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TWO ESSAYS ON PRODUCT DESIGN AND
CONSUMER EVALUATIONS

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Marketing
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at the University of Central Florida
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ABSTRACT

This paper is about the central role of product design on consumer evaluations. While the design literature has articulated two different types of design, i.e. form-based design and function-based design (Khalid 2004), most extant marketing literature has mostly focused on the impact of functional design on performance (see Chitturi, Raghunathan, and Mahajan (2007) for a notable exception). In this paper, I examine the individual and joint effects of the two design dimensions: form design and functional design on consumer evaluations of new products.

In the first essay, employing theoretical underpinnings from processing fluency theory, I investigate four major research questions. First, all else equal, does form design matter? Second, how does form design interact with functional design? Third, does the interaction between form and functionality change in an innovation context? Specifically, given a certain level of functionality, what type of form is more advantageous for a radically new product (RNP) or an incrementally new product (INP)? Fourth, is there an individual difference in consumer evaluations to innovative products with various form designs?

Results from the four experiments conducted demonstrate that (1) more typical form design leads to more positive attitudes toward the product than less typical form design, (2) a more typical design compensates for the average functionality of the product and hence a product with average functionality is evaluated as well as highly functional products in the more typical design condition. In a less typical design condition, a product with high functionality leads to much lower consumer attitudes towards the product, (3) whereas the form design for incremental innovations must be closer to the incumbent products for favorable evaluations, less typical form is evaluated as good as more typical form for radical innovations. (4) Form design of an

innovative product matters more to the technologically more sophisticated consumers (experts) than technologically less sophisticated consumers (novices).

In the second essay, I examine the issues involved in using form design to nullify first mover advantage. Pioneers or first movers can be defined as the first firm to sell in a new product category. Despite the proliferation of the pioneering advantage research, there are few empirical studies which examined how the product design enables the later entrants to nullify the first mover advantage. Employing theoretical underpinnings from categorization theory, I investigate the following research questions. First, what type of form is more likely to enhance consumer evaluations and nullify first mover advantage when the follower's product is featured with higher or lower functionality? Second, how does form design interact with functional design for the follower's product?

Results from the experimental study conducted demonstrate that (1) if the follower's functionality is not superior to the pioneer's, follower had better focus on design differentiation which can compensate for the lower functionality of the follower (2) if the follower's functionality is superior to the pioneer's, follower had better follow the pioneer's design for the better product evaluation.

The managerial implication is clear: Form design is a critical determinant of consumer evaluations. Form design helps create and appropriate value for firms.

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CHAPTER ONE: GENERAL INTRODUCTION

The product's form design (hereinafter "design) is one of the critical factors of success especially in today's market place where technology gaps between companies have become smaller, and companies can produce products that are similar in features, quality and price (Veryzer 1995). In one survey of marketing managers, 60% of respondents said design was the most important determinant of new product performance (Bloch 1995; Bruce and Whitehead 1988). Similarly, an analysis of the performance of 203 new products demonstrated that design was the most important sales success (Bloch 1995; Cooper and Kleinschmidt 1987). The receipt of design awards also has a positive relationship with profit margins and sales growth (Bloch 1995; Cooper and Kleinschmidt 1987). In marketing research, MSI research priorities (2008-2010) ranked 'Innovation and Design' as top research priority. These results prove that we should pay more attention to relationship between form design and product evaluations.

The centrality of design in marketing is well-established (see Bloch 1995), and several empirical studies have examined how overall product design will affect customers' perceptions toward the product (Dahl et. al 1999; Page and Herr 2002; Veryzer and Hutchinson 1998). Notably, Bloch (1995) states that a good design can attract consumers to a product, communicate to them, and add value to the product by increasing the quality of the usage experience associated with it. However, most marketing studies have focused on the importance of function-based design (see Chitturi, Raghunathan, and Mahajan (2007) for an exception) while the design literature suggests that product design comprises of two intertwined dimensions: form and functional dimensions (Khalid and Halander 2004; Norman 1998, 2004). This point is well

explained by Veryzer (1995) who suggests that marketing researchers need to adopt a conceptualization of design that acknowledges both its exterior and functional components. Similarly, Page and Herr (2002) propose that the two fundamental components of product design, exterior and function must be studied to understand the total impact of design. To fill this gap, I examine the independent and joint impacts of the form and functional design on consumer preferences in two essays.

In essay 1, I examined the four major research questions employing the theoretical underpinnings from processing fluency theory. According to the processing fluency theory, recent exposures to a target make the target more easily accessible in memory, which enhances the ease with which consumers identify and recognize the target. This enhanced ease by consumers is called processing fluency (Jacoby and Dallas 1981; Lee and Labroo 2004). Past researches demonstrate that processing fluency is affectively positive (Reber, Winkielman, and Schwarz 1998). Processing fluency of the target enhanced by the prior exposure is likely to lead to a more favorable attitude (Anand and Sternthal 1991; Lee and Labroo 2004). Since form and function based design of the new product is mainly evaluated by the baseline knowledge or previous experience (Gregan-Paxton et. al. 2005; Hoffler 1993; Myers-Levy and Tybout 1989), processing fluency theory provides good theoretical underpinnings for this research. More specifically, in our research context, typical form design is conceptualized as the design similarity to the prototype in consumer's memory. Thus, if the form is more typical, consumers can easily access to memory, which will eventually lead to processing fluency and positive product evaluation. Since the main purpose of the current research is to examine the

relationship between form design and consumer evaluations, processing fluency theory provides good theoretical backgrounds.

The following four research questions were examined in essay 1. First, does form design matter? Should the form be designed as similar to, or different from those of the incumbent products (study 1)? Second, how does form design interact with functional design? What type of form is likely to enhance consumer evaluations when the product is featured with high or low functionality (study 2)? Third, I also examine the interaction between functionality and form in an innovation context. If the new product is featured with new technological functionality that does not exist among incumbent products, how will functionality and form interact? What type of form is more advantageous for a radically new product (RNP) or an incrementally new product (INP) Study 3)? Fourth, is there an individual difference in consumer evaluations to innovative products with various form designs (Study 4)?

I conducted four experiments. Results demonstrate that (1) more typical form design leads to more positive attitudes toward the product than less typical form design, (2) for a new member of an incumbent product category, a more typical design compensates for the average functionality of the product and, therefore, a product with average functionality is evaluated as well as highly functional products in the more typical design condition. In a less typical design condition, a product with high functionality with less typical design leads to much lower consumer attitudes towards the product, (3) whereas the form design for incremental innovations must be closer to the incumbent products for favorable evaluations, less typical form is evaluated as good as more typical form for radical innovations. (4) Form design of an innovative product

matters more to the technologically more sophisticated consumers (experts) than technologically less sophisticated consumers (novices).

In essay 2, employing the comparison-based learning theory, I examine the interaction of form and function in pioneer and follower context. Specifically, the following research question regarding form and function was examined. How does form design interact with functional design for the follower's product? What type of form is more likely to enhance consumer evaluations and nullify first mover advantage when the product is featured with higher or lower functionality?

Comparison-based learning theory demonstrates that when people learn about a category, they often compare the new instances with similar old instances and notice features common to the compared instances (Spalding and Ross 1994). Especially, comparison-based learning theory was well adopted in the new brand context in marketing. Previous marketing literatures involve on how the representation of the brand will be influenced by its similarity to previous brands (Zhang and Markman 1998). Since consumers are likely to learn the follower's new product by comparing it with that of the pioneer (Zhang and Markman 1998), comparison-based learning is a good theoretical lens.

The major finding from the experiment conducted demonstrate that if the follower's functionality is not superior to the pioneer's, followers had better focus on design differentiation which can compensate for the lower functionality of the followers and lead to higher willingness to buy of the consumers. In other words, as long as the follower's new product design is different from the pioneer's, even follower's lower functionality leads to as high level of consumer's willingness to buy as higher functionality. On the other hand, if the follower's

functionality is superior to the pioneer's, follower had better follow the pioneer's design which will lead to higher willingness to buy of the consumers.

This dissertation offers a theory-based empirical examination of design and innovation. From a theoretical perspective, this research will fill the gap of under-researched area in marketing: form-based design in innovation and provide a more systematic approach to the empirical studies of form design issues in marketing. This research extends the current design and innovation literatures by examining the two dimensional types of design (visceral form and functionality) and also their potential moderators such as functionality, the degree of innovativeness (RNP vs. INP) and consumer knowledge (technological sophistication). This research also extends the processing fluency literatures by finding another type of processing fluency caused by fit between perceptual fluency and conceptual fluency.

Furthermore, essay 2 fills the gap of form based design in pioneering literature and provides a theoretical model for the form and functionality interaction of the follower's product. More specifically, this research introduces the form design in pioneering advantage literature to examine the interaction with the functionality, fills the gap of marketing strategies that would enable the later entrants to nullify the first mover advantage and fills the gap of under researched area of psychological mechanisms that contribute to the pioneering advantage.

The managerial implications are manifold. Depending on the functionality and the degree of the technological innovation, the form of the new products should be strategically determined to increase the value of the products. While both form and functionality of the product jointly determine the consumer preferences (Rindova and Petkova 2007), our theory suggests that the degree of the technological innovation and the form of the product jointly determine the

customer assessments of the value of the new products. The findings suggest that marketing managers who deal with the incrementally new products had better follow traditional form for the better evaluations of the new products. However, managers who launch radically new products can try atypical or innovative form since consumers are not likely to penalize atypical design, which may result in a strategic freedom of innovators and “first mover advantage” in the long-run. Thus, this research demonstrates the possibility for innovating firms to influence the perceived value of the new products. In addition, managers who target technologically more sophisticated consumers (experts) should determine the form of new products more strategically to increase the value of the products.

This research also provides some theoretical perspective for the marketing managers who want to use the form design of the new product as a strategic weapon to nullify the pioneer’s advantage. This research implies that depending on the functionality level and form similarity, new product launch strategy needs to be different. The findings suggest that marketing managers who are the later entrants and do not have the superior functionality to the first entrant had better differentiate the product design for the better product evaluations. However, managers who have the superior functionality had better follow the pioneer’s product design for the better product evaluation. Thus, this research demonstrates the possibility for the follower to nullify the pioneering advantage by different product design strategy.

CHAPTER TWO: MORE TO FORM THAN MEETS THE EYE? THE IMPACT OF FORM AND FUNCTIONAL DESIGN ON EVALUATIONS OF NEW PRODUCTS

Introduction

In his famous book, “The Design of Everyday Things,” Norman (1998) argues that a product’s form design may be more critical to product success than its practical elements. Norman’s view point is well taken especially in today’s competitive market place where technology gaps between companies have become smaller, and companies can produce products that are similar in features, quality and price (Veryzer 1995), and form design elements help companies stand out. Good product form design can attract consumers to a product, communicates to them, and adds value to the product by increasing the quality of the usage experience associated with using the product (Bloch 1995).

The centrality of design in marketing is well-established (see Bloch 1995), and several empirical studies have examined how overall product design will affect customers’ perceptions toward the product (Dahl et. al 1999; Page and Herr 2002; Veryzer and Hutchinson 1998). While the design literature suggests that product design comprises of two intertwined dimensions: form and functional dimensions (Khalid and Halander 2004; Norman 1998, 2004), however, most marketing studies have only examined the importance of function-based design (see Chitturi, Raghunathan, and Mahajan (2007) for an exception).

Ignoring form-based design is tantamount to missing a critical piece of the puzzle because the visceral look of the product is the first cue that consumers see when they examine the physical product. This point is echoed by Veryzer (1995) who suggests that marketing researchers need to adopt a conceptualization of design that acknowledges both its exterior and functional components. Similarly, Page and Herr (2002) propose that the two fundamental components of product design, exterior and function must be studied to understand the total impact of design. Hence it is only appropriate that we examine both types of design (visceral form and functionality) to understand consumers' responses to product design in a holistic manner.

Given the importance of visceral cues, the lack of empirical evidence for the relationship between form design and preferences is surprising. In this paper, I study the independent and joint impacts of form and functional design on consumer preferences. Specifically, the following research questions regarding form and function are examined.

Question 1: For a given level of functionality, does form design matter in terms of consumer evaluations of new products?

Question 2: How does form design interact with functional design? What type of form is more likely to enhance consumer evaluations when the product is featured with high or low functionality? In other words, does good functionality compensate for atypical form design? Or does typical form design compensate for average functionality?

While question 2 examines what types of form should be designed for new products with little innovative functionality, research question 3 investigates form design for innovative products with new functionalities. If form design interacts with functional design, then the next

question might be whether the form design should be different for radically new products (RNP) and incrementally new products (INP). This is because the role of functionality is actually different for incrementally new products and radically new products, not because of the economic value of the products but because of the perceptions of the consumers (Gourville 2006). As a result, because of the processing fluency for consumers, functionality plays different roles in INP and RNP products. Moreover, if visceral cues are indeed critical, these cues could be used as a diagnostic for value, and any pointers in this direction would be useful in designing radically new and incrementally new products. This leads us to the proposed question:

Question 3: Does the relationship between form and consumer preferences vary depending upon whether the product is a radically new product or an incrementally new product? If so, how should radically new products and incrementally new products be designed from a form perspective?

It is well known that customers vary in their preferences for, and ability to cope with product novelty (Rindova and Petkova 2007). The relative impact of form versus function may differ across customer groups such as experts and novices (Moreau et. al 2001). For example, experts tend to have more product knowledge about the product category and the relationship between form and consumer preferences might vary depending on whether the product is radically new or incrementally new. On the other hand, novices tend to have less product knowledge about the product category and form and functionality might have no effect on consumer preferences. This leads us to the next question:

Question 4: Does the moderating role of form and the type of innovation (RNP vs. INP) change depending upon whether the user is a novice or expert?

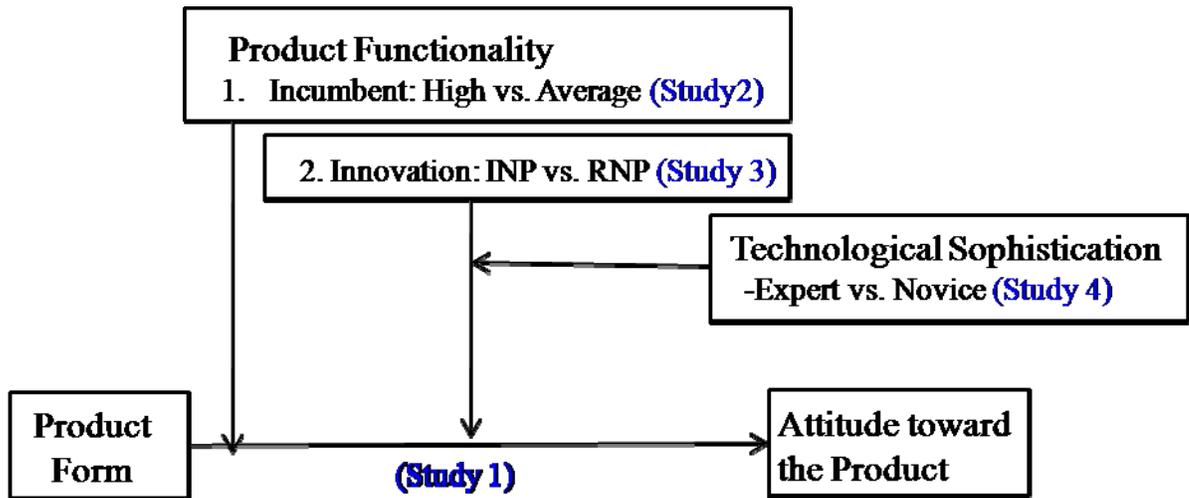


Figure 1
A Model of Consumer Response to Product Form and Function

Literature Review and Theoretical Framework

Form-Based Design vs. Function-Based Design

A product's form represents a number of elements chosen and blended into a whole by the design team to achieve particular sensory effects (Bloch 1995; Lewalski 1988). More specifically, form-based design is a physical form of a product and visual stimuli (appearance). Form-based design is detached from any direct practical value and develops instantaneously below the level of consciousness (spontaneous) (Lewalski 1988). Form-based design also generates symbolic and aesthetic meanings as well as visceral emotional reactions to the product (Rindova and Petkova 2007). For example, the form of a Harley-Davidson Sportster includes the sparkle of its chrome, the prominent V-configuration of its engine, the raked angle of its front

shocks, the teardrop shape of its gas tank, the visibility of its mechanical components, and the way in which these elements work together as a visual whole (Bloch 1995). Form based design in our context represents a physical form or appearance of product which arouses some sensory effects at the visceral level.

On the other hand, function-based design refers to the design that understands the end-user's unmet and unarticulated needs. Thus, good function-based design should be human-centered, focusing on understanding and satisfying the needs of the people who actually use the product (Norman 1994). For example, bigger storage area, easier adjustments and cup holders would be good function-based designs of car since convenience and comfort for drivers and passengers are the most important needs of the car (Norman 1994).

Form and functions are two fundamental aspects of design, and I expect that the two will interact to impact consumer evaluations of a new product. That is, the relationship between form and product evaluations is expected to be further moderated by the functionality level of the product.

Recent work (Chitturi et. al 2007, 2008; Gill 2008) in the marketing literature alludes to the interaction between form and functionality. Chitturi et al. (2007) investigate the trade-off between utilitarian and hedonic product attributes to examine the emotional and behavioral consequences. Their findings demonstrate that depending on the functional vs. hedonic trade-offs, both negative and positive emotions can be evoked (Chitturi et. al 2007). Gill (2008) examined the effect of adding new functionalities to a convergent product on incremental values of product. It has been shown that goal congruence between functionality and base and the nature of the base product affect the convergent product evaluations (Gill 2008).

The current research extends the form and functionality literatures by examining multi-dimensions of the form and function interaction in an innovation context. Since the main focus of the Chitturi et. al (2007) is to examine the *form and function trade-off* and emotional/behavioral consequences, they investigate two different dimensions (e.g. low functionality / high style vs. high functionality vs. low style). However, the literature is silent on the various combinations of form and function on consumer evaluations. Current research examines four different dimensions of form and function relationship [2 (high vs. low levels of functionality) X 2 (high vs. low levels of design)] which make it possible to investigate the form as a differentiating factor.

Additionally, Chitturi et. al (2007) examine the form and function trade-offs in an *incumbent* product context. On the other hand, the current research examines the interaction between form and function in both incumbent and innovative product contexts (incrementally new vs. radically new) which enables us to investigate the separate and joint roles of form and function in an innovative context as well. More importantly, Chitturi (2007, 2008) and Gill (2008) examine the relationship between hedonic and utilitarian features to explain the interaction between form and function. Even though hedonic features are referred to as “form” in these papers, the concept is more than the exterior appearance of the product; it also could be functional features like the ability to show TV on a MP3 player. On the other hand, the current research defines the “form” as a physical appearance of product (specifically typical vs. atypical) which arouses some sensory effects at the visceral level.

Also, existing innovation literature tends to have overlooked the role of form-based design on the development of new products (see Gill (2008) for an exception). Especially,

empirical studies which examine the impact of form on discontinuous new products are very rare (Veryzer 2005; Moreau 2001). This current research extends the existing design and innovation literature by investigating consumers' reactions to the product form driven by the degree of the technological innovation (RNP vs. INP) and hence demonstrates the possibility for innovating firms to influence the perceived value of the new products through form-based design in which the firms embody a novel technology (Rindova and Petkova 2007).

The current research also tests the three-way moderating role of the degree of the technological sophistication on the relationship between form and product attitudes. Technological sophistication is a proxy for expertise and hence this leads to an intriguing question: should form design be different depending upon the target audience? Answer to this question would enable managers to understand synchronizing the product form in terms of how consumers perceive the value of new products (Rindova and Petkova 2007). Figure 1 provides a visual representation of the four different studies conducted in this dissertation.

More Typical Form vs. Less Typical Form

Typicality is one of the most important determinants of visceral aspects of product design since it captures the notion that the determinants vary in the degree to which they are influenced by experience, including external interventions (Veryzer and Hutchinson 1998). Typicality refers to the degree to which a product is the representative of its category (Veryzer and Hutchinson 1998). Typicality has been widely researched to examine the relationship between typicality and affect. Many studies have demonstrated a positive linear relationship between

typicality and affect (Carpenter and Nakamoto 1996; Folkes and Patrick 2003; Simonin and Ruth 1998; Veryzer and Hutchinson 1998).

A different research stream finds that the linear relationship between typicality and affect is moderated by motivation and knowledge in some specific contexts (Loken et. al 2007). For example, when the consumers are highly motivated to process information, the moderate level of incongruity is more pleasing (Meyers-Levy and Tybout 1989). Perrachio and Tybout (1996) also argue that if consumers have very low prior knowledge of the category, the moderate incongruity effect occurs.

Typicality often leads to the perception of aesthetics in some literatures. Findings by Veryzer and Hutchinson (1998) demonstrate the positive relationship between typicality and affective response. Preference for typical objects is also consistent with the literature on facial attractiveness, which shows that “averaged” or composite faces are rated as more attractive than individual faces (Hogg and Alba 2007; Rhodes et. al 2002). In our context, more (less) typical form refers to a form which looks closer (farther) to the representative of its category.

According to the processing fluency theory, recent exposures to a target make the target more easily accessible in memory, which enhances the ease with which consumers identify and recognize the target. This enhanced ease by consumers is called processing fluency (Jacoby and Dallas 1981; Lee and Labroo 2004).

Since form and function based design of the new product is mainly evaluated by the baseline knowledge or previous experience (Gregan-Paxton et. al. 2005; Hoffler 1993; Myers-Levy and Tybout 1989), processing fluency theory provides good theoretical underpinnings for this research. More specifically, in our research context, typical form design is conceptualized as

the design similarity to the prototype in consumer's memory. Thus, if the form is more typical, consumers can easily access to memory, which will eventually lead to processing fluency and positive product evaluation. Since the main purpose of the current research is to examine the relationship between form design and consumer evaluations, processing fluency theory provides good theoretical backgrounds. Before I highlight the theoretical underpinnings of the interaction between form and functionality, a brief discussion of the processing fluency theory is in order.

Theoretical Background: Processing Fluency

Recent exposures to a target make the target more easily accessible in memory, which enhances the ease with which consumers identify and recognize the target. This enhanced ease by consumers is called processing fluency (Jacoby and Dallas 1981; Lee and Labroo 2004). Past researches demonstrate that processing fluency is affectively positive (Reber, Winkielman, and Schwarz 1998). Thus, processing fluency of the target enhanced by the prior exposure is likely to lead to a more favorable attitude (Anand and Sternthal 1991; Lee and Labroo 2004). Extant literature in implicit memory demonstrates that processing fluency might be perceptual and conceptual in nature (Lee and Labroo 2004; Tulving and Schacter 1990).

Perceptual fluency reflects the ease with which consumers can identify the physical identity of the stimulus on subsequent encounters. Perceptual fluency involves the processing of physical features such as modality and shape (Lee and Labroo 2004). Perceptual fluency is influenced by several variables such as perceptual priming, clarification, presentation duration, or repetition (Reber et. al 2004). Especially, perceptual fluency is known to be enhanced through prior exposures (Lee and Labroo 2004).

On the other hand, conceptual fluency reflects the ease with which the target comes to consumers' minds and pertains to the processing of meaning which is related with semantic knowledge structures (Lee and Labroo 2004; Reber et. al 2004). Whereas perceptual fluency is not influenced by attention or elaboration, conceptual fluency benefits from elaboration at the time of exposure (Lee and Labroo 2004). For example, conceptual fluency can be enhanced in a predictive context or in a related context (e.g. an image of ketchup following an advertisement of mayonnaise) (Lee and Labroo 2004).

Experiment 1

Design and Attitude toward the Product

Does form design matter? More specifically, does typical form lead to more positive attitude toward the product? Perceptual fluency can cast light on this perspective.

The design of products involves aesthetics. Aesthetic aspects are a potential source of pleasure for the consumer (Holbrook and Zirlin 1985; Veryzer and Hutchinson 1998). Aesthetic response tends to involve a number of factors. Out of those several factors, typicality has been widely researched to examine the relationship between typicality and affect. Many studies have demonstrated that form typicality influences product evaluation via affect. Previous literature shows that a typical form is usually more appealing such that there is a positive relationship between typicality and affect (Carpenter and Nakamoto 1996; Folkes and Patrick 2003; Simonin and Ruth 1998; Veryzer and Hutchinson 1998).

A different research stream finds that the linear relationship between typicality and affect is moderated by motivation and knowledge in some specific contexts (Loken et. al 2007). For example, when the consumers are highly motivated to process information, the moderate level of incongruity is more pleasing (Meyers-Levy and Tybout 1989). Perrachio and Tybout (1996) also argue that if consumers have very low prior knowledge of the category, the moderate incongruity effect occurs. (*See the discussion sections*)

However, most studies support a strong positive, linear relationship between typicality and affect as long as the category has valued attributes (Loken et. al 2007). Some explanations have been offered for this linear relationship. One explanation is based on ‘perceptual fluency (Loken et. al 2007; Schwarz 2004).’ Some literatures demonstrate that a typical design can enhance perceptual fluency. According to perceptual fluency concept, more typical category members are likely to have greater perceptual fluency, which is affectively pleasing (Loken et. al 2007; Schwarz 2004). Perceptual fluency tends to increase over time, as familiarity with a category increases (Loken et. al 2007). Enhanced perceptual fluency by previous exposure and familiarity leads to enhanced *affective* judgments. (Lee and Aaker 2004; Schwartz 2004). Thus, both aesthetic appeal and perceptual fluency can raise the positive affect and positive evaluation of the product.

H1: Form-based design influences the attitude toward the product such that more typical design will lead to more positive attitude toward the product than less *typical* design.

Pre-Test

The purpose of the pre-test is 1) to test the familiarity of the car design that would be used as a typicality manipulation in the questionnaire and 2) to test whether more typical form leads to higher design preference. For the manipulation check, 65 undergraduate business students at a major southeastern university participated in the experiment designed to test the familiarity and emotional pleasure of the car design. Subjects were provided with a questionnaire that includes four different car designs (Please see appendix for car designs). The following is a direction given to the participants, “The following pictures are designs of new products. Please look at each of them and answer the questions asked.” Then, four different car pictures were given to the participants.

Level of *typicality* was measured by asking, “How similar do you believe the product is to an existing vehicle?” Level of *typicality* was assessed with three seven point scale items including the following scale: Very Dissimilar / Very Similar. The different level of attitude toward the design was measured by asking, “How do you feel about the product design in the picture?” Attitude toward the design was assessed with three seven point scale items with the following scales: (1) Displeasing / Pleasing (2) Not Favorable / Favorable (3) Unwanted/ Wanted (Holbrook 1986).

Based on the average mean comparison of four product design familiarity level [1(6.61), 2(6.18), 3(1.69), 4 (2.87)], we chose two designs (1 and 2) as more typical design and two designs (3 and 4) as less typical design. Then, paired comparison analysis was performed to test the difference of two different designs. There was a statistically significant difference at the $p < .0001$ level for all possible pairs: 1&3[t(63)=25.06, $p < .0001$], 1&4[t(63)=18.84, $p < .0001$],

2&3[t(63)=19.95, $p < .0001$] and 2&4[t(63)=15.80, $p < .0001$] suggesting that a different level of design familiarity exists between more typical designs (1&2) and less typical designs (3&4). Thus, more typical designs record higher level of familiarity [1(6.61), 2(6.18)] than less typical designs [3(1.69), 4 (2.87)].

Similarly, paired comparison analysis was performed to test the difference of the design preference for the two different designs (more typical vs. less typical). Paired comparison analysis was performed to test the difference of two different designs. There was a statistically significant difference at the $p < .0001$ level for all possible pairs: 1&3[t(63)=9.83, $p < .0001$], 1&4[t(63)=7.59, $p < .0001$], 2&3[t(63)=8.70, $p < .0001$] and 2&4[t(63)=6.93, $p < .0001$] suggesting that a different level of design preference exists between more typical designs (1&2) and less typical designs (3&4). Thus, more typical designs record higher level of preference [1(6.00), 2(5.68)] than less typical design [3(3.66), 4 (4.02)]. In sum, pre-test results demonstrate that more typical designs are perceived as more familiar and more preferred by consumers.

Method

In exchange for extra credit, 49 undergraduate business students at a major southeastern university participated in the experiment designed to test whether a more typical design leads to more positive attitude toward the product. Subjects were provided with four different kinds of questionnaires that manipulated the design (two more typical vs. two less typical).

In study 1, one factor was manipulated between subjects (design typicality: more typical vs. less typical). Four versions of product design were used to manipulate two more typical designs and two less typical designs. More (less) typical design was designated as a design

which looks closer (farther) to the representative of its category. Based on the pre-test result, design was manipulated with four different pictures of vehicles. Two of them were used for the more typical designs and two of them for the less typical designs. The following is the direction given to the participants: “The following is the function and design of a new product. Please look at the following table and picture of the product and answer the questions asked.” The same function table was given to the participants to control for the objective functionality of the vehicle across the various conditions. The function table included engine type, engine displacement, horsepower, independent suspension, tires, mileage and performance rating. The subject’s product evaluations were assessed by asking respondents to fill out seven seven-point scale items: attitude toward the product scales (Luna and Peracchio 2005) – “poor quality/high quality, not appealing at all/very appealing, mediocre/exceptional, very bad/very good, unattractive/attractive, boring/interesting, dislike/like.” Coefficient alpha is .90 for attitude toward the product scales.

Results

A one way between groups analysis was conducted to explore the impact of two different designs on the level of attitude toward the product. Since two different versions of more typical designs [F (1, 22) =.00, p=1.00] and less typical designs [F (1, 23) =2.08, p=.163] record no significant difference each, two versions of each condition were summed up for the analysis.

There was a statistically significant difference at the $p < .05$ level in attitude toward the product scores for two different design typicality (preference) level [F (1, 47) =5.41, p=.024] suggesting that a different level of attitude toward the product exists between the two different

design typicality (preference) levels. H1 was supported by the data. We can see from the result that the more typical design recorded more positive level of attitude toward the product (5.80) than the less typical design (5.21).

Discussion

Results from Study 1 provide empirical support for the notion that the more typical design is likely to lead to more positive attitude toward the product than less typical design. The current research hypothesized design effect with ‘perceptual fluency.’ If the product design is more typical, more typical category members are likely to have greater perceptual fluency, which is affectively pleasing (Loken et. al 2007; Schwartz 2004). So, consumers are likely to overvalue products which have more typical designs. This result seems inconsistent with Meyers-Levy and Tybout (1989)’s. However, the current research design has two major differences from the Meyers-Levy and Tybout (1989)’s.

First, congruity in Meyers-Levy and Tybout (1989) was manipulated by the product description of the new drink, which is likely to lead to conceptual fluency. On the other hand, the current research manipulated the typicality of the product by form design only, which is likely to lead to perceptual fluency. Thus, since the basic definitions of ‘schema congruity’ and ‘form typicality’ are different, the underlying mechanisms which will lead to the product evaluation are also different. Second, preference for moderate incongruity effect occurs if the individuals score high need for cognition. (Meyers-Levy and Tybout 1989). Since the product category in Meyers-Levy and Tybout (1989) was new (new beverage) and the detailed description of the product was provided, individuals in the experiments are likely to have higher

need for cognition. However, the product category of the current research was incumbent product (car) and the individuals are likely to have relatively lower need for cognition.

Experiment 2

Form, Functionality and Attitude toward the Product

Form and functions are two fundamental aspects of design, and I expect that the two will interact to impact consumer evaluations of a new product. That is, the relationship between form and product evaluations proposed in hypothesis 1 is expected to be further moderated by the functionality level of the product. Typicality and perceptual fluency view can cast light on this perspective.

Perceptual Fluency and Conceptual Fluency

Perceptual fluency reflects the ease with which consumers can identify the physical identity of the stimulus on subsequent encounters. Perceptual fluency involves the processing of physical features such as modality and shape (Lee and Labroo 2004). Perceptual fluency is influenced by several variables such as perceptual priming, clarification, presentation duration, or repetition (Reber et. al 2004). Especially, perceptual fluency is known to be enhanced through prior exposures (Lee and Labroo 2004).

On the other hand, conceptual fluency reflects the ease with which the target comes to consumers' minds and pertains to the processing of meaning which is related with semantic

knowledge structures (Lee and Labroo 2004; Reber et. al 2004). Whereas perceptual fluency is not influenced by attention or elaboration, conceptual fluency benefits from elaboration at the time of exposure (Lee and Labroo 2004). For example, conceptual fluency can be enhanced in a predictive context or in a related context (e.g. an image of ketchup following an advertisement of mayonnaise) (Lee and Labroo 2004).

Functionality and Conceptual Fluency

One area of the research which has been researched widely in categorization and typicality is the graded membership (Loken et. al 2001). According to the models of the category representation, membership is graded based on the typicality (Loken et. al 2001). The typical members of the category are graded as very good members and atypical members as very poor members of the category (Loken et. al 2001). One of the reasons that this membership has been researched widely is because of its relationship with affect (Loken et. al 2001). For example, McDonalds are likely to be perceived as a more typical and good member in fast-food industry and being preferred to other less typical members: Church's Chicken or Taco Bell in the category (Carpenter and Nakamoto 1989; Loken et. al. 2001).

This linear relationship between graded membership and affect can be explained by the conceptual fluency. Conceptual fluency reflects the ease with which the target comes to consumers' minds and pertains to the processing of meaning which is related with semantic knowledge structures (Lee and Labroo 2004; Reber et. al 2004). Consideration-set membership and memory-based choice are facilitated by conceptual fluency due to the easy accessibility of the brand in memory (Lee and Labroo 2004). For example, conceptual fluency can be enhanced

in a predictive context or in a related context (e.g. an image of ketchup following an advertisement of mayonnaise) (Lee and Labroo 2004). In our context, McDonalds and fast-food can be perceived as the related and predictive context semantically and conceptual fluency is likely to be enhanced.

Then, the next question is how the functionality of new products can be related with conceptual fluency. According to the previous literatures, new members tend to include better attributes that are highly valued by the customers since the category evolves over time (Loken et. al. 2001; Loken and Ward 1990). These better attributes tend to have more in common with the typical category members than atypical category members (Loken et. al. 2001). So, highly valued attributes and typicality tend to be closely related each other (Loken et. al. 2001; Loken and Ward 1990).

Especially, in our innovation context of consumer product categories (e.g. car and electronics), people tend to value higher functionality of the new products (e.g. higher horse power, better consumer ratings, higher mega pixel etc.) and perceive higher functionality as more typical. Then, the better quality of the new product is more likely to be perceived as a more typical and good member of the category. Thus, in higher-functionality conditions, higher conceptual fluency is likely to be enhanced. We expect that processing fluency matters more in high functionality conditions due to the enhanced processing fluency by 'fit' (Lee and Aaker 2004) between high conceptual fluency (high functionality) and high perceptual fluency (more typical form). In other words, more typical design is likely to be evaluated much better than less typical design in higher functionality conditions. On the other hand, in average-functionality conditions, consumers are likely to feel that average quality of the new car is less typical and

conceptually less fluent. Then, it is likely that processing fluency doesn't matter as much. So, we expect that the difference of the attitude between more typical design and less typical design will be much smaller in average functionality conditions.

H2: The functionality of product moderates the relationship between form design and attitude toward the product such that in higher functionality conditions, more typical design leads to much more positive attitude toward the product than less typical design. On the other hand, in lower functionality condition, the difference of the attitude between more typical and less typical design will be much smaller than the difference in higher functionality condition.

Method

In exchange for extra credit, 67 undergraduate students participated in the between subject experiment in which two factors were manipulated (2 x 2 ANOVA): Functionality (high vs. average) and Form (more typical vs. less typical) designed to test the impact of form and product functionality on levels of attitudes toward the product. Functionality (high vs. average) was manipulated by two different descriptions from Consumer Reports. According to Moreau et. al (2001), engine is one of the most immutable car features. Thus, the high functionality table includes flat 6 engine types, 3.6 liters base engine displacement, 325 hp @6800 rpm horsepower and good ratings from Edmunds.com (9.0/10.0). On the other hand, average functionality table includes inline 4 base engine type, 2.4 liters base engine displacement, 158 hp @ 6000 rpm horsepower and average performance rating from Edumunds.com (7.0/10.0). Then, based on the

pre-test results (please see 'pre-test' section in experiment 1 for the detailed procedures of the pre-test), form typicality was manipulated by two different pictures of vehicles: design 1 (more typical form) vs. design 3 (less typical form).

The subject's product evaluation was assessed by asking respondents to fill out nine seven-point scale items anchored by "I dislike it/I like it, displeasing/pleasing, not enjoyable/enjoyable, inappropriate/appropriate, undesirable/desirable, unwanted/wanted, good/bad, positive/negative and favorable/not favorable" (Cronbach Alpha=0.848) (Maheshwaran and Chen 2006).

For a functionality manipulation check, the following direction was given to the participants, "Based on the above functional descriptions of the new product, please rate how good you think it is." Then, respondents were asked to fill out two seven point scale items: (1) Not at all good / Very good, (2) Not a good product / Very good product (Cronbach Alpha=0.967). Typicality manipulation check was measured by asking, "How similar do you believe the product is to an existing vehicle? (1) Does it look like an existing vehicle? (2) Does it have a similar appearance as an existing vehicle? (3) By just looking at the design of vehicle, does it remind you an existing vehicle?" Level of typicality was assessed with seven point scale items with the following scale: Very Dissimilar / Very Similar.

Pre-test results demonstrate that high functionality (5.64) records higher ratings of perceived functionality than average functionality (4.77) [$t(1, 65)=13.00, p=.001$]. More typical form product records higher similarity level (5.86) to the existing ones than less typical form product (3.57) [$t(1, 65)= 40.01, p=.000$].

Results

A two-way between group ANOVA analyses was performed to explore the impact of form and product functionality on levels of attitude toward the product. The main effect of form with respect to attitude was significant [$F(1, 63)=27.60, p=.000$] suggesting that more typical form leads to more positive attitude (5.48) than less typical form (3.94). The interaction of form and product functionality was significant with respect to attitude [$F(1, 63)=4.85, p=.031$] suggesting that the influence of form on attitude toward the product depends on whether the product functionality is high or average.

H2 was supported by the data. See Figure 2. We can see from these results that in higher functionality condition, more typical form recorded much more positive attitude (5.60) than less typical form (3.42) [$t(1, 63)=5.48, p=.000$]. On the other hand, in lower functionality condition, even though there was a significantly different attitude level between more typical design (5.36) and less typical design (4.47) [$t(1, 63)=2.08, p=.041$] at the .05 p-value level, the difference of the attitude between more typical design and less typical design (0.89) was much smaller than the difference in higher functionality condition (2.18).

The study 2 results are likely to show that functionality of product (high vs. average) moderates the relationship between form and attitude toward the product such that, in high functionality condition, form design does matter more than low functionality condition. Another interesting finding is that as long as the form is atypical, a product with average functionality (4.47) is likely to be preferred more than a product with higher functionality (3.42) [$t(1, 63)=2.50, p=.015$]. High functionality was penalized by atypical form. Also, if the form is typical, there

was no significant difference [$t(1, 63)=.59, p=.555$] between high functionality (5.60) and average functionality (5.36). More typical form compensates average functionality.

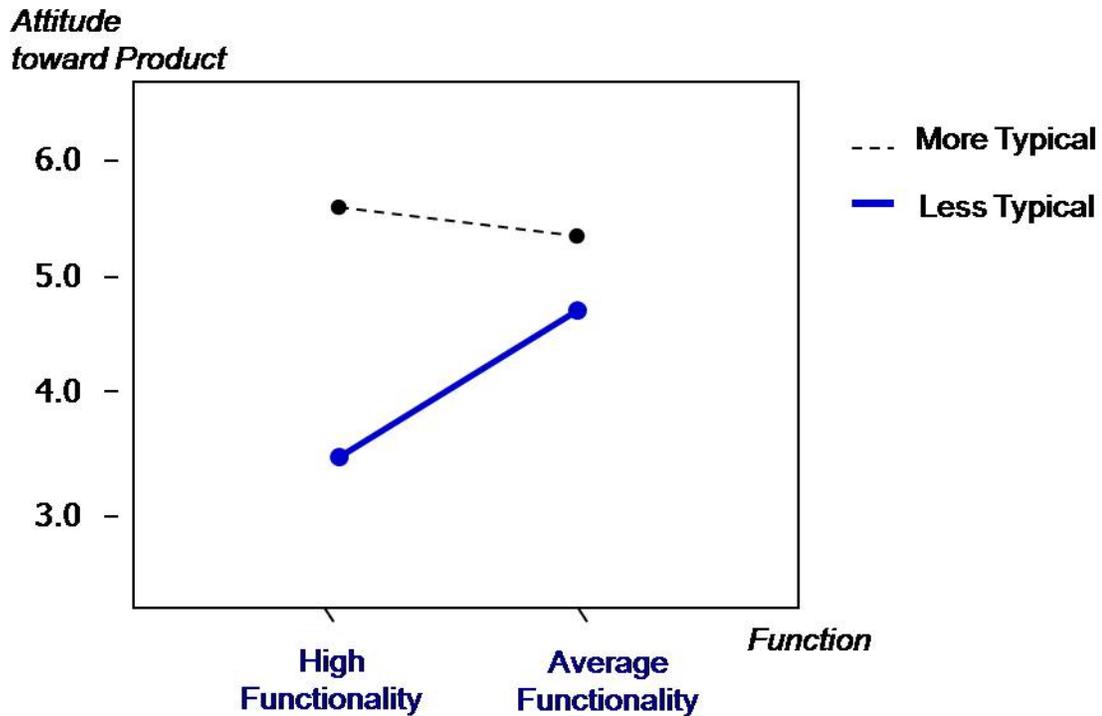


Figure 2
Representation of the Form vs. Function Interaction

Discussion

Study 2 results show that functionality of the product (high vs. average) moderates the relationship between form and attitude toward the product such that, in high functionality condition, form design does matter more than low functionality condition. Interesting finding is that in less typical form conditions, average functionality leads to more positive attitude than high functionality. In other words, atypical form penalizes high functionality. This is a very

interesting counter-intuitive result since it demonstrates that products with superior functionality are hurt more when combined with atypical form. On the other hand, in more typical form conditions, there are no significant differences in attitudes toward the product between high functionality and average functionality. In other words, typical form elevates average functionality.

Experiment 3

Form, Degree of Technological Innovation and Attitude

Hypothesis 2 examines what types of form should be designed for new products with little innovative functionalities. Hypothesis 3 investigates form design for innovative products—products with new functionalities. Does the relationship between form and product evaluations vary depending upon whether the product is a radically new product (RNP) or an incrementally new product (INP)? Typicality and processing fluency can cast light on this perspective.

Really New Product (RNP) vs. Incrementally New Product (INP)

Really new products (RNP) are defined as innovations that defy straightforward classification in terms of existing product categories and create a new category rather than reallocate shares within categories (Gregan-Paxton and John 1997). For example, when PDAs first appeared on the market, consumers didn't have knowledge structures which allow them to classify and identify PDA and make sense of its features and benefits (Gregan-Paxton and John

1997). From the consumer's perspective, RNP adoption involves significant learning and learning cost (Moreau et al. 2001). If a firm does not give enough information about the product, consumers cannot understand the products fully (Hoffler 2003). Really new products also shift market structures, represent new technologies, require consumer learning, and induce behavior changes (Urban, Weinberg and Hauser 1996).

On the other hand, incrementally new products (INP) involve much lower levels of market and technological uncertainties. For example, during the evaluation of new laptop computers, respondents who currently own laptops should understand only the relationship between weight and portability (Hoffler 2003). Market uncertainty is low because these new products provide incremental benefits relative to existing products. For INPs, consumers normally have the baseline knowledge or experience in the same or related domain to understand what the product is (Hoffler 2003).

Categorization Based Knowledge Transfer

For INPs, consumers normally have the baseline knowledge or experience in the same or related primary base domain to understand what the product is (Hoffler 2003). The primary base domain is defined as the category most similar to the innovation in terms of the benefits provided. Knowledge in the primary base domain is expected to have the most significant influence on consumers' perceptions of an innovation's continuity. For example, during the evaluation of a new laptop computer, respondents who currently own laptops can understand the relationship between weight and portability (Hoffler 2003). Thus, simple identification of the category might be all that is required for the consumers to understand the product fully (Hoffler 2003).

INP/RNP and Conceptual Fluency

Since consumers normally have the baseline knowledge or experience of INPs, they are more likely to use categorization based knowledge transfer to classify and understand the product (Hoffler 2003) and feel conceptually fluent. Because conceptual fluency reflects the ease with which the target comes to consumers' minds and pertains to the processing of meanings (Hamann 1990; Lee and Labroo 2004), conceptual fluency is likely to occur when a consumer has knowledge about both objects and the two objects go together conceptually. In our context, consumers are likely to feel high conceptual fluency with INPs since a target (INP) comes to mind more readily because of baseline knowledge or experience of car and then reading a functionality description which is very close to functionality of car. This is not likely to be the case with RNPs as consumers lack the basic knowledge of RNPs and hence conceptual fluency is likely to be lower.

Form Typicality and Perceptual Fluency

Prototype view suggests that all categories have a prototype that is the set of average attributes that most members of the category possess (Veryzer and Hutchinson 1998). The degree of similarity to this prototype determines the category membership (Rajagopal 2004) and the evaluation of the new products (Veryzer and Hutchinson 1998). People tend to respond more favorably to objects that are highly typical and less favorably to objects that are less typical (Veryzer and Hutchinson 1998). One explanation of this positive relationship between typicality

and attitudes can be explained by perceptual fluency which increases over time, as familiarity with a stimulus increases (Loken 2007).

Form Typicality and INP /RNPs

In our context, if consumers see the less typical design of INP, they might feel ‘non-fit’ (Lee and Aaker 2004) that INP is very different from the prototype thus leading to less positive attitude toward the product than more typical design. The perceived ‘non-fit’ might come from the discrepancy between conceptual fluency and perceptual fluency. Previous findings suggest that if conceptual fluency conflicts with perceptual fluency, the perceptually cued category will influence more inferences (Gregan-Paxton et. al 2005). In this research context, perceptually cued category (less typical design) will influence more inferences, which will lead to less positive attitudes. On the other hand, if consumers see the more typical design of INP, they might perceive that INP is similar to the prototype and be able to categorize it within their prototype. This perceived ‘fit’ (Lee and Aaker 2004) by conceptual and perceptual fluency is likely to lead to more positive attitude toward the product. Therefore, we expect that the INP should be designed similar to the existing incumbent product for better consumer evaluations. On the other hand, RNP should be designed different from the existing incumbent product for the perceived ‘fit’ (Lee and Aaker 2004) and better evaluations.

H3: The degree of technological innovation moderates the relationship between form design and attitude toward the product such that in INP conditions, more typical form is likely to lead to more positive attitude toward the product than less typical form. On the other hand, in RNP conditions, less typical form vis-à-vis more typical form is likely to lead to more positive attitude than the more typical form.

Method

In exchange for extra credit, 66 undergraduate students participated in the between subject experiment in which two factors were manipulated (2 x 2 ANOVA): the degree of technological innovation (radically new product (RNP) vs. incrementally new product (INP)) and form (more typical vs. less typical). The degree of technological innovation (RNP vs. INP) was manipulated by two product descriptions (see appendix 4). Verbal product description communicated the degree of technological innovation. In RNP context, product description of a vehicle that could commute on both land and water (see Herzenstein et. al 2007) was presented. In the INP context, product description of a traditional vehicle with enhanced engine and brake power (for example, Moreau et. al 2001) was presented. The two product descriptions were constructed to be as similar to each other as possible (Moreau et. al 2001). “A vehicle that will transform your life. This is GA 3000. _____ (description of product features). This vehicle is made possible by the _____ (new technology description).” Then, based on the pre-test results, more typical form was manipulated by two different pictures of vehicles:

very similar to the traditional car design (more typical); moderately different from the traditional car design (less typical).

The subject's product evaluation was assessed by asking respondents to fill out nine seven-point scale items anchored by "I dislike it/I like it, displeasing/pleasing, not enjoyable/enjoyable, inappropriate/appropriate, undesirable/desirable, unwanted/wanted, good/bad, positive/negative and favorable/not favorable" (Maheshwaran and Chen 2006).

Pre-test results demonstrate that RNP condition (5.68) records more newness level than INP condition (4.44) [$t(1, 64)=6.44, p=.000$]. More typical form records more similarity level (6.60) to the existing ones than less typical form (1.69) [$t(1, 64)= 25.06, p=.000$].

For a degree of technological innovation pre-test, the following direction was given to the participants, "based on the above descriptions of the GA 3000, please rate how new you think it is." Then, respondents were asked to fill out two seven point scale items: (1) Not at all new / Extremely new, (2) Not a novel product / Extremely novel product. Typicality manipulation check was measured by asking, "How similar do you believe the product is to an existing vehicle? (1) Does it look like an existing vehicle? (2) Does it have a similar appearance as an existing vehicle? (3) By just looking at the design of vehicle, does it remind you an existing vehicle?" Level of typicality was assessed with seven point scale items with the following scale: Very Dissimilar / Very Similar.

Results

A two-way between group ANOVA analyses was performed to explore the impact of form and the degree of technological innovation on levels of attitude toward the product. The

main effect of form with respect to attitude was significant [$F(1, 62)=5.21, p=.026$] suggesting that more typical form leads to more positive attitude (5.44) than less typical form (4.79).

The interaction of design typicality and degree of technological innovation (RNP vs. INP) was significant with respect to attitude [$F(1, 62)=11.091, p=.001$] suggesting that the influence of design on attitude toward the product depends on whether the degree of technological innovation is high (RNP) or low (INP).

Hypothesis 3 was partially supported by the data. See Figure 3. We can see from the result that in INP condition, more typical form or when the product is designed to be similar to an incumbent product recorded more positive attitude (5.98) than less typical form (4.37) ($p=.000$). On the other hand, in RNP condition, there was no significantly different preference level between less typical form (5.20) and more typical form (4.9) ($p=.462$). The study 3 results are likely to show that the degree of technological innovation (RNP vs. INP) moderates the relationship between form and attitude toward the product such that, in INP condition, more typical form is likely to lead to more positive attitude toward the product than less typical form. On the other hand, in RNP condition, there is no significantly different preference level between more typical form and less typical form.

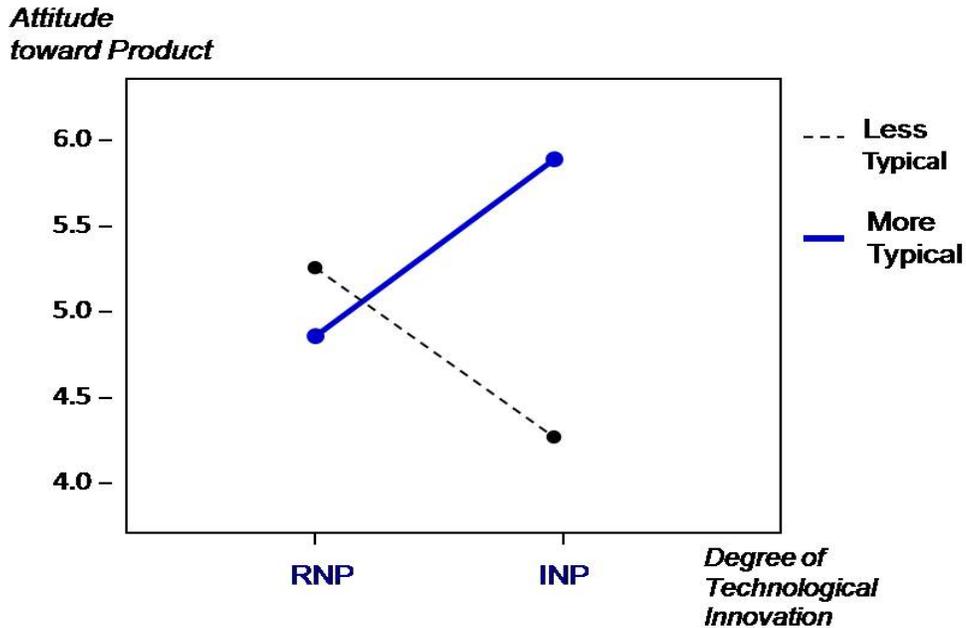


Figure 3
Representation of the Form vs. Innovation Interaction

Standard Deviation Analysis

Standard deviation is a measure of the variability or dispersion of a population, a data set, or a probability distribution. A low standard deviation indicates that the data points tend to be very close to the same value (the mean), while high standard deviation indicates that the data are spread out over a large range of values (Definition by Wikipedia). Thus, lower standard deviation of attitude in this research demonstrates that consumers are more certain of their attitudes. On the other hand, higher standard deviation means lower certainty level of attitude.

A test of homogeneity of variances was performed with the same data of study 3 to examine whether the standard deviation of attitude of each form design (more typical vs. less

typical) is different on each innovation context (INP vs. RNP). We can see from the result (please see figure 4) that in INP condition, more typical form or when the product is designed to be similar to an incumbent product recorded lower standard deviation (1.00) than less typical form (1.58) [p=.067]. On the other hand, in RNP condition, less typical form recorded lower standard deviation (0.86) than more typical form (1.07) [p=.067].

The results demonstrate that INP should be designed similar to the existing incumbent product for the reduced uncertainty level. On the other hand, RNP should be designed different from the existing incumbent product for the reduced uncertainty level.

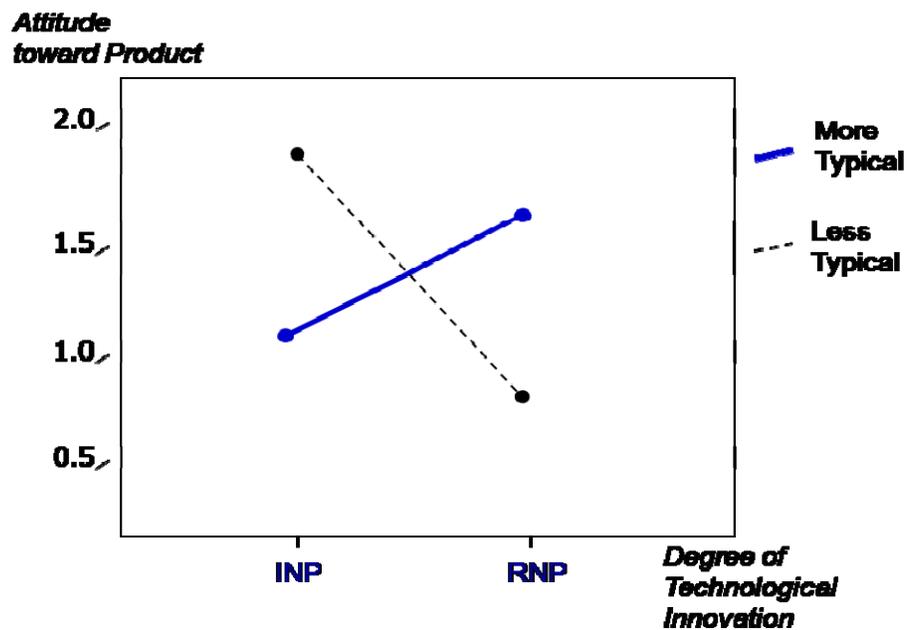


Figure 4
Representation of the Standard Deviation Analysis

Replication Study with Digital Camera

Method

In exchange for extra credit, 157 undergraduate students participated in the between subject experiment in which two factors were manipulated (2 x 2 ANOVA): the degree of technological innovation (radically new product (RNP) vs. incrementally new product (INP)) and form (more typical vs. less typical). The degree of technological innovation (RNP vs. INP) was manipulated by two product descriptions. Verbal product description communicated the degree of technological innovation. In RNP context, product description of a 3D camera was presented. In the INP context, product description of a traditional camera with improved resolution was presented (see the appendix 3). The two product descriptions were constructed to be as similar to each other as possible (Moreau et. al 2001). “Recently, _____ has been introduced to the market. _____ (description of product features). This allows the photographers to _____ (new technology description).”

Then, based on the pre-test results, more typical form was manipulated by two different pictures of cameras: very similar to the traditional camera design (more typical); moderately different from the traditional camera design (less typical). Pre-test results demonstrated that more typical design recorded higher similarity level to the existing product (6.83) than less typical design (4.25) [$t(1, 15) = 5.88, p = .000$].

The subject’s product evaluation was assessed by asking respondents to fill out nine seven-point scale items anchored by “I dislike it/I like it, displeasing/pleasing, not enjoyable/enjoyable, inappropriate/appropriate, undesirable/desirable, unwanted/wanted,

good/bad, positive/negative and favorable/not favorable” (Maheshwaran and Chen 2006). Coefficient alpha is .95 for attitude toward the product scale.

For a degree of technological innovation pre-test, the following direction was given to the participants, “based on the above descriptions of the QZ2010, please rate how new you think it is.” Then, respondents were asked to fill out two seven point scale items: (1) Not at all new / Extremely new, (2) Not a novel product / Extremely novel product (Cronbach Alpha=.80). Typicality manipulation check was measured by asking, “How similar do you believe the product is to an existing product? (1) Does it look like an existing product? (2) Does it have a similar appearance as an existing product? (3) By just looking at the design of product, does it remind you an existing product?” Level of typicality was assessed with seven point scale items including the following scale: Very Dissimilar / Very Similar (Cronbach Alpha=.879).

To investigate the underlying mechanism; how the perceptual fluency changes the consumer’s typicality evaluation, the following instructions were given to the respondents, “Please answer the following questions regarding the new product picture presented in page 2.” Then, respondents were asked to answer the following question, “1. Does it look similar to a product you already know well? (1= difficult to identify, 7= easy to identify) and 2. Is it easy to process the information in the picture? (1=difficult to process, 7=easy to process) (Cronbach Alpha = .741).” Similarly to test how the conceptual fluency changes the consumer’s innovation (RNP vs. INP) evaluation, the following instructions were given to the respondents, “Please answer the following questions regarding the new product description.” Respondents were then asked to answer the following questions, “1. According to the description, is the new product similar to a product you already know well? (1=not at all, 7=very much), 2. Does the new

product description come as you expected? (1=not at all, 7=very much), and 3. Is it easy to understand the new product description? (1=difficult to understand, 7=easy to understand) (Cronbach Alpha=.528).”

Results

A two-way between group ANOVA analyses was performed to explore the impact of form and the degree of technological innovation on levels of attitude toward the product. The main effect of form with respect to attitude was significant at the .005 p-value level [$F(1, 153)=10.93, p=.001$] suggesting that more typical form leads to more positive attitude (5.45) than less typical form (4.76). The main effect of innovation with respect to attitude was also significant at the .005 p-value level [$F(1, 153)=11.37, p=.001$] suggesting that RNP leads to more positive attitude (5.46) than INP (4.76).

The interaction of design typicality and degree of technological innovation (RNP vs. INP) was significant with respect to attitude [$F(1, 153)=4.65, p=.032$] suggesting that the influence of design on attitude toward the product depends on whether the degree of technological innovation is high (RNP) or low (INP).

The replication of study 3 was successful. See Figure 3. We can see from the result that in INP condition, more typical form or when the product is designed to be similar to an incumbent product recorded more positive attitude (5.32) than less typical form (4.17) [$t(1, 153)=3.85, p=.000$]. On the other hand, in RNP condition, there was no significantly different preference level between less typical form (5.33) and more typical form (5.58) [$t(1, 153)=.82, p=.416$]. The study 3 results are likely to show that the degree of technological innovation (RNP vs. INP) moderates the relationship between form and attitude toward the product such that, in INP

condition, more typical form is likely to lead to more positive attitude toward the product than less typical form. On the other hand, in RNP condition, there is no significantly different preference level between more typical form and less typical form.

Manipulation check results demonstrate that RNP condition (5.85) records more newness level than INP condition (4.35) [$F(1, 18)=14.4, p=.001$]. More typical form records more similarity level (6.83) to the existing ones than less typical form (4.25) [$t(1, 15)= 5.88, p=.000$]. Results of **underlying mechanism** test demonstrate that perceptual fluency affects consumer's typicality evaluation. There is a significant difference ($F(1,155)=65.94, p=.000$) between more typical and less typical condition such that more typical condition records higher ratings of perceptual fluency (6.06) than less typical condition. The result also demonstrates that conceptual fluency affects consumer's innovation evaluation. There is a significant difference ($F(1,155)=9.15, p=.003$) between INP and RNP such that INP records higher ratings of conceptual fluency (5.07) than RNP. Thus, the results of underlying mechanism test support the notion that processing fluency can be an underlying mechanism of our typicality of form and innovation effects on product evaluation.

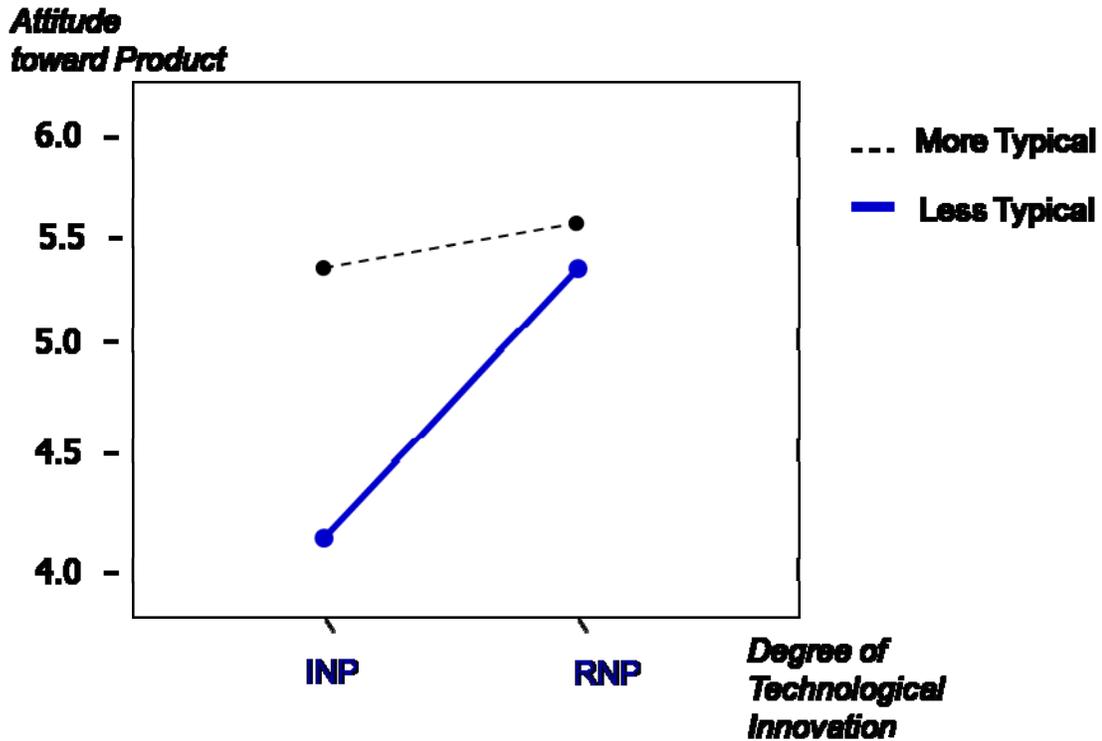


Figure 5
Representation of the Form vs. Innovation Interaction

Discussion

Study 3 results support the notion that the degree of the technological innovation moderates the relationship between form and attitude toward the product such that in INP conditions, more typical form is likely to lead to more positive attitude toward the product than less typical form. On the other hand, in RNP conditions, there is no significantly different preference level between less typical form and more typical form. The current research hypothesized typical form effects with perceptual fluency and conceptual fluency. Since consumers normally have the baseline knowledge or experience of INPs, they are more likely to use categorization-based knowledge transfer and feel conceptually fluent (Hoffler 2003; Veryzer

and Hutchinson 1998). If the design of INP is close to the incumbent product, consumers feel both conceptual and perceptual fluency leading to 'fit' and more positive attitude (Lee and Aaker 2004). If the design of INP is very different from the incumbent product, the perceived 'non-fit' is likely to lead to less positive attitude toward the product (Lee and Labroo 2004). So, consumers are likely to overvalue product designs which look closer to the incumbent products in INP innovation context. Since marketers tend to overweight the new product's benefits and adopt the innovation as status quo (Gourville 2006), our results are likely to be counterintuitive to marketers.

On the other hand, in RNP conditions, less typical form is likely to lead to as positive attitude as the more typical form toward the product. As we demonstrated in experiment, atypical form is likely to lead to less positive attitude toward the product than typical form due to the perceptual fluency effect. However, in the RNP conditions, due to the overall 'fit' effect between low conceptual fluency and low perceptual fluency, less typical form is evaluated as good as more typical form (Lee and Aaker 2004). The current research suggests that the impact of design can be bigger or smaller depending on the degree of technological innovation.

The standard deviation analysis demonstrates that INP should be designed similar to the existing incumbent product for the reduced uncertainty level and better consumer evaluations. On the other hand, RNP should be designed different from the existing incumbent product for the reduced uncertainty level and better consumer evaluations. The replication study with digital camera also shows that the interaction effects of form and technological innovation can be applied to other product categories such as digital camera.

Study 3 is different from study 2 because of the following three major points. First, whereas study 2 looks at new products of an incumbent product category which do not have innovative features, study 3 examines the innovative new products which have innovative features. Second, in study 2, the valence of function is examined. The two functionality conditions describe the same functions but different valence (high vs. low). On the other hand, in study 3, the types of new functions are examined. The two different functionality conditions are more unconventional vs. less unconventional. Third, the underlying mechanisms between study 2 and 3 are different. In study 2, the new product belongs to an existing category and the consumer judges on how good a member it is. In study 3, on the other hand, the new product doesn't belong to (although associated with) an existing category, and consumers use the associated category to learn the new product. Due to the difference in underlying mechanism, the pattern of the interaction between form and functionality is also different.

Experiment 4

Form, Degree of Technological Innovation, Technical Sophistication and Attitude

Does the moderating relationship between form and function on consumer preferences vary depending upon whether the user is a novice or an expert? Processing fluency can cast light on this perspective.

Consumers who are technologically sophisticated are less likely to be intimidated by the product complexity (Maheswaran 1994). These technologically more sophisticated consumers are likely to have more technical knowledge and differentiate the products based on their own

knowledge, attribute and stereotypical information (Alba and Hutchinson 1987; Maheswaran 1994). Since technologically more sophisticated consumers have baseline knowledge of the product, they can easily construct relation-based mappings between the base (e.g. film camera) and the target domains (e.g. digital camera) and transfer a significant amount of useful attribute- and relation-based knowledge (Moreau et. al 2001). In our context, technologically more sophisticated consumers are likely to use relation based mappings when they see the new product images and descriptions (Moreau et. al 2001). For the technologically more sophisticated consumers, knowledge transfer and perceived similarity between the base and target are likely to lead to processing fluency, which affect their evaluations of new products. Therefore, due to the processing fluency effect, we expect the same results as the hypotheses 2 for the technologically more sophisticated consumers.

On the other hand, technologically less sophisticated consumers are likely to have less technical knowledge and maybe unable to construct relational mappings (Moreau 2001). Technologically less sophisticated consumers have very few information stored in their base domain. If they see the new product images and descriptions which are not stored in their base domains, they will have difficulty mapping the new product to their base domain (Moreau 2001). At worst, technologically less sophisticated consumers may be unable to construct the attribute based mapping at all (Moreau 2001). Therefore, in our context, we expect that for technologically less sophisticated consumers, processing fluency will not affect their new product evaluations and form design doesn't matter both in RNP and INP conditions.

Moreau et al. (2001A, 2001B) also investigate the impact of innovation (innovation continuity for A and really new products for B) on consumer response. Especially, Moreau et. al

(2001A) examine the innovation continuity (continuous vs. discontinuous) on consumer's adoption decision. Since the main focus of the Moreau et. al (2001A) is to examine the relationship between form based innovation continuity and consumer adoption process in knowledge transfer paradigm, the main focus of their research is to investigate the impact of innovation continuity (continuous vs. discontinuous) on consumer adoption with primary base domain knowledge (expert vs. novice) as a moderator. Thus, the main focus of Moreau et. al (2001) is to examine the interaction between innovation continuity and primary base domain knowledge.

However, the current research examines the impact of form by examining the relationship between form and attitude toward the product with technological innovation (RNP vs. INP) as a moderator. Thus the main focus of current research is different from the Moreau et. al (2001) by examining the interaction between form, technological innovation [2 Technological Innovation (Really New Product vs. Incrementally New Product) X 2 Form (More Typical vs. Less Typical)] which makes it possible to investigate the form as a differentiation factor and compensation factor of the technological innovation. As a boundary condition, the current research also examines the technological sophistication to investigate how it affects the interaction between form and technological innovation.

H4: (a) In technologically more sophisticated condition, the degree of technological innovation moderates the relationship between form design and attitude toward the product such that in technologically more sophisticated condition, H3 result will be replicated.

(b) On the other hand, in technologically less sophisticated condition, there will be no significant difference between more typical form and less typical form both in INP and RNP conditions.

Method

In exchange for extra credit, 67 undergraduate students participated in the between subject experiment in which two factors were manipulated: the degree of technological innovation (radically new product (RNP) vs. incrementally new product (INP)) and form (more typical vs. less typical) and one factor was measured: Technological Sophistication. The degree of technological innovation (RNP vs. INP) was manipulated by two product descriptions (*see Appendix 4*). Then, based on the pre-test results, more typical (pleasing) form was manipulated by two different pictures of vehicles: very similar to the traditional car design (more typical); moderately different from the traditional car design (less typical) (*see Appendix 1*).

Consumer technological sophistication was measured by four seven-point scale items developed by Ahmed et. al (2002) – “(1) In general, I feel uncomfortable with technologically sophisticated products. (2) I can say that I do not experience difficulty in assimilating the functions of technologically sophisticated products that I use. (3) I often feel incapable of operating an appliance whose technology seems complex. (4) I do not like to find myself in a

situation where I have to use a technologically sophisticated product.” Respondents were asked to fill out four seven point scale items: “Disagree / Agree.”

The subject’s product evaluations were assessed by asking respondents to fill out nine seven-point scale items: I like it/I dislike it, pleasing/displeasing, enjoyable/not enjoyable, appropriate/inappropriate, undesirable/desirable, wanted/unwanted, good/bad, positive/negative, favorable/not favorable (Maheshwaran 2006). Coefficient alpha is .95 for attitude toward the product scale.

Results

A three-way between group ANOVA analyses was performed to explore the impact of form, the degree of technological innovation and consumer technological sophistication on levels of attitude toward the product. Hypothesis 4 was supported by the data. See Figure 3. The three way interaction of form, degree of technological innovation (RNP vs. INP) and consumer technological sophistication was significant with respect to attitude [$F(1, 59)=3.02, p=.088$] at the .1 p-value level suggesting that the influence of design and the degree of technological innovation on attitude toward the product depends on whether the consumer technological sophistication is higher or lower.

In higher technological sophistication condition, the degree of technological innovation moderates the relationship between form design and attitude toward the product such that in INP conditions, more typical form (5.41) records more positive attitude toward the product than less typical form (3.62) [$p=.001$]. In RNP conditions, there was no significantly different preference level between less typical form (5.28) and more typical form (5.25) [$p=.951$]. This is the same

results as study 3. On the other hand, in lower technological sophistication condition, there was no significantly different preference level between less typical form and more typical form both in INP [$p=.543$] and RNP [$p=.429$].

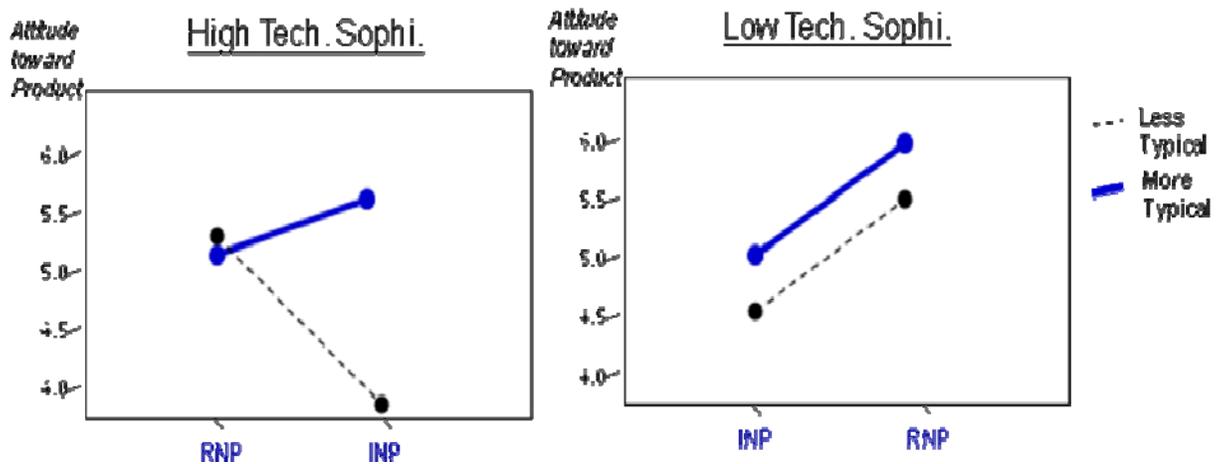


Figure 6
Representation of the Form, Innovation and Technological Sophistication Interaction

Discussion

Study 4 results support the notion that the technological sophistication moderates the relationship between form, innovation and attitude toward the product such that in higher technological sophistication, more typical form leads to more positive attitude toward the product than less typical form for INP innovation and less typical form is evaluated as good as the more typical form for RNP innovation. On the other hand, in lower technological sophistication condition, there was no significantly different preference level between less typical form and more typical form both in INP and RNP. The current research hypothesized

technological sophistication effects with processing fluency. Since technologically more sophisticated consumers are likely to have more technical knowledge, knowledge transfer and perceived similarity between the base and target are likely to lead to processing fluency, which also leads us to the same results as experiment 3.

On the other hand, technologically less sophisticated consumers are likely to have less technical knowledge and maybe unable to construct relational mappings (Moreau 2001). Technologically less sophisticated consumers have very few information stored in their base domain. Thus, they will have difficulty mapping the new product to their base domain (Moreau 2001), if they see the new product images and descriptions which are not stored in their base domains. At worst, technologically less sophisticated consumers may be unable to construct the attribute based mapping at all (Moreau 2001). Therefore, for technologically less sophisticated consumers, processing fluency does not affect their new product evaluations and form design doesn't matter both in RNP and INP conditions. Our findings demonstrate that the moderating relationship between form and function varies depending on whether the user is a novice or an expert.

Theoretical and Managerial Contribution

Norman (2004) states that product design becomes critical in a competitive market place where technology gaps between companies become smaller and companies can produce products that are similar in features, quality and price (Veryzer 1995). Thus, product design will become a key determinant of competitive advantage in a competitive market. Despite this importance of

design elements, there are few empirical studies (Chituri et. al 2007) which have examined the impact of two types of design (visceral form and functionality) on attitudes. For example, the current research demonstrates that if the design of the product is perceived as typical, the design can compensate for average functionality. Also, it has been found that products with superior functionality are hurt more when combined with atypical design.

This dissertation offers a theory-based empirical examination of design and innovation. From a theoretical perspective, this research will fill the gap of under-researched area in marketing: form-based design in innovation and provide a more systematic approach to the empirical studies of form design issues in marketing. Furthermore, this research extends the current design and innovation literatures by examining the two dimensional types of design (visceral form and functionality) and also their potential moderators such as functionality, the degree of innovativeness (RNP vs. INP) and consumer knowledge (technological sophistication). This research also extends the processing fluency literatures by finding another type of processing fluency caused by fit between perceptual fluency and conceptual fluency. Thus, this research finding implies that consumer evaluation of the new product is likely to be determined by (1) perceptual fluency, (2) conceptual fluency and (3) fit between perceptual fluency and conceptual fluency.

The managerial implications are manifold. Depending on the functionality and the degree of the technological innovation, the form of the new products should be strategically determined to increase the value of the products. While both form and functionality of the product jointly determine the consumer preferences (Rindova and Petkova 2007), our theory suggests that the degree of the technological innovation and the form of the product jointly determine the

customer assessments of the value of the new products. The findings suggest that marketing managers who deal with the incrementally new products had better follow traditional form for the better evaluations of the new products. However, managers who launch radically new products can try atypical or innovative form since consumers are not likely to penalize atypical design, which may result in a strategic freedom of innovators and “first mover advantage” in the long-run. Thus, this research demonstrates the possibility for innovating firms to influence the perceived value of the new products.

CHAPTER THREE: USING FORM DESIGN TO NULLIFY FIRST MOVER ADVANTAGE

Introduction

The pioneering advantage (or first mover advantage) has been remarkably robust both in consumer and industrial markets (Kardes and Kalyanaram 1992). “Pioneers” or “First Movers” can be defined as the first firm to sell in a new product category (Golder and Tellis 1993). Several studies have demonstrated that pioneers have long lived market share advantages and often become market leaders (Golder and Tellis 1993; Lambkin 1988; Robinson and Fornell 1985). Moreover, the pioneering advantage has been observed even when brand repositions and when consumer switching costs are low (Carpenter and Nakamoto 1989; Kardes and Kalyanaram 1992). Overall, there are two main causes of pioneering advantage (Zhang and Markman 1998). One of the major driving forces is consumer, such as cognitive processes of individual consumers (Carpenter and Nakamoto 1989; Kardes and Kalyanaram 1992; Zhang and Markman 1998). The other aspect seems to arise from the economic such as entry barriers, caused by preemptive positioning and switching costs (Lieberman and Montgomery 1988; Zhang and Markman 1998).

Despite the proliferation of the pioneering advantage research, there are few empirical studies which have targeted (1) marketing strategies that would enable the later entrants to nullify the first mover advantage (Zhang and Markman 1998 as a notable exception), and (2) psychological mechanisms that contribute to the pioneering advantage (Carpenter and Nakamoto

1989, Kardes and Gurumurthy (1992) and Kardes et. al (1993) as notable exceptions). Further, given that form design of the product is one of the important ways to gain consumer notice and important means of communicating information to consumers (Bloch 1985), design of the follower's product may contribute to the success of the follower in several ways. However, the extant research on form design of the follower's product was very rare.

To fill this gap, it is appropriate to examine how the design of the follower's product affects the follower's evaluation. More specifically, the proposed study can answer the following questions: How does form design interact with functional design for the follower's product? What type of form is more likely to enhance consumer evaluations and nullify first mover advantage when the product is featured with higher or lower functionality? In other words, what is the role of functionality in the relationship between form and preferences? Or does dissimilar form compensate for the lower functionality of the follower?

From a managerial perspective, this research provides some theoretical perspective for the marketing managers who want to use the form design of the new product as a strategic weapon to nullify the pioneer's advantage. This research implies that depending on the functionality level and form similarity, new product launch strategy needs to be different.

From a theoretical perspective, the current research can propose the theoretical model for the evaluation of the follower's products that have different functionality level (higher vs. lower) added to the different kinds of forms (similar vs. dissimilar). Much of the existing pioneering advantage literature has investigated the early entrant advantage, but few studies (Zhang and Markman 1998 as a notable exception) target strategies which would enable the later entrants to compete more successfully with the early entrants (Zhang and Markman 1998). Furthermore,

the role of the form associated with the later entrant strategy has not been examined. Thus, the proposed theoretical model extends the existing pioneering advantage literature by examining the interaction between form and functionality of later entrant's product and its impact on product evaluation.

Literature Review and Theoretical Framework

Form-Based Design

A product's form represents a number of elements chosen and blended into a whole by the design team to achieve particular sensory effects (Bloch 1995; Lewalski 1988). More specifically, form-based design is a physical form of a product and visual stimuli (appearance). Form-based design is detached from any direct practical value and develops instantaneously below the level of consciousness (spontaneous) (Lewalski 1988). For example, the form of a Harley-Davidson Sportster includes the sparkle of its chrome, the prominent V-configuration of its engine, the raked angle of its front shocks, the teardrop shape of its gas tank, the visibility of its mechanical components, and the way in which these elements work together as a visual whole (Bloch 1995).

Pioneers and Pioneering Advantage

"Pioneers" or "First Movers" are defined as "the first appearance" of a brand in "a distinctly new product" category (Golder and Tellis 1993). Thus, the term "pioneer" is used

alone to mean “market pioneer (Golder and Tellis 1993).” Pioneering brands often enjoy long-term market share advantage over follower brands (Kardes and Kalyanaram 1992). This phenomenon is called “pioneering advantage” or “early entrant advantage” and has many causes (Golder and Tellis 1993; Zhang and Markman 1998).

Some of these causes are individual consumer-based or producer-based (Golder and Tellis 1993; Zhang and Markman 1998). Consumer-based advantage is derived from the way consumers learn about the brands and form preferences about the brands (Carpenter and Nakamoto 1989; Golder and Tellis 1993). Prior research on consumer’s cognitive information processing that mediate the pioneering advantage has two streams. The first stream of research has focused on the really new product (RNP) case. In case of RNP, consumer’s preference formation process occurs when the new product’s ideal attribute combination is ambiguous (Carpenter and Nakamoto 1989; Kardes and Kalyanaram 1992). Under this condition, consumer’s learning is difficult and complex because prior knowledge is not available to provide a framework of inferences about novel product category (Kardes and Kalyanaram 1992). Thus, consumers are likely to form the preferences over time through anchoring-and-adjustment process (Kardes and Kalyanaram 1992).

Consistent with this anchoring-and-adjustment models is Carpenter and Nakamoto (1989)’s findings (Kardes and Kalyanaram 1992). Based on their learning theory, they provide three step processes which explain how consumers evaluate attributes of the pioneer brand in the product category and how the pioneer becomes the standard for the product category (Carpenter and Nakamoto 1992). .Since initially only one brand is available, the first brand has a temporary monopoly and tends to have large effect on consumer’s trial and preference (Kardes et. al 1993).

Consequently, (1) the ideal attribute combination of really new product is likely to be determined by the pioneers because consumer's prior knowledge is not available to provide the framework for the inference, (2) the pioneer becomes the standard in the product category and (3) asymmetric product comparison differentiate the pioneer from the followers which are likely to be perceived as "copy cats" (Carpenter and Nakamoto 1989; Kardes et. al 1993). This preference evolution model applied mainly for the discontinuous innovation because preference toward the discontinuous innovation is likely to be ambiguous (Kardes et. al 1993).

On the other hand, when the pioneering brand is incrementally new, preferences are much less ambiguous and previous knowledge will provide a good guideline in organizing attribute information about the pioneering brand (Kardes et. al 1993). In this case, preferences are already defined but consumers should learn about products (Kardes and Kalyanaram 1992).

Producer-based advantages are caused by the benefits derived from the economic forces such as barriers of entry, switching costs, economies of scale, learning cost and preemptive positioning (Golder and Tellis 1993; Liberman and Montgomery 1988; Zhang and Markman 1998). Another important advantage is a technological leadership. Pioneers can stay at the forefront of technology and constantly produce better products than followers (Golder and Tellis 1993).

Categorization Theory

Consumer category is defined as a set of products, services, brands, or other marketing entities, states or events that appear related in some way to the consumers (Loken et. al 2007). According to the categorization theory, consumers use categorization to assign particular

products or service to a consumer category, so that consumers can understand and draw inferences about it (Loken et. al 2007; Loken and Ward 1990; Sujan 1985).

The traditional categorization literature in marketing and psychology has mainly focused on how people organize knowledge in memory and how they classify novel objects (Cohen and Basu 1987; Loken and Ward 1990; Moreau et. al. 2001 B; Sujan and Bettman 1989; Spalding and Ross 1994). Recently, however, researchers have focused on the use of categories in making inferences or learning about new products (Gregan-Paxton and Cote 1999; Gregan-Paxton and John 1997; Moreau et. al. 2001 B; Murphy and Ross 1994) especially in inferences about ambiguous products.

In a domain based knowledge transfer, knowledge from a familiar domain (e.g. film camera) is transferred to an unfamiliar target (e.g. digital camera) in three stages: access, mapping, and transfer (Moreau 2001 A, B). If a category has been accessed, properties of that category are placed in one-to-one correspondence with properties of the target to facilitate the knowledge transfer (Moreau 2001 A, B).

In a categorization based knowledge transfer, a plausible category is provided to the consumers to suggest a new product's category membership. Then consumers are encouraged to make more extensive mappings from the category to the target than when no categorization is provided (Gregan-Paxton and Cote 1999; Moreau et. al. 2001 B). According to Moreau (2001 B), there are three reasons for this categorization effect. First, since the goal of the categorization is to maximize the within-category similarity and reduce the similarity across categories, a category label encourages people to think of the object as a whole. Second, a category label guides attention, focusing people on the features within the category while

discouraging attention to the features of other categories. Third, category labels have been shown to override feature similarity as a factor predicting the type of inferences made about missing information.

The findings of Moreau (2001B) suggest that the first plausible theory label provided to the consumer significantly influences their categorizations, expectations, and preferences. Consumers use information from multiple categories effectively only when marketers place limits on the type of information to transfer from existing category (Moreau 2001B). Similarly, in the category-based knowledge transfer stream, Gregan-Paxton et al. (2005) test whether and under what circumstances consumers might employ a multiple category strategy to generate inferences about ambiguous products.

In sum, past research in categorization has suggested that individuals can use information from multiple categories to draw inferences about ambiguous stimuli but they are unwilling to do so unless significant contextual support (e.g. limit on type of knowledge transfer, category familiarity and nature of category) is provided (Gregan-Paxton 2005).

These consumer categories can be best represented by “prototypes” or “exemplars” (Sujan 1985). The prototype view assumes that categories are represented by abstract images based on central tendency information (Loken et. al 2007; Sujan 1985). Thus, some category members are assumed to be more representative, or typical, of a category than other category members. Since the ‘similar form’ in the current research is conceptualized as the form which looks closer to the representative, the main focus of our discussion will be placed on prototype view.

Experiment

Form, Function and Willingness to Buy

Categorizations theory suggests that all categories have a prototype, which is the abstract image of the members of the category (Rosch and Mervis 1975). Then, category membership is determined by the degree of similarity to this prototype (Rosch and Mervis 1975).

Similarly, Susan (1985) demonstrates that category membership is determined by the similarity (“match”) or dissimilarity (“mismatch”) to the consumer’s prototype knowledge. In case of match, categorization will be successful and the object will be evaluated in a category based mode, which is called “category-based processing (Susan 1985).” The basic premise of the category-based processing is that people tend to categorize the world of objects for the better processing and efficient understanding of the new environments (Susan 1985). More specifically, when the new product (e.g. brand extension) is identified as belonging to a familiar category (e.g. a brand), the attitude of the familiar brand will affect the brand evaluation of the new product (Boush and Loken 1991). The category-based processing has been applied in many consumer research domains, including product category assessments (Loken and Ward 1990), product judgements (Susan 1985) and brand extensions (Boush and Loken 1991; Keller and Aaker 1992) (Goodstein 1993). On the other hand, if the new product is dissimilar or mismatches to the consumer’s prototype knowledge, categorization will not be successful and “piecemeal processing (Susan 1985)” will be evoked.

In our research context, form similarity of the follower’s new product to the pioneer’s is likely to determine the category membership since product form is one of the most important ways to gain consumer notice and important means of communicating information to consumers

(Bloch 1995). Product form design also provides visual cues with which the product is interpreted and some meanings can be attached to it (Rindova and Petkova 2007).

If the follower's new product design is similar to the pioneer's, the product design is likely to be perceived as a good match to the prototype and consumers will be engaged in "category-based processing (Susan 1985)." Then, consumers are likely to perceive the follower's new product as the same product category as the pioneer's. According to Moreau (2001A, B), if a category has been accessed, a category label encourages people to think of the object as a whole with one-to-one comparison and focuses people on the features within the category. Thus, if consumers can categorize the follower's new product based on the similar form, consumers are likely to focus more on the functionality comparison between pioneer and follower. Then, superior functionality of the follower is likely to help the follower's product be evaluated better than the pioneer's.

H1: If the form of follower's new product is similar to the pioneer's, functionality matters such that follower's new product in higher functionality condition will lead to higher willingness to buy than the follower's new product in lower functionality condition.

On the other hand, if the follower's new product design is different from the pioneer's, it is likely that consumers are engaged in "piecemeal processing (Susan 1985)." Due to the mismatch between consumer's prototype knowledge and dissimilar design of the follower's product, categorization is not likely to be successful.

Then, it is likely that follower's product will be perceived as the different product category from the pioneer's. That is, if the new product form of the follower is different from the pioneer's, consumers are not likely to learn the new product by comparing it with that of the pioneer. So, if the follower's form is dissimilar and perceived as new, it is likely that the followers' new product will be perceived as the latest innovation. Then, one-to-one comparison to facilitate the knowledge transfer is not likely to happen between pioneer's and follower's product, which will eventually discourage attention to the features of other categories (Moreau 2001 B). So, functionality of the follower is not likely to be highlighted by the comparison and receives less encoding and elaboration (Zhang and Markman 1998).

H2: If the form of the follower's new product is dissimilar to the pioneer's, functionality doesn't matter such that there will be no significant difference between higher functionality and lower functionality.

If the follower's new product design is similar to the pioneer's, the product design is likely to be perceived as a good match to the prototype and consumers will be engaged in "category-based processing (Susan 1985)." Then, consumers are likely to perceive the follower's new product as the same product category as the pioneer's and process the new information based on "memory-focused approach" (Zhao et. al 2009). Categorization theory mainly focuses on how people organize knowledge in memory and how they classify novel objects (Cohen and Basu 1987; Loken and Ward 1990; Moreau et. al. 2001 B; Sujana and Bettman 1989; Ross and Spalding 1994). So understanding how consumers process new product

information (memory-focused vs. imagination-focused) has good implications for the better understanding of the categorization and product evaluation.

If the follower's new product design is different from the pioneer's, it is likely that consumers are engaged in "piecemeal processing (Susan 1985)." Then, consumers are likely to perceive the follower's new product as the different product category as the pioneer's and "imagination-focused approach" is likely to be the major product evaluation method (Zhao et. al 2009).

Previous literatures on new product have demonstrated that visual simulation on the basis of the memory is likely to limit the mental imagery of the consumers and have a negative impact on the new product's perceived benefits (Dahl et. al 1999; Zhao et. al 2009). Consumers will have hard time capturing new product's benefits since they will narrowly focus on prior product usage patterns (Mukherjee and Hoyer 2001). However, in a new product context, if consumer's focus can be moved away from the routine and changed to the imaginative visualization, it will produce divergent thinking and positive benefits of the new product (Moreau and Dahl 2005; Zhao et. al 2009). Thus, in our context, if the consumers see the dissimilar form of the follower's product, they are likely to be engaged in imaginative and divergent thinking which will lead to better product evaluations.

H3: Follower's new products designed dissimilar to the pioneer's will lead to higher willingness to buy than the follower's new products designed similar to the pioneer's.

Pre-Test

Method

The purpose of the pre-test is 1) to choose the two product form design (similar vs. dissimilar) that would be used as a form design stimuli in the main-test questionnaire and 2) to test whether higher vs. lower functionality stimuli of the new product actually leads to higher vs. lower perceived functionality. For the form design pre-test, 31 undergraduate business students at a major southeastern university participated in the experiment designed to test the similarity and aesthetic attractiveness of the design. Subjects were provided with a questionnaire that includes brief description and picture of the new Audio PC, XIO and eight different pictures of another Audio PC, APC. The stimuli of the pioneer were developed based on Zhao, Hoeffler and Dahl (2009). Eight different pictures of APC were counter-ordered in two different kinds of questionnaires to eliminate the ordering effect. The following is a direction given to the participants, "The following pictures are designs of another Audio PC (APC). Please look at the picture and answer the questions below." Then, eight different Audio PC pictures were given to the participants.

Level of form similarity was measured by asking, "How similar do you believe the product is to XIO?" Level of similarity was assessed with three seven point scale items

including the following scale: Very Dissimilar/Very Similar: (1) Does it look like a XIO? (2) Does it have a similar appearance as a XIO? And (3) By just looking at the design of product, does it remind you a XIO? (Crombach alpha = .952)

The different level of aesthetic value of the design was measured by asking, "Please evaluate the design of the product (APC) in terms of how aesthetically attractive it is." Attitude toward the design was assessed with three seven point scale items with the following scales: (1) Displeasing / Pleasing (2) Not Favorable / Favorable (3) Unwanted/ Wanted (Holbrook 1986).

Results

The purpose is to select a pair of design that are statistically different in terms of the perceived similarity to the pioneer, but have comparable aesthetic values. Based on the average mean comparison of eight product design similarity level [1(4.55), 2(3.96), 3(4.00), 4 (3.82), 5 (1.25), 6(2.46), 7(2.21), 8(2.43)], paired comparison analysis was performed to test the similarity difference of two different designs. There was a statistically significant difference at the $p < .000$ levels for 19 pairs: 5 & 1 ($t(32) = -11.28, p = .000$), 5 & 3 ($t(32) = -8.81, p = .000$), 5 & 2 ($t(32) = -8.61, p = .000$), 5 & 4 ($t(32) = -10.42, p = .000$), 5 & 6 ($t(32) = -5.34, p = .000$), 5 & 8 ($t(32) = -5.83, p = .000$), 5 & 7 ($t(32) = -4.46, p = .000$), 7 & 1 ($t(32) = -7.28, p = .000$), 7 & 3 ($t(32) = -6.06, p = .000$), 7 & 2 ($t(32) = -6.03, p = .000$), 7 & 4 ($t(32) = -5.87, p = .000$), 8 & 1 ($t(32) = -7.13, p = .000$), 8 & 3 ($t(32) = -4.95, p = .000$), 8 & 2 ($t(32) = -4.96, p = .000$), 8 & 4 ($t(32) = -4.91, p = .000$), 6 & 1 ($t(32) = -6.85, p = .000$), 6 & 3 ($t(32) = -4.75, p = .000$), 6 & 2 ($t(32) = -4.82, p = .000$), 6 & 4 ($t(32) = -4.99, p = .000$) and significant difference at the $p < .05$ levels for 1 pair: 4 & 1 ($t(32) = -2.39, p = .023$).

Then, another paired comparison analysis was performed to test the aesthetic value of two different designs with 20 different pairs. Out of 20 pairs, 3 pairs have been chosen because there was no significant difference in aesthetic value: 5 & 8 ($t(32) = -1.31, p = .199$), 7 & 1 ($t(32) = -.104, p = .918$) and 6 & 1 ($t(32) = -.67, p = .51$).

To ensure that there is no ordering effect, all five pictures (1, 5, 6, 7 and 8) chosen were tested to determine whether there was any ordering effect (statistically significant difference between regular order and reverse order). All five different pictures didn't have any ordering effect: Picture 1. $F(1,31) = .384, p = .54$, Picture 5. $F(1,31) = .03, p = .864$, Picture 6. $F(1,31) = .112, p = .740$, Picture 7. $F(1,31) = .172, p = .681$ and Picture 8. $F(1,31) = .819, p = .372$. So, based on the pre-test, one possible pair was chosen for the followers' form design stimuli as dissimilar and similar pairs: 5 & 8 [similarity perception means 5(1.25) and 8 (2.43)].

Method

In exchange for extra credit, 69 undergraduate students in the major southeastern university participated in the experiment that is designed to test the interaction effect of form and functionality of the follower's new products.

Main-test was done during the spring semester. The main purpose of the main-test was to test whether the follower's new product should be designed similar to the pioneers or dissimilar to the pioneers in higher and lower functionality conditions for the better product evaluation.

In the classroom session, pioneer's new product (XIO) functionality description and picture were provided. Subjects first read the pioneer's product functionality and saw the picture which was same in all conditions. The headline stated "The Audio PC, XIO is the mobile

product for people on the go (Zhao, Hoffler and Dahl 2009).” The short description paralleled the headline: “The Audio PC, XIO ultra–portable notebook gives users outstanding performance in a small and light notebook. The XIO can recognize users’ handwriting and voice. So, users can revise or annotate documents whenever or wherever they want. XIO also attaches wearable eyeglass mounted monitor which provides 3D color image with QVGA resolution (Zhao, Hoffler and Dahl 2009).” After the short description, the product functionality included a list of eight features: “Biometric smart pen recognizes, stores, and converts handwritten text, Chip-based audio recorder synchronizes with handwritten notes, PDF file enhancer allows for onscreen annotation, Wearable computer attachment has eyeglass, Mounted LCD display, Lightweight (weighs about 4.5 pounds), 14” TFT screen, Intel Pentium M processor at 1.73 GHz. and Three-year limited warranty.” (Zhao, Hoffler and Dahl 2009).

Then, the description of the follower’s new product functionality (lower vs. higher) and the picture (similar vs. dissimilar) was provided. After the pioneer’s and follower’s product functionality and picture were presented, participants made product evaluations both for the follower’s and pioneer’s products (Zhang and Markman 1998). After the product evaluations, participants were asked to answer some personal trait measures such as motivation, innovativeness, need for cognition and knowledge (Carpenter and Nakamoto 1989).

On the main-test, a between subject experiment was conducted in which two factors were manipulated (2 x 2 ANOVA): functionality of the follower’s new product (lower vs. higher) and design of the follower’s new product (similar vs. different). Functionality (lower vs. higher) was manipulated by two different new product descriptions: Audio PC functionalities (Zhao, Hoffler and Dahl 2009). Following Zhao, Hoffler and Dahl (2009), we included three components in

product functionality descriptions: the headline, a short description of the product and a set of product features. The headline stated “The APC is the mobile product for people on the go.” The short description paralleled the headline: “The APC ultra-portable notebook gives users outstanding performance in a small and light notebook. The APC can recognize users’ handwriting and voice. So, users can revise or annotate documents whenever or wherever they want. APC also attaches wearable eyeglass mounted monitor which provides 3D color image with QVGA resolution (Zhao, Hoffler and Dahl 2009).”

After the short description, the product functionality included a list of eight features (four were common features and four were distinctive features) (Zhao, Hoffler and Dahl 2009). For the higher functionality condition, the product functionality included lighter weight, bigger screen size, faster speed and longer warranty period: Biometric smart pen recognizes, stores, and converts handwritten text, Chip-based audio recorder synchronizes with handwritten notes, PDF file enhancer allows for onscreen annotation, Wearable computer attachment has eyeglass-mounted LCD display, Lightweight (weighs about 2.5 pounds), 20” TFT screen, Intel Pentium M processor at 4.52 GHz and Ten-year limited warranty. For the lower functionality condition, the product functionality included the heavier weight, smaller screen size, slower speed and shorter warranty period: Biometric smart pen recognizes, stores, and converts handwritten text, Chip-based audio recorder synchronizes with handwritten notes, PDF file enhancer allows for onscreen annotation, Wearable computer attachment has eyeglass-mounted LCD display, Lightweight (weighs about 4.4 pounds), 14” TFT screen, Intel Pentium M processor at 1.74 GHz and Three-year limited warranty.

Then the follower's product design was manipulated by two different pictures of the Audio PC: similar to the pioneer's (similar form); moderately different from the pioneer's (dissimilar form). Based on the pre-test result, one pair of the similar and dissimilar form was selected. The subject's 'willingness to buy' and 'willingness to try' were measured by scales developed by Hertenstein (2005) and Veryzer (1993): How likely are you to buy the product? (1) It is likely that I will buy the product, (2) I will purchase it the next time I need a product and (3) I will definitely try the product (1= "disagree" and 7= "agree") (Cronbach's alpha =.873). How likely are you to try this product? (1) If I were in the market to buy an Audio PC, I would try this new product, (2) If I were in the market to buy an Audio PC, I would consider this new product for purchase and (3) If I were in the market to buy an Audio PC, this new product would be in my consideration set of Audio PCs (Cronbach's alpha =.943).

The subject's attitude toward the product was assessed by asking respondents to fill out following three seven-point scale items (1= "bad" and 7= "very good", 1= "unsatisfactory" and 7= "satisfactory", and 1= "Unfavorable" and 7= "Favorable") (Cronbach's alpha =.910) (Zhang and Markman 1998) and five seven-point scale items (1= "unappealing" and 7= "appealing", 1= "unpleasant" and 7= "pleasant", 1= "unattractive" and 7= "attractive", 1= "boring" and 7= "interesting" and 1= "dislike" and 7= "like") (Cronbach's alpha =.906) (Li et. al 2002).

For a pioneer and follower manipulation check, the following was given to the participants, "which of the following was the first entrant in Audio PC market? Please check the blanks" and "which of the following was the later entrant in Audio PC market? Please check the blanks" (A. _____XIO, B. _____APC). Product design manipulation check was measured by asking, "Does the product design of the APC look similar to the XIO? (1=similar, 7=dissimilar)."

Functionality manipulation check was assessed by asking, “Based on the above functional descriptions of the APC (later entrant), please rate how good you think APC is compared with the XIO (first entrant) (1=similar, 7=much better).”

To investigate the underlying mechanism; how the categorization theory affects the consumer’s product evaluation, the following question was given to the respondents, “Do you perceive that product APC belongs to the same product category as the product XIO? (1=same product, 7=very different product).”

After the product evaluation, manipulation check and underlying mechanism check, participants’ motivation, familiarity to the product, innovativeness, need for cognition (Cacioppo, Petty, and Kao 1984) and knowledge were measured as possible covariates.

Results

A two way between group ANOVA analyses was performed to explore the impact of the follower’s form and functionality on levels of willingness to buy. Since the main purpose of this study is how the followers can use the form design to nullify the pioneering advantage, participant’s right distinction between pioneer and follower in the experiment is the most basic and critical factor which will affect the results of this study. So, based on the manipulation check which was given to the participants, “which of the following was the first entrant in Audio PC market? Please check the blanks” and “which of the following was the later entrant in Audio PC market? Please check the blanks” (A. _____XIO, B. _____APC), five data points which failed to identify the XIO as a pioneer and APC as a follower were deleted for the analyses.

The main effect of the functionality with respect to the willingness to buy was significant at the .05 p-value level [$F(1, 60)=6.00, p=.017$] suggesting that higher functionality of the follower's new product leads to higher willingness to buy than similar functionality. The interaction of form and functionality of the follower's new product was significant with respect to the willingness to buy at the .01 p-value level [$F(1,60)=7.24, p=.009$] suggesting that the influence of the design of the follower's new product depends on whether the degree of the functionality is lower or higher.

Hypothesis 1 was supported by the data. See Figure 7. We can see from the result that in similar design condition, higher functionality recorded higher willingness to buy (4.23) than the lower functionality (2.36) [$t(1,63)=4.27, p=.000$]. If the follower's new product design is similar to the pioneer's, higher functionality of the follower's product leads to higher willingness to buy than the lower functionality. This finding replicates the Zhang and Markman (1998)'s findings which demonstrate that later entrants which have superior attributes are more likely to be preferred. On the other hand, in dissimilar design condition of the follower's new product, there was no significant difference level between lower functionality and higher functionality [$t(1,63)=0.15, p=.88$]. In other words, if the follower's new product design is dissimilar to the pioneer's, there will be no significant difference of consumer's willingness to buy between higher functionality and lower functionality of the follower's. So, hypothesis 2 was also supported by the data. The study results show that there is an interaction effect between form and function such that, in similar design condition, higher functionality leads to higher willingness to buy than similar functionality. On the other hand, in dissimilar design condition, there is no significantly different willingness to buy between lower functionality and higher

functionality. This pattern of results establishes a boundary condition for the finding in the Zhang and Markman (1998). This research extends the Zhang and Markman (1998) by demonstrating that if the follower's product design is dissimilar to the pioneer's, lower functionality is evaluated as good as the higher functionality.

A hypothesis 3 was partially supported by the data. See Figure 7. Follower's new product designed dissimilar to the pioneer's (3.17) leads to marginally higher level of willingness to buy than product designed similar to the pioneer's (2.36) in lower functionality condition [$t(1,63)=1.72, p=.098$] at the .1 p-value level. However, in higher functionality condition, follower's new product which is similar to the pioneer (4.23) leads to higher willingness to buy than the product which is dissimilar to the pioneer (3.08) [$t(1,63)=2.27, p=.042$].

Manipulation check results demonstrated that higher functionality condition recorded higher perceived functionality level (5.13) than lower functionality condition (2.58) [$F(1, 60)=40.79, p=.000$]. Dissimilar product design records higher perceived dissimilarity level (6.22) than similar product design (4.97) [$F(1, 60)=15.02, p=.000$]. The result of the process measure also demonstrated that similar product design is perceived as more similar product category (2.29) than the dissimilar product design (2.88) [$F(1, 62)=2.82, p=.098$] at the .1 p-value level.

The main effect and interaction effect of form and functionality with respect of other dependent variables (attitude toward the product 1, 2 and willingness to try) were also tested. The main effect of the form and functionality with respect to the attitude toward the product 1 was not significant at the .05 p-value level: form [$F(1, 60)=1.881, p=0.175$] and functionality [$F(1, 60)=1.857, p=0.278$]. The interaction effect of the form and functionality with respect to the

attitude toward the product 1 was not significant either at the .05 p-value level [F (1, 60)=1.033, p=0.314].

The main effect of the form with respect to the attitude toward the product 2 was marginally significant at the .1 p-value level [F (1, 60)=3.949, p=0.051] such that similar design recorded more positive attitude toward the product (4.34) than dissimilar design (3.62). The main effect of the functionality with respect to the attitude toward the product 2 was not significant at the .05 p-value level [F (1, 60)=1.504, p=0.225]. The interaction effect of the form and functionality with respect to the attitude toward the product 2 was not significant either at the .05 p-value level [F (1, 60)=2.344, p=0.131].

The main effect of the form with respect to the willingness to try was not significant at the .05 p-value level [F (1, 60)=1.047, p=0.310]. The main effect of the functionality with respect to the willingness to try was marginally significant at the .1 p-value level [F (1, 60)=3.473, p=0.067] such that higher functionality recorded higher willingness to try (4.58) than the lower functionality (3.80). The interaction effect of the form and functionality with respect to the willingness to try was also significant at the .05 p-value level [F (1, 60)=5.715, p=0.02]. The result was consistent with that of willingness to buy such that in similar design condition, higher functionality recorded higher willingness to try (5.29) than lower functionality (3.51) [F (1, 63)=2.96, p=0.004]. On the contrary, in dissimilar design condition, there was no significant difference between higher functionality and lower functionality [F (1, 63)=0.379, p=0.706].

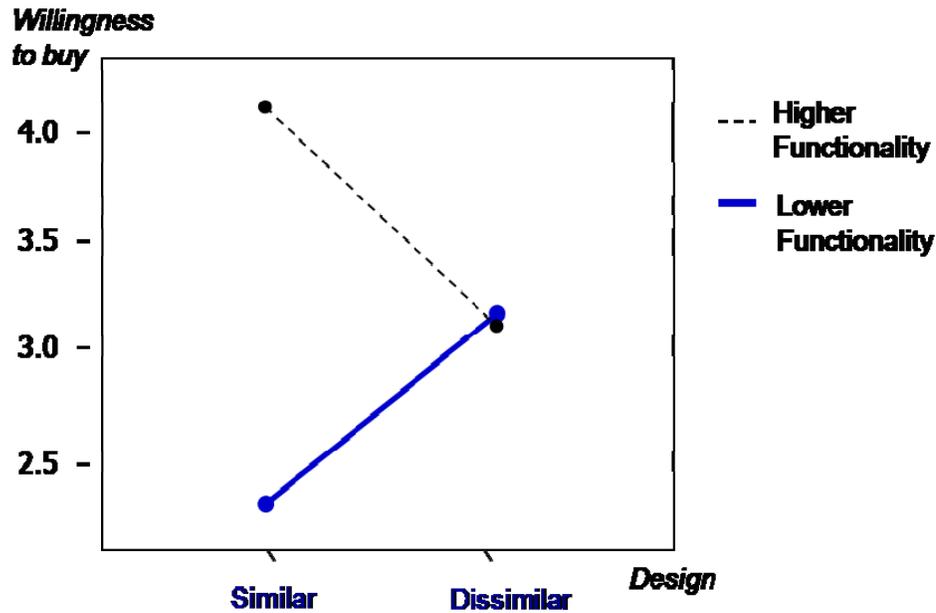


Figure 7
Representation of the Form vs. Function Interaction of the Follower

Discussion

Main study results support the notion that there is an interaction effect between form and function such that in similar design conditions, higher functionality leads to higher willingness to buy than lower functionality. On the other hand, in dissimilar design condition, there is no significantly different willingness to buy level between higher functionality and lower functionality. In other words, if the follower’s new product design is similar to the pioneer’s, higher functionality of the follower leads to higher consumer’s willingness to buy. However, if the follower’s new product design is different from the pioneer’s, even follower’s lower functionality leads to as high level of consumer’s willingness to buy as higher functionality.

This finding implies that followers had better focus on higher functionality to differentiate the product from the pioneer's and to penetrate into the existing market if the follower's new product design is similar to the pioneer's. If the follower's new product design is similar to the pioneer's, the product design is likely to be perceived as good match to the prototype and consumers will be engaged in "category-based processing (Susan 1985)." Then, consumers are likely to perceive the follower's new product as the same product category as the pioneer's and superior functionality of the follower will help the follower's product be evaluated better than the pioneer's.

On the other hand, if the follower's new product design is different from the pioneer's, it is likely that consumers are engaged in "piecemeal processing (Sujan 1985)." Due to the mismatch between consumer's prototype knowledge and dissimilar design of the follower's product, categorization is not likely to be successful and the follower's product will be perceived as the different product category from the pioneer's. So, as long as the design is dissimilar and perceived as new, functionality doesn't matter. Even lower functionality of the follower's product leads to as high willingness to buy as the higher functionality in dissimilar design condition. In other words, dissimilar design of the follower can compensate for the lower functionality of the follower. In lower functionality condition, dissimilar design of the follower leads to moderately higher willingness to buy than the similar design. In other words, if the follower's new product functionality is not superior to the pioneer's, follower had better differentiate the new product design from the pioneer to lead to higher willingness to buy of the consumers.

Due to the entry barriers, it is likely that follower doesn't have as much resources and technology as the pioneer (Carpenter and Nakamoto 1989). In this case, dissimilar design of the follower can play some role of differentiation point of the follower and compensate for the lower functionality of the follower. So, if the followers don't have higher functionality of the new products due to the entry barriers, it is likely that they had better focus on design differentiation which can compensate for the lower functionality of the followers and lead to higher willingness to buy of the consumers. In turn, it is likely that consumer's higher willingness to buy for the dissimilar design product in lower functionality condition helps followers penetrate into the existing market.

If the follower's functionality is higher, follower's new product design had better follow the pioneer's. It is likely that if the follower's new product design is similar to the pioneer's, consumers will be engaged in "comparison-based learning (Zhang and Markman 1998)," and perceive the follower's product category as the same product category as the pioneer's. Then, functionality comparison is likely to be the major factor which will determine the consumer's willingness to buy. So, if the follower's new product has higher functionality than the pioneer's, followers had better follow the pioneer's design which will lead to higher willingness to buy of the consumers.

Theoretical and Managerial Contribution

The pioneering advantage has been robust both in consumer and industrial markets (Kardes and Kalyanaram 1992) and several studies in marketing and management literatures have demonstrated that pioneers have advantages over the followers (Golder and Tellis 1993;

Lambkin 1988; Robinson and Fornell 1985). Despite the robust findings of the pioneering advantage researches, there are few empirical researches which have focused on marketing strategies that enable the late entrants to nullify the pioneering advantage (Zhang and Markman 1998 as a notable exception) and psychological mechanisms that contribute to the pioneering advantage (Carpenter and Nakamoto 1989, Kardes and Gurumurthy (1992) and Kardes et. al (1993) as notable exceptions). Further given the importance of the design elements of new products, empirical studies which focused on form design of the follower were very rare. This dissertation offers a theory-based empirical examination of the form and functionality interaction of the follower's new product and its impact on follower's new product evaluation.

From a theoretical perspective, this research fills the gap of under-researched area in pioneering literature and provides a theoretical model for the form and functionality interaction of follower's product. More specifically, this research (1) introduces the form design in pioneering advantage literature to examine the interaction with the functionality, (2) fills the gap of marketing strategies that would enable the later entrants to nullify the first mover advantage and (3) fills the gap of under researched area of psychological mechanisms that contribute to the pioneering advantage. Further, this research extends the Zhang and Markman (2008) and provides the boundary condition. Zhang and Markman (2008) demonstrate that later entrants which have superior attributes are more likely to be preferred. But the findings of this research show that as long as the design of the follower is different from the pioneer's, even lower functionality is evaluated as good as the higher functionality.

From a managerial perspective, this research provides some theoretical perspective for the marketing managers who want to use the form design of the new product as a strategic weapon to nullify the pioneer's advantage. This research implies that depending on the functionality level, new product launch strategy needs to be different. If the follower's functionality is not superior to the pioneer's, followers had better focus on design differentiation which can compensate for the lower functionality of the followers and lead to higher willingness to buy of the consumers. In other words, as long as the follower's new product design is different from the pioneer's, even follower's lower functionality leads to as high level of consumer's willingness to buy as higher functionality. On the other hand, if the follower's functionality is superior to the pioneer's, follower had better follow the pioneer's design which will lead to higher willingness to buy of the consumers. Thus, this research demonstrates the possibility for the follower to nullify the pioneering advantage by product design strategy.

APPENDIX
IRB APPROVAL LETTER



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Notice of Exempt Review Status

From: **UCF Institutional Review Board**
FWA00000351, Exp. 5/07/10, IRB00001138

To: **Sangwon Lee, MBA**

Date: **April 09, 2008**

IRB Number: **SBE-08-05629**

Study Title: **Design and Innovation**

Dear Researcher:

Your research protocol was reviewed by the IRB Vice-chair on 4/9/2008. Per federal regulations, 45 CFR 46.101, your study has been determined to be **minimal risk for human subjects and exempt** from 45 CFR 46 federal regulations and further IRB review or renewal unless you later wish to add the use of identifiers or change the protocol procedures in a way that might increase risk to participants. Before making any changes to your study, call the IRB office to discuss the changes. **A change which incorporates the use of identifiers may mean the study is no longer exempt, thus requiring the submission of a new application to change the classification to expedited if the risk is still minimal.** Please submit the Termination/Final Report form when the study has been completed. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

The category for which exempt status has been determined for this protocol is as follows:

2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures, or the observation of public behavior, so long as confidentiality is maintained.
 - (i) Information obtained is recorded in such a manner that the subject cannot be identified, directly or through identifiers linked to the subject, **and/or**
 - (ii) Subject's responses, if known outside the research would not reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or reputation.

A **waiver of documentation of consent** has been approved for all subjects. Participants do not have to sign a consent form, but the IRB requires that you give participants a copy of the IRB-approved consent form, letter, information sheet, or statement of voluntary consent at the top of the survey.

All data, which may include signed consent form documents, must be retained in a locked file cabinet for a minimum of three years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained on a password-protected computer if electronic information is used. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

On behalf of Tracy Dietz, Ph.D., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 04/09/2008 09:20:44 AM EDT

IRB Coordinator

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