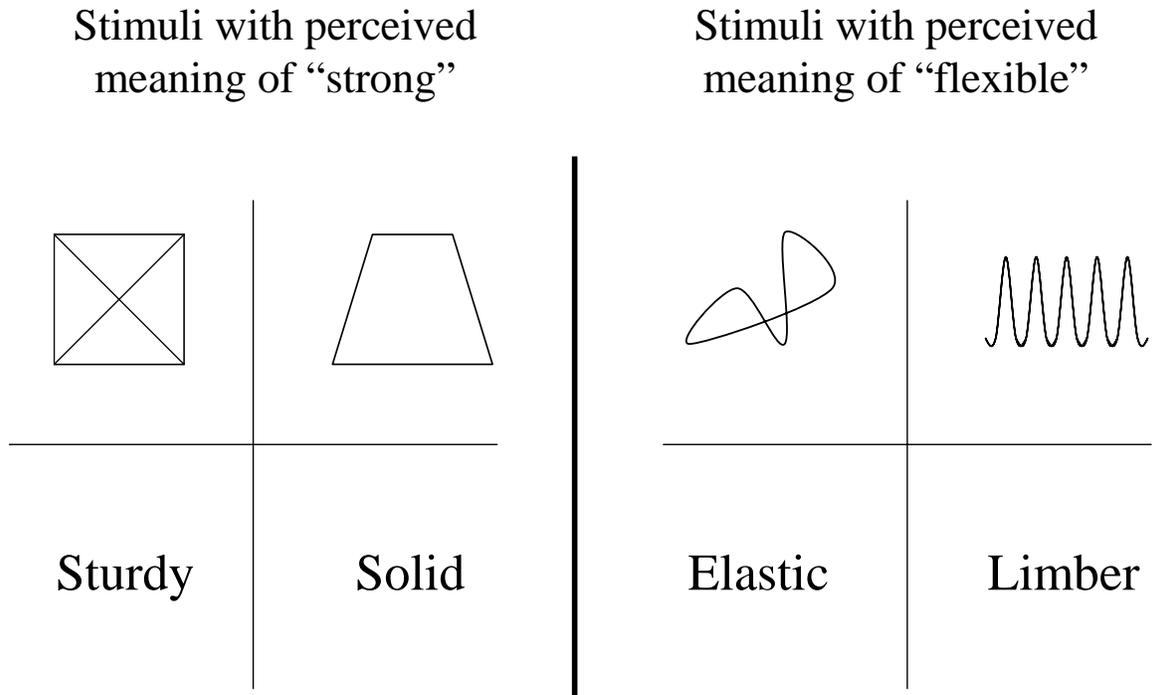


FIGURE 5

SHAPE-WORD OBJECTS ARE LIKED MORE WHEN THE MEANINGS OF THE VISUAL AND VERBAL INFORMATION ARE PERCEIVED TO BE UNIFIED

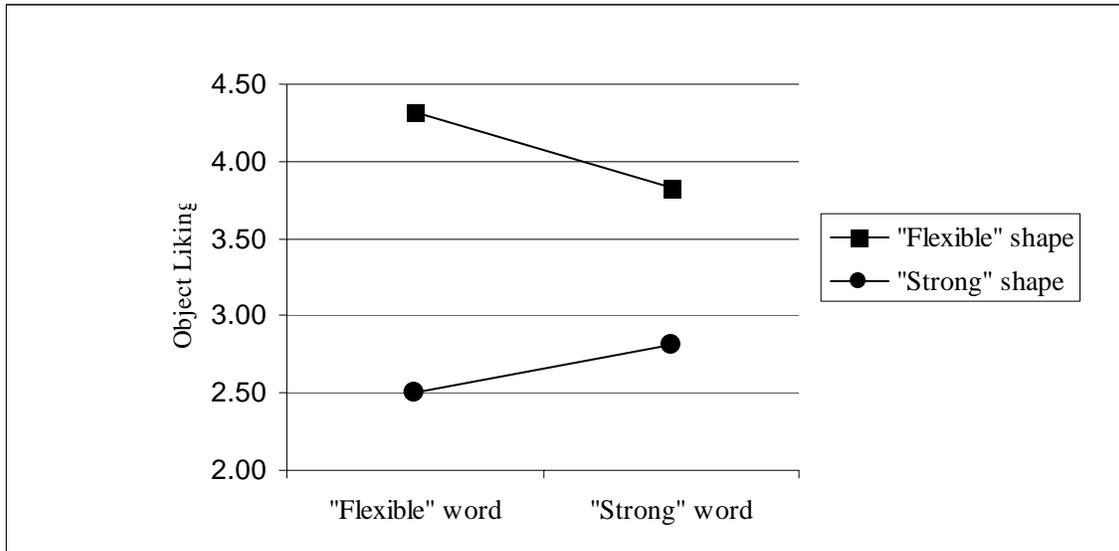


FIGURE 6

ILLUSTRATIVE EXPERIMENT 2 STIMULI

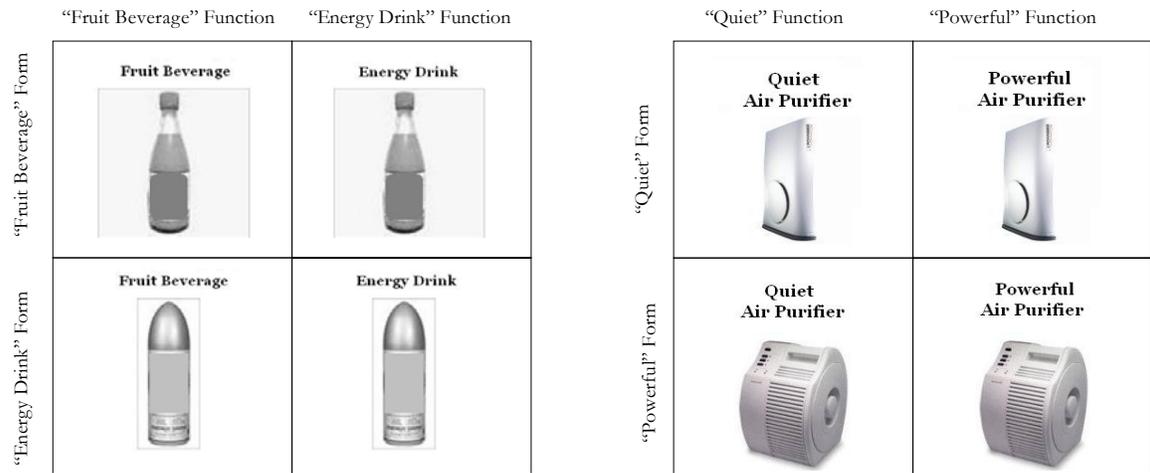
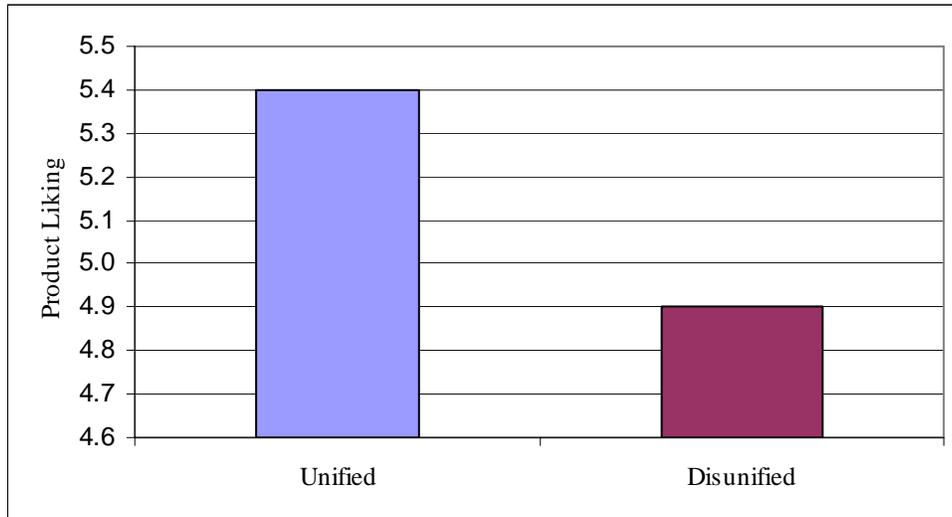


FIGURE 7

PRODUCTS ARE LIKED MORE WHEN THEIR FORMS AND FUNCTIONS ARE  
PERCEIVED TO BE UNIFIED (Vs. DISUNIFIED)



## FIGURE 8

### EXPERIMENT 3 STIMULI

#### FORM-FUNCTION UNITY

**The 2008 Brido leads the industry in fuel efficiency.** It achieves amazing fuel economy with an EPA fuel efficiency of 55 miles-per-gallon combined with an Advanced Technology Partial Zero Emission Vehicle (AT-PZEV) rating. You save and its good for the environment. A wise choice.



**The 2008 Turbido leads with power.** With its RP1 technology, this engine easily exceeds 280 horsepower. Maximum torque is consistently available between 2250 and 7600 rpm, and delivers a top speed of 120 mph. The result is excellent muscle and pulling force at all times. A true powerhouse for those with the need.



#### FORM-FUNCTION DISUNITY

**The 2008 Turbido leads with power.** With its RP1 technology, this engine easily exceeds 280 horsepower. Maximum torque is consistently available between 2250 and 7600 rpm, and delivers a top speed of 120 mph. The result is excellent muscle and pulling force at all times. A true powerhouse for those with the need.



**The 2008 Brido leads the industry in fuel efficiency.** It achieves amazing fuel economy with an EPA fuel efficiency of 55 miles-per-gallon combined with an Advanced Technology Partial Zero Emission Vehicle (AT-PZEV) rating. You save and its good for the environment. A wise choice.



FIGURE 9

CARS ARE LIKED MORE WHEN THEIR FORMS AND FUNCTIONS ARE  
PERCEIVED TO BE UNIFIED (Vs. DISUNIFIED)

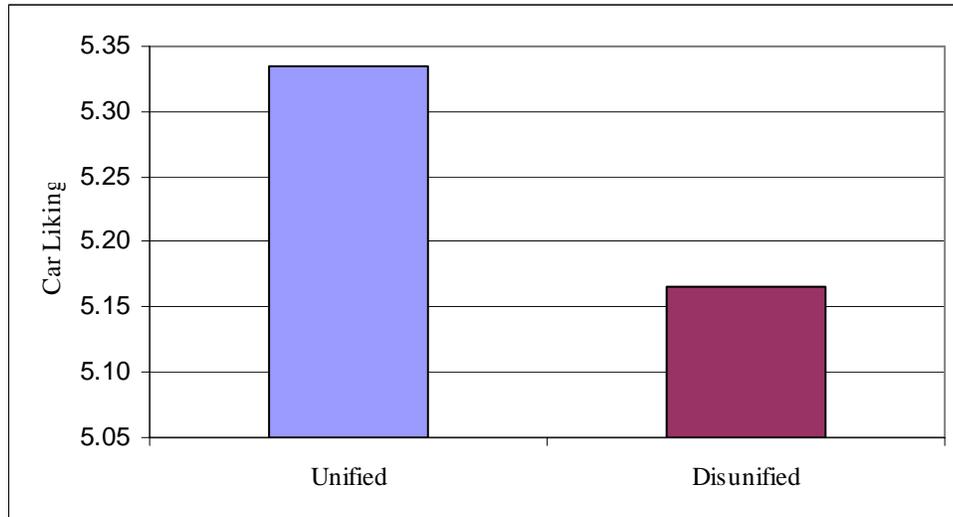


FIGURE 10

THE PREFERENCE FOR UNIFIED (Vs. DISUNIFIED) CARS DECREASED AS  
THE COMBINATION OF INVOLVEMENT AND PRODUCT KNOWLEDGE  
INCREASED

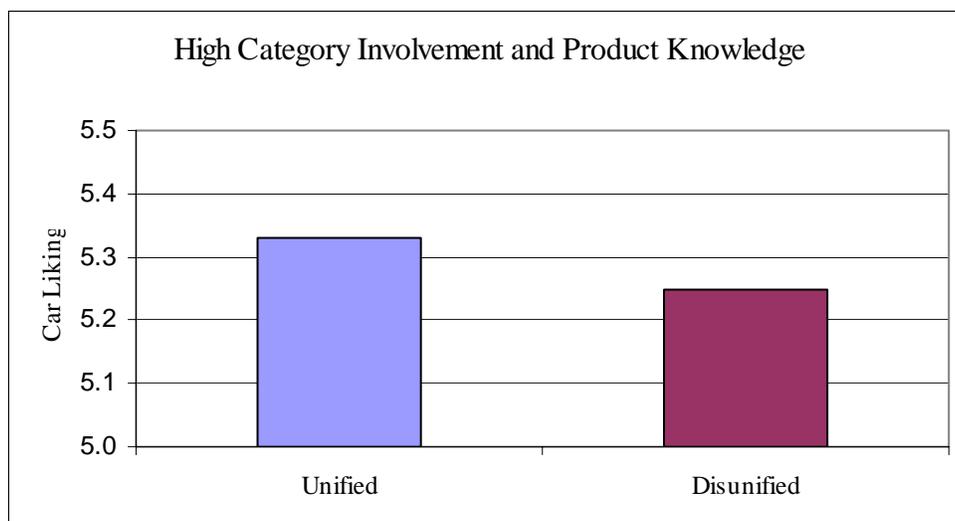
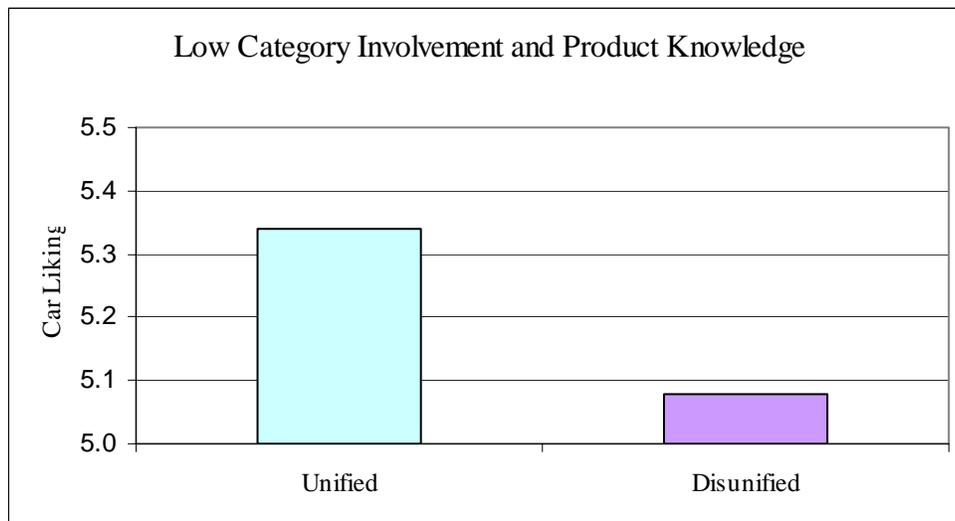
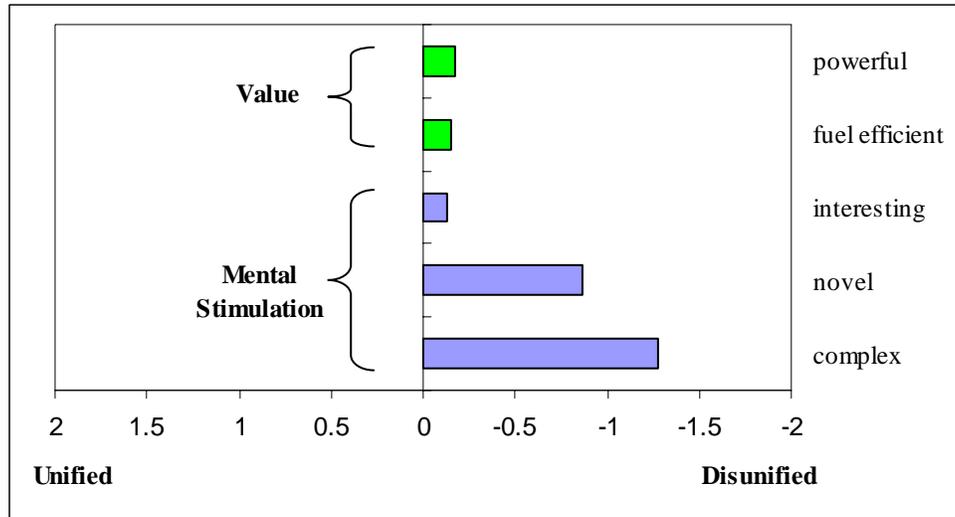


FIGURE 11

DISUNIFIED CARS WERE PERCEIVED TO HAVE HIGHER ATTRIBUTE  
VALUE AND TO BE MORE MENTALLY STIMULATING



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## VITA

Michael Gerhard Luchs was born in Antananarivo, Madagascar on January 8<sup>th</sup>, 1968, the 2<sup>nd</sup> of four sons of United States Foreign Service Officer Lewis Luchs and his wife Susan Luchs. After living in and attending schools in Singapore, France and the United States, Michael graduated in 1985 as the valedictorian of the International School of Kuala Lumpur, Malaysia. He then attended Tufts University in Medford, Massachusetts, completing a B.S.E. in Mechanical Engineering, cum laude, and a B.A. in Psychology in 1990. After two years as a consultant with Andersen Consulting, he attended the Darden Graduate School of Business at the University of Virginia. After completing his M.B.A. in 1994, he began his career in product management and marketing; first as a Product Manager at the Black and Decker Power Tool Company and then as the Sr. Vice President of Marketing for Labtec (now a division of Logitech). He married Ivonne Marie Rivera, the 3<sup>rd</sup> of three daughters of USAF Brigadier General Pedro N. Rivera, M.D., and his wife Myrna Syamara Rivera, on September 26<sup>th</sup>, 1998. They moved to Arlington, Virginia in 2000 where Michael became a consultant with Pittiglio, Rabin, Todd & McGrath (PRTM). He left PRTM in 2004 as a Principal of the firm to begin his Ph.D. program at the University of Texas at Austin. Michael, Ivonne and their three sons, Andrew, Matthew and Ethan, will be moving to Williamsburg, Virginia in the summer of 2008 where Michael will be joining the faculty of the Mason School of Business at the College of William and Mary.

Permanent address: 3505 Mallard Cove, Williamsburg, Virginia, 23185, U.S.A.

This dissertation was typed by the author.