

HAVE YOU SEEN THE NEW MODEL?  
VISUAL DESIGN AND PRODUCT NEWNESS

---

A Dissertation  
presented to  
the Faculty of the Graduate School  
University of Missouri-Columbia

---

In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Philosophy

---

by

Scott K. Radford

Dr. Peter Bloch, Dissertation Supervisor

May 2007

The undersigned, appointed by the dean of the Graduate School, Have examined the  
dissertation entitled

HAVE YOU SEEN THE NEW MODEL?

VISUAL DESIGN AND PRODUCT NEWNESS

presented by Scott K. Radford

a candidate for the degree of doctor of philosophy,

and hereby certify that, in their opinion, it is worthy of acceptance.

---

Peter Bloch, Professor of Marketing

---

Srinivasan Ratneshwar, Bailey K. Howard  
World Book Chair of Marketing and  
Chair, Department of Marketing

---

Mark Houston, David and Judy O'Neal  
MBA Professor and Associate Professor  
of Marketing

---

Suraj Commuri, Assistant Professor of  
Marketing

---

Benyamin Schwarz, Professor of  
Architectural Studies

This work is dedicated to my wife Wendy.  
Without her love, support, and  
encouragement I would never have been  
able to achieve this goal.

## ACKNOWLEDGEMENTS

I would like to thank the members of the marketing faculty at the University of Missouri and in particular the members of my dissertation committee: Ratti Ratneshwar, Mark Houston, Suraj Commuri, and Benyamin Schwarz. I have been fortunate to have such a strong committee of scholars and their guidance and mentoring has been instrumental in the success of this project.

I would especially like to thank my dissertation chair Peter Bloch, for his valuable advice, his enthusiasm for the topic, and the opportunities that he has provided me to work with him. I feel that he has become both a mentor and friend and I cannot imagine that I would have been as successful in the doctoral program had I not had the opportunity to learn from such a valuable role model.

I would like to acknowledge the help that I received from Mike Holden and Kenneth Green in Technology Services for their valuable assistance in designing and implementing the web based survey instruments and Linda Paul for her tireless assistance with the electronic enrollment system.

I would also like to thank my fellow doctoral students, who provided some of their own valuable time to assist me in completion of this project.

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS.....</b>	<b>ii</b>
<b>INDEX OF TABLES.....</b>	<b>vi</b>
<b>INDEX OF FIGURES.....</b>	<b>vii</b>
<b>ABSTRACT .....</b>	<b>viii</b>
<b>CHAPTER 1 – INTRODUCTION.....</b>	<b>1</b>
Research Objectives .....	3
Contribution.....	4
Chapter Summary .....	6
<b>CHAPTER 2 – LITERATURE REVIEW.....</b>	<b>7</b>
Introduction .....	7
Related Constructs.....	7
Creativity .....	7
Modernity .....	8
Invention.....	9
Innovation and Innovativeness .....	10
Newness.....	11
Operationalization of Newness and Innovation.....	12
The Importance of Visual Design to Product Innovation .....	15
The Communication of Newness.....	17
Primacy of Visual Appearance .....	19
Aesthetics and Psychobiology .....	21
Mere-exposure .....	22
Nonconscious Processing .....	24
Universal and Cultural Archetypes.....	25
Responses to Product Newness .....	28
Emotional Response .....	28
Aesthetic Impression.....	29
Semantic Interpretations .....	31
Symbolic Association .....	33
Summary.....	33
Chapter Summary .....	34
<b>CHAPTER 3 – THEORETICAL MODEL.....</b>	<b>35</b>
Introduction .....	35
Theoretical Model .....	35
Visual Characteristics of the Product.....	38
Newness Appraisal .....	39
Responses to Visual Product Newness .....	41
Context Effects.....	42
Marketing Variables .....	42
Cultural and Social Influences.....	43
Industry Factors .....	44
Individual Differences .....	44
Consumer Innovativeness.....	45
Design Acumen .....	47
Need for Uniqueness.....	50
Chapter Summary .....	52

<b>CHAPTER 4 – NEWNESS PRODUCT SORT.....</b>	<b>54</b>
Introduction .....	54
Study 1A .....	55
Bicycles .....	56
Espresso Machines.....	56
Toasters.....	57
Hand Vacuums.....	58
Stimulus Reduction .....	58
Materials .....	58
Expert Ratings .....	59
Stimuli .....	60
Participants .....	60
Procedure.....	61
Analysis.....	62
Bicycles .....	63
Espresso Makers .....	64
Toasters.....	65
Hand Vacuums.....	66
Multidimensional Scaling.....	67
Bicycles .....	77
Espresso Makers .....	78
Toasters.....	81
Hand Vacuums.....	82
Study 1B.....	84
Stimulus Selection .....	85
Stimuli .....	86
Procedure.....	86
Analysis.....	87
Descriptive Statistics.....	87
Multidimensional Scaling.....	89
Toothbrushes.....	92
Pens.....	93
Sorting Descriptions .....	94
Organizing Strategies.....	95
Structure of Consumers’ Aesthetic Response.....	96
Nonconscious Processing Algorithms .....	98
Chapter Summary .....	99
<b>CHAPTER 5 – PRODUCT ATTRIBUTE ELICITATION .....</b>	<b>100</b>
Introduction .....	100
Stimuli .....	101
Participants .....	102
Procedure.....	103
Measures.....	104
HLM (Mixed Model) Analysis.....	106
Inter-rater reliability.....	106
Results .....	108
Model Selection .....	109
Chapter Summary .....	113

<b>CHAPTER 6– CONSUMER RESPONSE TO VISUAL PRODUCT NEWNESS .....</b>	<b>115</b>
Introduction .....	115
Pretest 1 .....	115
Stimulus Selection .....	116
Procedure .....	117
Pretest 2 .....	117
Method.....	118
Participants .....	118
Procedure .....	119
Measures .....	121
Dependent Variable.....	121
Independent Variable .....	126
Moderating Variables.....	126
Innovativeness .....	126
Design Acumen.....	127
Desire for Unique Consumer Products .....	128
Manipulation Check .....	128
Results .....	131
Interaction Effects.....	135
Chapter Summary .....	143
 <b>CHAPTER 7 - DISCUSSION AND FUTURE RESEARCH.....</b>	<b>145</b>
Introduction .....	145
Summary of Key Findings.....	145
Contribution.....	148
Limitations and Future Research .....	150
Conclusion.....	157
 <b>REFERENCES .....</b>	<b>158</b>
 <b>VITA.....</b>	<b>188</b>
 <b>APPENDICES .....</b>	<b>189</b>

## INDEX OF TABLES

Table 1: Descriptive Statistics Bicycles Sorting Task .....	64
Table 2: Descriptive Statistics Espresso Makers Sorting Task.....	65
Table 3: Descriptive Statistics Toasters Sorting Task .....	66
Table 4: Descriptive Statistics Hand Vacuums Sorting Task .....	67
Table 5: Bicycles Ordinal Distance Ranks .....	69
Table 6: Espresso Makers Ordinal Distance Ranks.....	70
Table 7: Toasters Ordinal Distance Ranks.....	71
Table 8: Hand Vacuums Ordinal Distance Ranks .....	72
Table 9: Non-metric Multidimensional Scaling Fit indices.....	73
Table 10: Descriptive Statistics Toothbrushes Sorting Task .....	87
Table 11: Descriptive Statistics Pens Sorting Task .....	88
Table 12: Toothbrushes Ordinal Distance Ranks .....	90
Table 13: Pens Ordinal Distance Ranks.....	91
Table 14: Inter-rater Reliability .....	107
Table 15: Results of Hierarchical Linear Estimation – Emotion.....	110
Table 16: Results of Hierarchical Linear Estimation - Aesthetic .....	111
Table 17: Results of Hierarchical Linear Estimation - Semantic .....	112
Table 18: Results of Hierarchical Linear Estimation - Symbolic .....	113
Table 19: Positive and Negative Comments from Attribute Elicitation Task .....	116
Table 20: Dependent Variables for Final Study Results of Pretest 1 .....	123
Table 21: Correlation of Study 3 Variables .....	125
Table 22: Manipulation Check ANOVA Model Fit .....	130
Table 23: Manipulation Check Means of Trendiness at Different Factor Levels.....	130
Table 24: Post Hoc Analysis of Manipulation Check.....	131
Table 25: Results of ANOVA Model Fit For Dependent Variables.....	132
Table 26: Mean of Affect.....	133
Table 27: Post hoc Comparisons of Affect.....	134
Table 28: Regression Model Fit.....	137
Table 29: Regression Coefficients .....	139
Table 30: Regression Model Fit Cognitive and Sensory Innovativeness .....	140
Table 31: Regression Coefficients Cognitive and Sensory Innovativeness.....	141

## INDEX OF FIGURES

Figure 1: Booz-Allen & Hamilton Product Innovation Matrix .....	13
Figure 2: Conceptual Model .....	37
Figure 3: MDS Plots of Disparity and Linear Fit .....	74
Figure 4: Bicycles Multidimensional Scaling.....	77
Figure 5: Espresso Maker Multidimensional Scaling.....	80
Figure 6: Toaster Multidimensional Scaling.....	82
Figure 7: Hand Vacuum Multidimensional Scaling .....	83
Figure 8: MDS Plots of Disparity and Linear Fit – Toothbrushes and Pens .....	89
Figure 9: Toothbrushes Multidimensional Scaling.....	92
Figure 10: Pens Multidimensional Scaling.....	94

HAVE YOU SEEN THE NEW MODEL?  
VISUAL DESIGN AND PRODUCT NEWNESS

Scott K. Radford

Dr. Peter Bloch, Dissertation Supervisor

**ABSTRACT**

Firms must continually innovate to successfully meet both consumer needs and competitive pressures. Previous investigations of innovation have examined this construct solely from the firms' perspective and only minimal work has examined how consumers evaluate product newness. Consumers' adoption of an innovation is central to marketing and understanding the way that consumers react to new products will be the focus of this dissertation. Specifically, this work explores the changes in visual form that signal newness and the reactions engendered by the product. Three studies were undertaken to explore the construct and test several a priori hypotheses: a sorting task, an attribute elicitation, and a between-subjects experiment. The research revealed that consumers were capable of identifying product newness from visual form alone, however, they were not always certain of the reasons that they made these judgments. It was also clear that different levels of newness tended to elicit different responses, and generally, higher levels of newness received more positive evaluations by the consumers.

## CHAPTER 1 – INTRODUCTION

“Our society is quite preoccupied with The New, and much of its vitality stems from its pursuit of The New. Society seems to equate newness with progress, either rightly or wrongly.” (Jones 1962, p. 244)

There is something about new products that excite us. We line up for hours (or even days) to be the first to see the latest Harry Potter film or to buy the latest generation video game system. Every year, thousands of consumers travel to auto shows to glimpse the newest product vehicles and cutting edge concept cars. In fashion, hundreds of magazines, runway shows, and television programs attempt to quench consumers desire to see the newest clothing styles.

Consumers continually seek new products and it is important that marketers appeal to this desire for the new. Not only must a product have new features, it must also look new. To gain attention, the product must be visually arresting and stand out in a crowd. The visual design of the product signals the newness to the consumer in the most efficient manner. While it has been recognized that the adoption of innovations is an important domain of marketing research, there is little work that attempts to understand the visual characteristics of products that consumers perceive as new. The way that consumers recognize and demand newness is of particular interest to marketers because consumption decisions will often be driven by this desire for ‘new and improved’ models. The degree of newness, as it is perceived by the consumer, is therefore central to a product’s success, and understanding the controllable dimensions of product design that facilitate the communication of newness is a vital, yet understudied, area in marketing.

Consumers are continually seeking new products, services, and experiences, and the success of a firm is dependent on its capacity to innovate (Booz Allen Hamilton 1982). Due to increasing technology and industrialization, the demand for new products has further intensified. Firms must continually innovate, not only to prosper, but also to survive (Ali 2000). Corporations such as Apple, Target, and Motorola have recognized that superior design is a key determinant of product success and marketing scholars are beginning to explore the importance of visual design and its impact on consumer preferences (e.g., Bloch 1995; Leder and Carbon 2005; Veryzer and Hutchinson 1998). Despite this recent research, the visual design of the product is still a secondary concern in the innovation literature. Consumers rarely buy a product without seeing it, yet, research on new product adoption virtually ignores visual form, and focuses instead on dimensions such as verbal descriptions (Hoeffler 2003), signaling (Boulding and Kirmani 1993), and learning effort (Atuahene-Gima 1995). The newness of a product is strongly communicated through its design and visual product newness (VPN) is a primary determinant of new product adoption.

Past work in innovation simply assumes that consumers will perceive a firm-produced innovation as new. However, fundamental to the success of any innovative product is the way that it is perceived by the target market. An innovation is new as long as the buyer perceives it as such - newness is in the eye of the consumer (Johannessen, Olsen, and Lumpkin 2001; Rogers and Shoemaker 1971). This is best summarized by Rogers (2003, p. 12) who stated that: "An innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption." This statement provides the

basis for this dissertation; which is an examination of consumers' perception of visual product newness.

The adoption of new products is intimately tied into the attribution of newness by the buyer and, therefore, understanding consumer perceptions of product newness is of central importance to marketing success. Even though the marketing concept dictates the importance of a consumer focus, consumer perceptions of innovations have either been ignored or deemed as unimportant in past innovation research (Barksdale and Darden 1971; Garcia and Calantone 2002). Recent studies on innovation have taken a company focus, addressing such issues as product performance (Atuahene-Gima 1995), the new product development process (Veryzer 1998b) and company characteristics that facilitate adoption (Chandy and Tellis 2000; Garcia and Calantone 2002). This dissertation will address this gap in the literature by more fully exploring the concept of newness, a construct that must specifically be investigated from the consumer perspective, and will focus on the importance of product design as it influences product newness perceptions.

### **Research Objectives**

New product introductions are risky, by some estimates, more than 50% of new products fail in the marketplace (Ogawa and Piller 2006). Innovation alone is not a panacea for firm success and research on buyer needs and consumer reactions to product form can mitigate some of this risk. Therefore, this research therefore explores visual product newness perceptions and seeks to understand some of the specific characteristics of visual form that underlie these perceptions. Moreover, because product preferences are subjective, consumers' interpretations of visual product stimuli vary. This research also

explores variations in individual differences on some known psychological variables that are specifically related to innovation and product perception.

In summary, the specific research objectives for this dissertation are as follows:

1. To provide a conceptual foundation based on the literature on aesthetics, new product development, and the diffusion of innovations to explain the role of visual aesthetics in consumer perceptions of newness.
2. To examine the effects of visual form on consumer perceptions of product newness.
3. To test the effects of visual product newness on consumer's preferences for new products.
4. To determine when and how individual differences moderate consumer reactions to newness perception.

### **Contribution**

Innovation researchers have long argued that the consumer is of central importance to the adoption of innovations. However, in empirical studies, there is a bias towards the firm. The consumer's willingness to adopt innovations is critical to firm success, but has only received a small amount of empirical attention in the literature. Understanding why consumers are drawn to certain product forms will help firms better understand consumers' needs and create products that fulfill these needs.

Buyers use visual cues as a means of inferring product attributes, including newness, and exploring the way that visual design signals newness is increasingly important. While the product cannot be separated from its form, the majority of research on consumers' perception of newness seems to do exactly this. Most studies in this area have divorced the visual form from the verbal descriptions and specifications of the product. Yet, without a firm grasp of the visual dimensions that influence adoption, firms may be 'flying blind' when they design new products. Although the form of a product is

a central component of consumers' decision making, the research on visual design in marketing is still in its infancy, and, while the topic is gaining momentum, there is still much research to be done in this area.

Technological advancement does not always require an outward change in product appearance. This is particularly true in electronics, where the internal changes, such as software upgrades, do not necessitate a change in appearance. For example, when Motorola introduced music playback capability into their cell phones, this change could be effected through the software without substantive changes in the phone handset. Despite this, the product was introduced in a newly designed physical package called the ROKR. In this way, visual design may be used to facilitate the adoption of less evident technology advancements in high tech products and the link between visual product newness and product innovation is of particular interest to marketing practitioners.

Companies often assume that merely creating an innovation will ensure its success. Much of the research on innovation has focused on the firms' creation and management of innovation, without considering that all innovation is not necessarily good. Firms must recognize that if the consumer does not value the innovation then the product will not be successful. Industry, product, and individual factors will all determine the value that is placed on innovation and newness. Understanding the dimensions of new product design that are most appealing to consumers, will assist firms in communicating the value of a new product to the buyer.

With a more complete understanding of the perception of product forms, practitioners can more effectively manipulate the product design. For example, if a firm wants a product to appear new, it can emphasize those design characteristics that

communicate newness to consumers. If, on the other hand, the firm wants a product to appear more traditional, designers can downplay design elements that signal newness. An understanding of how consumers evaluate visual design can assist managers in designing and introducing products with a greater chance of market success.

### **Chapter Summary**

This chapter introduced the concept under study in this dissertation, outlined the overall purposes and specific objectives, and highlighted the potential contributions of this research to marketing academics and practitioners. This dissertation is concerned with consumers' perception of product newness and it specifically examines end-user reactions to new product forms. In the next chapter, the construct of newness will be defined and the domain of this construct will be specified in relation to related constructs such as innovation, creativity, modernity, and invention. Second, a theoretical argument is made for the primacy of visual design in product evaluations. This argument draws from research in aesthetics and psychology and highlights the importance of aesthetic evaluations; it explores the interest that people have in interacting with visually pleasing objects; and it examines the way that aesthetics and novelty have been conceptualized and empirically tested. Finally, a comprehensive theory of consumer responses to product form will be identified, that addresses the interaction of cognitive and sensory evaluations of visual product form, and provides a foundation for the empirical studies.

## CHAPTER 2 – LITERATURE REVIEW

### Introduction

In diffusion research, the construct of newness is frequently employed, but the application of the term has been quite variable. Underlying this variability is the fact that this construct has not been clearly delineated from numerous related constructs such as modernity, creativity, innovation, and invention. Specifying newness as a construct that represents consumer evaluations of new products offers a promising start to clarifying contradictions inherent in this research domain. Therefore, the first part of this chapter will examine the conceptualization and operationalization of the major relevant constructs in the innovation literature.

Researchers have not examined visual design as a component of new product evaluations, yet, the visual dimensions of the product are as important to the buyer as other dimensions such as function and durability. Therefore, the second section of this chapter examines the role of aesthetic stimuli in consumer evaluations of new products, drawing from literature in psychology and aesthetics.

### Related Constructs

#### *Creativity*

Creativity is a process of bringing into existence a novel object, idea, or concept. Csikszentmihalyi (1996) proposed that Creativity<sup>1</sup> requires the interaction of three

---

<sup>1</sup> Csikszentmihalyi distinguishes between capital 'C' Creativity as a systems based, holistic construct and small 'c' creativity as an activity that resides in the individual that has not been accepted or adopted at a cultural level. I will maintain this distinction throughout the text.

necessary elements; “a culture that contains symbolic rules, a person who brings novelty into the symbolic domain, and a field of experts who recognize and validate the innovation” (Csikszentmihalyi 1996, p. 6). Creativity is about both bringing something into existence and the acceptance of this new thing. From this perspective, innovation is most analogous to the act of creation, and newness to the acceptance and evaluation of the created object. In other words, Creativity cannot exist without innovation or without newness, but, Creativity differs from newness in two ways. First, Creativity constitutes an act of creation, while newness is an act of perception. Second, Creativity describes a more systems based, holistic construct, while newness is a much more specific practical conceptualization.

### *Modernity*

At its most basic level, modernity may be described as up-to-dateness (Webster 2002). Something that is modern fits within the dominant cultural practice and is often defined by the cultural norms, fashions, or standards. For example, for most consumers a ‘modern’ home consist of elements such as a gable roof, plastic siding, and a two car garage. This is certainly up-to-date and hence modern, yet, it is not novel or new. In academic research, modernity has received attention in both sociology, and psychology.

In sociology, Max Weber conceptualized modernity as a cultural level manifestation of the values of a society, with a time dependence or ‘currentness’ (Weber and Kalberg 2005). This theory suggests that rationalization is responsible for the rise of modern societies and has replaced traditional dominant ideologies, such as religion. Modernity is concerned with embracing the new, instead of holding onto traditional

theories and values, and newness is a necessary condition of modernity. In other words, modernity is concerned with adapting and re-investigating the value of the new, and not with understanding the newness itself.

In the behavioral literature, modernity is treated as a trait variable that is made up of qualities such as sense of efficacy, openness to new experience, and an interest in planning (Inkeles 1983; Inkeles and Smith 1974). This is the form of modernity most commonly adopted in the marketing literature. For example, Hirschman (1980b) described modernity as a propensity to consume diverse and innovative products. This is operationalized along two dimensions – change orientation and a new experience scale. It was found that these dimensions are highly correlated with creativity, cognitive complexity, and the seek new/different dimension of innovativeness (Hirschman 1980b, p. 137). Therefore, at the individual level, modernity is treated as an individual predisposition that leads to an embracing of and openness to new products and experiences.

### *Invention*

In the marketing literature, invention is closely related to innovation but it is conceptually distinct. Invention generally describes the initial creative idea, while innovation is the process of bringing that creative idea into fruition as a useable and marketable product. Invention has been described as the process of creating new ideas and making them work (Roberts 2007), as promising ideas (Chandy et al. 2006), or as new product ideas or concepts developed by research and development (Khilji, Mroczkowski, and Bernstein 2006). In each case invention is primarily concerned with

the initial creative idea as it is first manifest in a functioning product and innovation is the commercialization of this idea. This process of bringing invention to innovation has been described as exploitation (Roberts 2007) or conversion ability (Chandy et al. 2006). Even though these two constructs are conceptually distinct, innovation is often thought to encompass invention. The Institute of Research Management (IRI) describes the relationship between innovation and invention as follows: “Innovation is composed of two parts: (1) the generation of an idea or invention, and (2) the conversion of that invention into a business or other useful application” (Roberts 2007, p. 36). In other words invention is the first step in innovation, and innovation is thought of as a complete process of bringing new ideas forth into the market (Khilji, Mroczkowski, and Bernstein 2006).

### *Innovation and Innovativeness*

The terms newness and innovativeness are often used interchangeably to indicate that a new product differs in some fundamental way from prior offerings. But, it is important that the differences between these two constructs be specified. Innovation involves bringing forth, or presenting, something that is novel, unique, or different to a target audience. Innovation has, therefore, been conceptualized as the degree of familiarity organizations or users have with a product (Brentani 2001), the degree to which a product is a departure from a firm’s present resource and strategies (Micheal, Rochford, and Wotruba 2003) and as a discontinuity within an industry (Debruyne et al. 2002). Fundamentally, as an act of creation, innovation is the bringing forth of a new technology, a new product, or a new idea by a firm.

Several attempts have been made to label innovation; in fact, every exploration of innovation seems to bring with it some new way of categorizing this phenomenon. Terms such as *radical*, *incremental*, *really new*, *discontinuous*, and *imitative* as well as *architectural*, *modular*, *improving*, and *evolutionary* have appeared to fulfill this need (Garcia and Calantone 2002). These categorizations typically represent the amount of innovation as interpreted by the firm or industry and the innovation management literature clearly has a strong bias towards the internal impact of innovativeness on the firm. Moreover, much of this literature usually measures the degree of newness by interviewing managers from the firm.

#### *Newness*

Unlike innovation, newness is attributed to the product by an observer and what is often missing in studies of innovation is this consumer perspective (Blythe 1999). Newness is the perception of the degree of change contained in the innovation, relative to past offerings. This dissertation will maintain this distinction between bringing forth (innovation) and perception (newness) and is primarily concerned with the way that the target audience perceives the product. If the product is new to the firm, how do the managers in the firm perceive this innovation? If the product is new to the market, how do customers perceive it? The perception of newness is a function of where the perceiver places the product along a continuum ranging from no change, to extreme change. For this paper, the following definition of newness will be used.

*Newness is the degree of change or innovativeness that the consumer perceives in a product when compared with prior offerings in the same or proximal categories.*

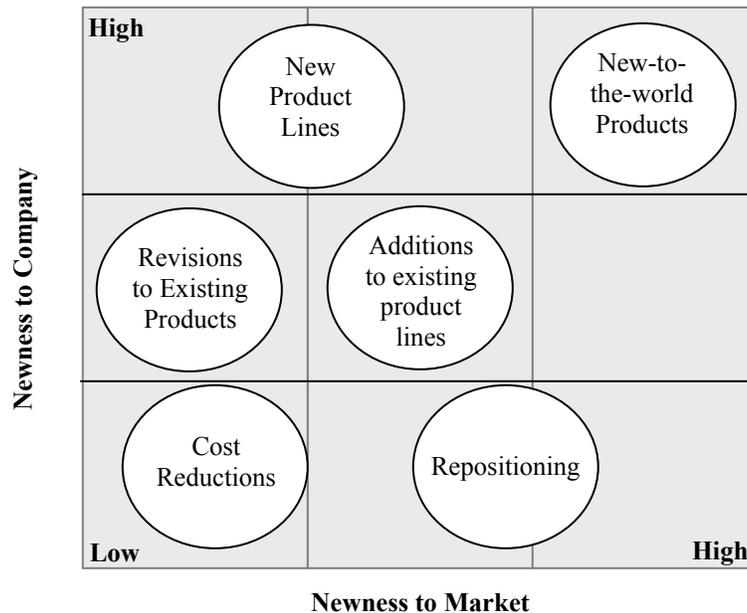
The constructs of innovation, modernity, creativity and invention are closely related to newness but differ in some critical ways. Newness is fundamentally about the perceptual evaluation of a product, whereas creativity, innovation, and invention are about the product development, and modernity is an individual propensity to prefer newness. Each of these variables may emerge in studies of innovation, and each has its place, however, it is clear that while related to newness they are fundamentally different.

### **Operationalization of Newness and Innovation**

Two dominant approaches emerge in operationalization of newness and innovation. The first approach focuses on the creator of the innovation. Innovation has generally been examined from the firm's perspective and often relies on the Booz-Allen and Hamilton (1982) categorization of innovation type. This taxonomy places innovations in a matrix of; newness to the company and newness to the market, with six different categories (Figure 1). Although this approach conceptualizes innovations by their degree of newness, the perceived newness is assigned by the firm. Operationally, research that uses this taxonomy generally takes an existing product and asks managers to categorize it. This taxonomy has been used extensively by innovation scholars, in its original form, and with modifications that include greater (see Cooper and Kleinschmidt 1993) or fewer categories (see Ali 2000; Atuahene-Gima and Evangelista 2000). The second approach examines innovations from the perspective of the adopting audience. This research is concerned with the reactions of the target audience to the innovation and relies on the conceptualization of Rogers (1962). Operationalizations that rely on this perspective are much scarcer in the literature. The following section will examine the

operationalization of newness and innovation and highlight the difference between the two approaches.

Figure 1: Booz-Allen & Hamilton Product Innovation Matrix



Innovation research often refers to a consumer orientation, but in execution actually measures innovation from the firm perspective. Research tends to focus on the creative entity (i.e., the firm) and less on the adopting entity (i.e., the consumer). Perhaps the best example of the failure of a firm to recognize buyers willingness to adopt technology was pets.com, the company received large sums of venture capital without ever evaluating if consumers were willing to buy pet food and supplies on the internet. The company, like many other dot coms, assumed that buyers would embrace the new technology (Wolverton 2000). In a review of over 50 operationalizations of innovation and newness, nearly half of these studies conceptualized newness from the perspective of the consumer (see appendix 1). But, when the construct was operationalized only 20% of these consumer focused studies actually assessed newness from the perspective of the

firm (e.g., De Kluyver 1977; Eliashberg and Robertson 1988), and another 40% of the studies used researcher generated stimuli or categorization (e.g., Mukherjee and Hoyer 2001; Nowlis and Simonson 1996).

Most studies of new products, even those from a consumer perspective, have provided consumers with a written description of a product, rather than a visual depiction. For example, in studies of consumer responses to new products, Hoeffler (2003) asked respondents to evaluate the level of newness of a product based on a description of the product and Olshavsky and Spreng (1996) provided respondents with a description of nine innovative products such as vitamin-enriched beer, peanut butter in slices, and melt-resistant ice cream. In both studies, respondents were only provided with descriptions of the product and were given no visual representation.

There are, however, a few studies of newness that provided a visual depiction of a product. Ziamou (2002) provided a visual depiction in a study of the interaction of the functional dimensions and the interface for an electronic product and Blythe (1999) asked consumers how the appearance of hi-fi equipment affected their perception of product newness. Only one study focused exclusively on the impact of visual perceptions of product newness. In this study, Leder and Carbon (2005) created line drawings of car interiors that represented three levels of innovation (low, medium, high), three level of complexity (low, medium, high), and three levels of curvature (straight, original, curved). Respondents were asked to rate the attractiveness of these interiors from a spontaneous first impression without explicit awareness of the dimensions that were involved.

There is a general lack of empirical work that examines how consumers interpret visual design in evaluations of product newness. Clearly a consumer focus is important,

because it is often included in the conceptualization of the construct, yet, in execution, many studies abandon the consumer focus and instead draw their measures from manager or researcher derived categorizations. In addition to this lack of research on the consumer evaluation of newness, the impact of visual design has virtually been ignored, even as design is receiving more attention from practitioners and marketing researchers. Marketing scholars are only just beginning to embrace the product form as a suitable research subject, and the impetus is often stemming from industrial designers rather than marketing scholars (Schroeder 2006). The next section will examine the importance of visual design as an integral part of the communication of newness to the target audience.

### **The Importance of Visual Design to Product Innovation**

Recognizing that consumers' perception of new products is important to product success, it is important to understand how product design affects this perception. Aesthetic design is a central facet of perceived newness, differential positioning, and success in the marketplace (Bloch 1995). Design has experienced a resurgence in the last twenty years. Since the mid-80s the enrollment in design schools has grown (Schonberger 1990), firms are realizing the importance of designing an attractive product (Politis 2005) and they are increasingly employing product design as a means of remaining competitive in the marketplace (Nussbaum 1988). Design is a fundamental part of product innovation and marketers are recognizing the importance of the visual appearance for communicating the product quality (Norman 1990; Nussbaum 1993). For example, Target has teamed up with designers such as architect Michael Graves, fashion designer Isaac Mizrahi, and interior designer Todd Oldham to deliver sophisticated

design in inexpensive products. The Michael Graves toaster became Target's best selling toaster, while at the same time their most expensive (Postrel 2003). Good design has become so important to product success that it may contribute to the value of the product as much as performance, quality, and reliability and researchers are beginning to recognize that product design is central to the effective marketing of new products (Coates 2003).

Product design can impact the perception and adoption of new products in three very important and fundamental ways. First, product design can communicate newness to the consumer. The functional benefits of a new product are often hidden in technical jargon and specifications, and may be inaccessible to the average consumer. Design that communicates newness may help the consumer realize that a product is different from prior offerings. For example, when Apple computers introduced the iMac computer, it was a novel translucent 'bondi blue' computer that integrated the monitor and computer into one unit and it was simple to install for even novice computer users. The iMac also contained the new G3 chip which was a significant advancement over the older 604e chipset. Apple did not just introduce a stylish new computer; they integrated the design of the product and the advanced functionality. This included functionality that was evident for consumers, such as the ease of installation, and the functionality that was not as evident, like the advancements in the processor.

Second, new product design can distinguish a product from a competitor. With improvements in operations management and quality systems, there is relative parity among firms in terms of price and quality. Design offers a way for the firm to differentiate itself from its competitors. For example, Reebok introduced the pump

sneaker, with an innovative basketball shaped orange pump in the tongue. This was preferred to the Nike version, introduced around the same time, that required a separate hand pump. Both firms integrated the air technology into their product, but the Reebok product, which had a superior design, achieved revenues of \$200 million, while Nike dropped their shoe (Dumaine 1991).

Third, product design can help maintain interest in mature products. Bill Stumpf's Aeron chair, designed for Herman Miller, was a technical achievement, integrating a novel pivot that more closely mimicked the movement of the human body. Rather than encasing this design, Stumpf celebrated it with a high-tech form that revealed the workings of the chair. Initially, the design was received with interest only by other designers and was often seen as too technical and 'ugly' in the mature and staid office chair market. Yet, after winning the design of the decade award from the Industrial Designers Society of America, sales took off and the chair became an icon in the office chair market, setting it apart from the sameness that is exhibited by most office chairs (Gladwell 2005). Because of this superior design, the Aeron chair was able to command a higher price than many of its competitors.

The visual appearance of the product is, therefore, an important dimension for the communication of product newness, and understanding the way that the target audience will perceive and interpret this communication is of critical importance to the marketer.

### **The Communication of Newness**

The diffusion of innovations in the market is a function of the innovation, communicated through channels, over time, to members of a social system (Rogers and

Shoemaker 1971). At its most basic level, communication is an interactive process of encoding, transmitting, and decoding messages between two individuals (Adler and Rodman 2003). Product design is a central component of encoding the message –in this case product newness. Industrial product designers use the tools of their craft to signal to consumers the newness of the product and consumers, as the target audience, process and decode these messages.

Design studies have addressed encoding as part of the design process. These studies focus on the act of design and the use of universal forms and shape grammars (Lidwell, Holden, and Butler 2003; Stiny 1980), creating a consistent brand identity (McCormack and Cagan 2004), expressing product characteristics in packaging (Smets and Overbeeke 1995) and understanding the design process (Oxman 1997). However, the literature is surprisingly bereft of studies that examine the process of decoding these messages. One of the few examples that studies consumers' decoding of visual messages, examines images presented in advertisements and why they are evocative for consumers (Williamson 1978). But, this work positions itself more as a critique of capitalism than an empirical examination of the decoding process. Understanding how consumers decode messages sent by the product designer, is essential to understanding the adoption of new products that are introduced in the market.

The form of the new product is the first thing that the consumer sees. Therefore, the design must communicate, through visual cues, the meaning, function, and, of course, the beauty of the product. For example, the hybrid Honda Insight, had a teardrop futuristic shape that immediately communicated the cars' unique characteristics as an energy efficient vehicle. Without knowing anything about the specifications of the car,

such as acceleration, safety, or fuel efficiency, the consumer is clearly capable of understanding that this car is different than other cars, it is new and innovative. Honda then moved away from the Insight in favor of a hybrid Civic. The hybrid Civic is virtually indistinguishable from its non-hybrid counterpart and is being briskly outsold by the Toyota Prius which maintained distinctive design elements that help the hybrid stand out from the companies other offerings in the small car segment.

This capability of the design to invest the product with meaning is important in all design aspects, a gun must look menacing, a lawnmower must look powerful, and furniture must look comfortable. To examine how individuals react to aesthetic cues, it is important to turn to the literature on art and aesthetics, which has empirically studied individuals' appreciation of art works and product design.

### **Primacy of Visual Appearance**

Because the consumer is exposed to the form of the product before they buy it, products are evaluated on both their visual design and their functional purpose. Moreover, because of the visibility of the form, consumers are exposed to the design and form of the product before they can evaluate the functional characteristics. "Never forget, whatever the product, the customers *see* it first before they buy it. The physical performance comes later, *the visual always comes first*" (Hollins and Pugh 1990, p. 91).

The primacy of the visual has been recognized by marketing scholars. Coates (2003) suggested that deliberate cognitive 'making sense' reactions occur after rapid affective responses. While these rapid, affective responses are tied most closely with the visual appearance of the product, the comparison and understanding of the product

generally relies on more cognitive processes. Empirical research in art has recognized a similarly quick affective reaction. Leder et al. (2004) noted that automatic affective processing is triggered by the form, complexity, and symmetry of the perceptual process. This automatic affective processing precedes more deliberate cognitive processing which includes classification and cognitive interpretation of the stimuli. In design studies, Crilly et al. (2004) proposed that the senses decode product traits such as shapes, textures, dimensions, and materials prior to more effortful categorization and cognitive evaluations of the product. The visual perception of a product precedes more effortful cognitive evaluation, yet most marketing studies of product newness and innovation tend to focus on cognitive evaluations, virtually ignoring the appearance and the implicit affective processing of the product.

It is not only marketing where cognitive evaluations are often complemented or preceded by aesthetic evaluations. Research has shown that individuals rely on aesthetic evaluations, even when they are making important decisions that are ostensibly based on cognitive evaluations. For example, the attractiveness of political candidates is often used to make voting decisions (Budesheim and DePaola 1994; Sigelman et al. 1986), the attractiveness of students can affect teacher expectations (Clifford and Walster 1973), and the attractiveness of job candidates has been shown to affect hiring decisions (Cann, Siegfried, and Pearce 1981)

It is evident from these examples that the affective reactions to the visual form tend to precede more thoughtful cognitive reactions. In other words, individuals will have a sudden reaction to the form, before they have a chance to formulate an evaluation of the performance, quality, or durability; all elements that receive the most attention in the

marketing literature. The following sections explore four complementary fields of research that further support the primacy of visual design.

### *Aesthetics and Psychobiology*

Research in psychobiology has explored the way that individuals react to particular stimulus properties. The pioneering work by Berlyne (1971) proposed that aesthetic stimuli are tied to learning, arousal, and pleasure. At a very basic level, aesthetic stimuli are thought to stimulate action and unconscious responses. These unconscious processes are rooted in evolution and lead to a preference for moderate amounts of tension. A large amount of uncertainty with a stimulus is likely to trigger a primal fight or flight response, whereas a smaller amount of uncertainty is likely to be ignored because it blends into the environment. Moderate degrees of tension, in the form of uncertainty, arouse a desire to investigate the stimuli more closely, and encourage us to explore. In other words, greater degrees of arousal and action occur when a person is exposed to moderate amounts of contrast

Berlyne posited that there are three arousal increasing devices that create this heightened degree of tension. The first, *psychophysical variables*, encompass the inducement of arousal through high intensity stimulus. For example, in classical music the volume often swells at the climax of the piece, increasing the level of arousal in the perceiver. The second, *ecological variables*, refers to the content; the meaning of the object affects the arousal potential. For example, the manner that a “trumpet’s loud clangor invites us to war, and drum beats create a funeral mood” (Berlyne 1971, p. 139) . The third arousal inducing device, *collative variables* “involve comparison, and thus

response to degree and nature of similarity or difference, between stimulus elements that may be present together or at different times” (Berlyne 1971, p. 141). How a person reacts to a stimulus is dependent on a comparison with other immediately revealed stimuli and with past recollections of similar stimuli. Arousal is increased when a stimulus exhibits differences in novelty, complexity, conflict, and ambiguity. This third device has received the most attention in Berlyne’s work, and in subsequent research in this area (see Berlyne 1974; Wohlwill 1976).

Novelty is an important dimension of Berlyne’s work it is suggested that individuals are drawn to items that they perceive as new. When faced with novel stimuli, individuals are more inclined to engage in active exploration, in proportion to the amount of conflict and uncertainty that the stimulus engenders (Wohlwill 1976). Novelty in a stimulus, causes an immediate reaction that is based on the visual congruity or incongruity with past experiences (Whitfield 1983). Moreover, people will be enticed by new information but only insofar as one possesses the requisite knowledge to understand the information and make effective choices (Kaplan 1987). In other words, the arousal level of the object, and desire to explore and investigate the object, occurs when there is moderate incongruity with similar objects in memory.

#### *Mere-exposure*

Gestalt psychologists propose that individuals are drawn to objects that are prototypical and represent goodness of example (Garner and Clement 1963). The notion that there is an ideal form for a product category, and that products that approach this ideal form are preferred, has been addressed by psychologists (Whitfield 1983), designers

(Coates 2003), and art historians (Martindale, Moore, and West 1988). Most products in a particular category will vary from the ideal form, yet there are a number of characteristics, that express the ideal form, and are present in most products. Therefore, there is a more typical form of the product that is the design manifestation of the ideal form. Consumers derive satisfaction from products that are more closely related to the typical product in the category. As a result, product typicality is most often recalled by consumers, and forms expectations of a product category, because it represents a selection of the most frequently accessed products in a particular category (Yi and Gray 1996).

In the research on preference for typicality it is interesting to note that people exhibit some preference for what they know (Leder 2003). This effect has been called the mere-exposure effect (Zajonc 1968). Research on this phenomenon has shown that simply exposing a subject to a visual stimulus enhances that subject's attitude towards the stimulus. In experiments, subjects showed a marked preference for shapes to which they had previously been exposed, even with no recollection of the prior exposure (Kunst-Wilson and Zajonc 1980). At first, this mere-exposure effect seems somewhat at odds with Berlyne's preference for moderate incongruity hypothesis, because it seems to suggest that people prefer similarity over novelty. However, the conditions under which each theory is best employed remains an empirical question that has not yet been resolved (e.g., Boselie 1991; Martindale and Moore 1988). Answering this question is not a task that will be addressed in this research; however, it is important to note that, the mere-exposure hypothesis raises a tautological question. Research in this area has shown that people exhibit a preference for prototypes (Leder 2003) and the frequency of exposure to

a category is shown to be a determinant of its prototypicality (Rosch and Mervis 1975; Whitfield and Slatter 1979). In other words, we may ‘like what we know’, but, we also may ‘know’, because it is ‘what we like’. This may explain why the effects of mere-exposure are generally strong in experiments that employ forms and shapes (Handel and Garner 1965; Murphy and Zajonc 1993), but are much less robust when applied to real products (Whitfield 2000). Still, this theory indicates that there is a perceptual evaluation occurring without a cognitive recognition of the effect, and this is consistent with the primacy of visual design thesis.

### *Nonconscious Processing*

Visual design elements are evaluated in a different way than functional elements. The interpretation of visual cues is often faster, less effortful, and perhaps even more poignant, than the processing of cognitive cues. Research that only captures the cognitive, functional components of the product overlooks a critical component of the product perception and evaluation process. Aesthetic appreciation operates relatively effortlessly, while still exhibiting some process of comparison. One explanation is that the evaluation of aesthetic design may actually occur at a nonconscious level.

The formal elements of a design, such as surface, texture, and shape, have been referred to as attribute expedients. Consumers bring these attribute expedients together during the process of perception to form the characteristics of the product in a nonconscious way (Veryzer 1999). Generally, consumers are unable to articulate this process, yet, they are able to appreciate the overall differences in the design elements. The average consumer is able to see a difference between two products, and they are able

to ascribe that difference to the newness of the product. Yet, because the perceptual processing of these attribute expedients occurs at a nonconscious level, they are unable to access the elements that cause them to make this judgment. Consumers use nonconsciously acquired internal processing algorithms to form overarching judgments of product form (Lewicki 1986). Therefore, they are capable of evaluating the overall form, and the newness of the form, but they are generally unable to access the reasons that they have made this judgment. Once again, this research highlights the importance of visual form to product evaluations, and further supports the primacy of visual design thesis.

#### *Universal and Cultural Archetypes*

One approach that has sought to understand something akin to these processing algorithms is found in marketing practice but has received little attention in the marketing academic literature. This approach posits that individuals use Jungian archetypes that are contained in the primal, limbic areas of the brain to guide the processing of attribute expedients. Although not specifically identified, newness would likely be represented by an archetype. An examination of Jungian archetypes and the triune theory of the brain can shed some light on this nonconscious processing.

Jungian theory posits that members of a social system share a collective unconscious. In this theory, there is a pool of meanings in a culture that unconsciously drive behavior. Examples of this may involve, the love a child immediately feels for a mother, or the adoration of a hero figure. Jung suggests that these predispositions to certain actions are contained in the subconscious psyche and emerge in behavior and the

unconscious is composed of collective, thematic representations, shared by all members of a social group (Davis 2003). Jung explained the accessibility of these archetypes with a tri-partite theory of the psyche; the *ego* – the conscious mind; the *personal unconscious* – anything that is currently unconscious, but can be brought to mind; and the *collective unconscious* – a collective repository of human experience (Davis 2003) This third dimension of the psyche represents the most significant departure for Jung from prior psychoanalysts. It is also that dimensions that has been expropriated in some market research.

Understanding archetypes provides a means of unlocking some of the fundamental unconscious motivators that underlie human actions (Wertime 2003). More specifically, it has been proposed that firms should attempt to understand and employ universal and cultural archetypes as a means of understanding consumer behavior (Rapaille 2001). There is a culturally held code that can be ‘unlocked’ for concepts such as newness (Rapaille 2006). Consumers are driven by their unconscious, and this motivates their actions towards particular archetypal forms. This is similar to the internal processing algorithm and it suggests that people are driven to make choices by a nonconscious process. They can rationalize and state their preferences, but they have difficulty communicating the attribute expedients that help them to make decisions.

Rapaille draws from Paul MacLean’s triune theory of the brain (MacLean 1990; MacLean and Kral 1973) to explain conscious and nonconscious responses to products and brands. The triune theory identifies three distinct areas of the brain, each of which is responsible for distinct functions. The reptilian brain controls quick decisions that are essential for survival – triggering arousal, pleasure, and fight or flight reactions. The

limbic system or mammalian brain, is the focus of emotions and moods. It contains the amygdala which is involved in the association of events with emotion, and the hippocampus which is active in converting information to memory. Finally, the most advanced area of the brain, the neo-cortex, is responsible for rational thought, speech, and problem solving. Most marketing research works at the level of the neo-cortex, however, emotionally driven unconscious urges are contained in the reptilian or the limbic portion of the brain (MacLean and Kral 1973; Rapaille 2001). For example, Rapaille (2001) contends that the reptilian brain is responsible for Americans preference for big cars. Research on Hummer owners has recognized that many of these owners simply rationalize or overlook the negative aspects of the vehicle, while emphasizing the social desirability of the car (Luedicke 2005). Clearly the neo-cortex is not the primary decision maker. Instead, consumers base their decisions on a much more primal desire. Rapaille (2006) argues that when a decision is to be made, the desires contained in the reptilian and limbic brains will always win out over the rationality of the neo-cortex.

These diverse literature streams all point towards a nonconscious processing that emerges from visual perception and is central to the evaluation of visual stimuli. While consumers may be unable to access the processing algorithms that form their judgments, it is clear that they have an important impact on consumers' decision making. The effortless, affective reactions that are prompted by product form clearly operate at this instinctive level. Therefore, it is important to recognize, and attempt to understand, the marketer controlled stimuli that can engender a positive reaction in the buyer.

## Responses to Product Newness

Understanding responses to visual product newness is of central relevance to marketing researchers. Several authors have studied the dimensions of the response to product design (Berlyne 1971; Frijda 1986; Frijda, Manstead, and Bem 2000). In most studies the authors focused on one dominant theory, however, product response is multifaceted, and consumers tend to react emotionally, physically, and cognitively. Recent work by Crilly and his colleagues (2004) proposed a comprehensive model of responses to visual product design that integrates a number of different theories. This model proposes that product design is first attended to by the senses, and then consumers respond to this sensory information. This response is both cognitive and affective and ultimately leads to a behavioral action. In this model, Crilly et al. (2004) integrate four different literature streams into their comprehensive model of consumer responses; *Emotional Response, Aesthetic Impression, Semantic Interpretation, and Symbolic Association.*

### *Emotional Response*

The literature has clearly established that products are capable of eliciting emotional responses in consumer (Norman 1990). Desmet (2003) suggested that consumers' response to products represent 5 distinct types: (1) *Instrumental emotions*, include emotions that deal with the perception of the product's ability to satisfy consumers' objectives (disappointment and satisfaction); (2) *aesthetic emotions* are related to the way that the product tends to delight, or offend, the senses (disgust and attraction); (3) *social emotions* are related to the perception that the product complies

with socially accepted standards (indignation or admiration), and will likely be more pronounced in publicly consumed and conspicuous products; (4) *surprise emotions* are particularly driven by novelty and uniqueness in the product design (amazement); and (5) *interest emotions*, are concerned with the ability of the product to challenge and raise the interest of the observer (boredom or fascination) (Desmet 2002). Crilly et al. (2003) recognized that these emotional responses do not occur in isolation. The affective response to the product is not solely a function of these emotional responses to the aesthetic form, but may also be impacted by the cognitive processes. Some researchers suggest a distinction; affective responses are primarily judgmental, and cognitive responses are concerned with ‘making sense’ of stimuli (Norman 2004). However, even though they are clearly distinct, the two response systems frequently interact. The three, primarily cognitive response categories will be described next.

### *Aesthetic Impression*

Fundamental to any study of aesthetics is that products may be valued for their innate design characteristics (Pye 1978). Philosophers and designers have long been concerned with identifying pleasing shapes, order, and forms (Linn 1974) often drawing from nature (Murphy 1993), or developing complex rules and standards (Lawrence and Tomlinson 1996). Objects may be viewed as pleasing and beautiful irrespective the emotional judgment that they engender (Berlyne 1974). One paradigm suggests that aesthetic beauty is objective and all people will interpret the same object as beautiful (Coates 2003). This approach underlies philosophical work such as Kant’s critique of judgment (Kant and Pluhar 1987), the adherence to strict geometric rules such as the

golden section (Elam 2001), the application of these rules to design by groups such as the Bauhaus (Girard 2003), and by Gestalt psychologists (Köhler 1969; Weber 2002). An objective approach to aesthetics suggests that the application of rules such as symmetry, proportion, repetition, and closure will lead to more positive aesthetic evaluations of product forms (Crilly, Moultry, and Clarkson 2004).

Others have posited that aesthetic evaluations are not objectively held by all individuals, and may instead be a function of cultural contexts, social, technological, and historical factors (Crozier 1994). From this perspective, objective aesthetics alone are insufficient for explaining the judgments of beauty in product forms, and the individual's subjective experiences will also influence the perceptions of attractiveness in aesthetic forms (Crilly, Moultry, and Clarkson 2004). In other words, the aesthetic perception of the product is influenced by both the objective qualities of the product and the perceiver's subjective perception of these qualities.

Coates (2003) provided a valuable framework for identifying the components of subjective and objective design that influence perceptions of product attractiveness: (1) *objective information*, is the contrast that the design has within itself and relative to the background of other products. This is a function of the way that the design elements are combined. (2) *Subjective information* is the perception that these contrasting forms differ from consumers' knowledge structures. The novelty and uniqueness of the design is subjective information, because consumers are comparing current products with past knowledge of the product category. (3) *Objective concinnity* represents the order perceived in the design, such as completion, symmetry, and orthogonality. (4) *Subjective concinnity* is the extent to which the design makes sense to the perceiver. This is also

dependent on consumer's past experiences, and includes their ability to categorize the product and understand its purpose (Coates 2003; Crilly, Moultry, and Clarkson 2004).

These categories are perhaps most closely related to Berlyne's aesthetic interpretation. This approach posits that dimensions such as novelty, and typicality stem from the perceiver's past experiences. Moreover, aesthetic appreciation will likely be greatest with an optimal, balanced amount of each dimension. These four ingredients represent balancing dimensions of product aesthetic valuation. A product must be equally balanced on these dimensions to be viewed as beautiful or attractive. Products that are high in concinnity, but low in information, will be viewed as boring and uninteresting, while products that are high in information but low in concinnity will make little or no sense to the perceiver (Coates 2003). Therefore, like Berlyne (1971), this theory of aesthetic appreciation posits that the optimal level of aesthetic appreciation occurs with moderate levels of difference in the product form.

#### *Semantic Interpretations*

A significant portion of the value assigned to a product is attributed to its utility. Because this research focuses on product designs, the evaluation is not solely based on the visual appeal of the product, but also its perceived ability to perform a task. The utility of the product can comprise practical qualities such as function, performance, efficiency, and ergonomics. However, without being offered the opportunity to use a product, it is impossible for consumers to objectively judge the actual function of the product, instead, consumers use the visual form of the product to infer the product's apparent utility, and perceived qualities (Crilly, Moultry, and Clarkson 2004).

Essentially, the visual form of the product communicates information about the product encourages buyers to infer the values and properties of the product. For this research, a relatively narrow definition of the semantic functions is drawn from Monö (1997) that differs somewhat from conventional definitions of semantics.

In this work, a product's form may communicate the qualities of the product through four semantic functions: (1) *Description*, refers to the way that the form of the product infers its usage. In other words knobs are intended to be turned, buttons to be pushed. This is similar to Norman's (1990) concept of *affordances*, which suggests that one of the primary purposes of the product is to communicate its usage to the user. (2) *Expression*, refers to the qualities and properties of the product itself, such as durability, stability, weight, and portability. These expressive qualities suggest to the perceiver how the product should be treated; for example, a fragile vase should be treated with care, while a rugged looking mountain bike can be treated much more aggressively (Crilly, Moultry, and Clarkson 2004). (3) *Exhortation* is concerned with the actions that the product seems to encourage from the user through signals (Monö 1997). Exhortations trigger a response in the perceiver, for example, the cup tray on an espresso machine tends to encourage the user to place cups there. (4) *Identification* assists the consumer in understanding the category to which the product belongs (Crilly, Moultry, and Clarkson 2004). Identification recognizes that the product must possess some consistency with past manifestations to assist the buyer in recognizing the belongingness (Monö 1997). In summary, visual product form is not viewed in isolation from the function and usability of the product, and not only does the product design communicate attractiveness, it can

also communicate the usage, durability, and functional characteristics of the product to the consumer.

### *Symbolic Association*

As consumers attempt to make sense of product forms, they will also draw from socially shared meanings that surround a product category. Products are thought to have both private and public meanings (Richins 1994) and these meanings are often communicated through the product form. Products contain symbolic associations that infer this meaning, both to the self and to others (Crilly, Moultry, and Clarkson 2004). For example, a Rolex watch symbolizes wealth, a hybrid car symbolizes environmentalism, and a Harley Davidson Motorcycle symbolizes rebellion. In other words, consumers use past associations of design forms and elements to draw inferences about the current product and decide what the design of the product symbolizes to others.

### *Summary*

While past work has focused on the responses to product form, little attention has been given to the impact that the newness will have on these evaluations. Crilly et al. (2004) were primarily concerned with the first exposure that the buyer has to a product. They do not, however, explicitly address the impact of product newness on the types of responses that consumers will have. New products will engender all four types of responses from the consumers, what is not known is which types of responses consumers are more likely to exhibit as the newness of the product changes. In other words, there is no extant theory that indicates if newer products will exhibit greater levels of emotional,

aesthetic, semantic, or symbolic responses. However, the past research highlighted here, would begin to suggest that moderate levels of newness will engender more positive reactions from the consumer. The impact of different levels of visual product newness on the responses to products is explored in more detail in study 2.

### **Chapter Summary**

This chapter has further elucidated the theoretical foundation of this dissertation. It is clear that studies of innovation are lacking a consumer focus. There is much research that purports to study the perceptions of the target audience but falls short in empirical execution. An examination of the literature on aesthetics reveals that not only is this visual dimension important for communicating product newness, it is also the first dimension that consumers seek. Before they have a chance to evaluate the performance, the durability, or the quality of a product, the buyer first evaluates the form. Therefore, it is important to understand how the product form is interpreted by the consumer when they are faced with a new product. The following chapter will outline a conceptual model that proposes to explain this process.

## **CHAPTER 3 – THEORETICAL MODEL**

### **Introduction**

It is clear that visual design is an important ingredient to new product success, and that it represents the first characteristic that consumers use when forming new product impressions. This chapter will introduce a model that addresses the process through which changes in design that signal newness are translated into product preferences. This model will also examine a number of related situational and individual variables, and their relationship to the process of preference formation. The following sections examine the major elements of the model (Figure 2) and the interaction between these elements. The specific objectives of this chapter are as follows: 1) to propose a conceptual model of consumer reactions to new product design; 2) to identify situational and individual variables that will impact this reaction; and 3) to identify testable hypotheses that will form the basis of the empirical studies.

### **Theoretical Model**

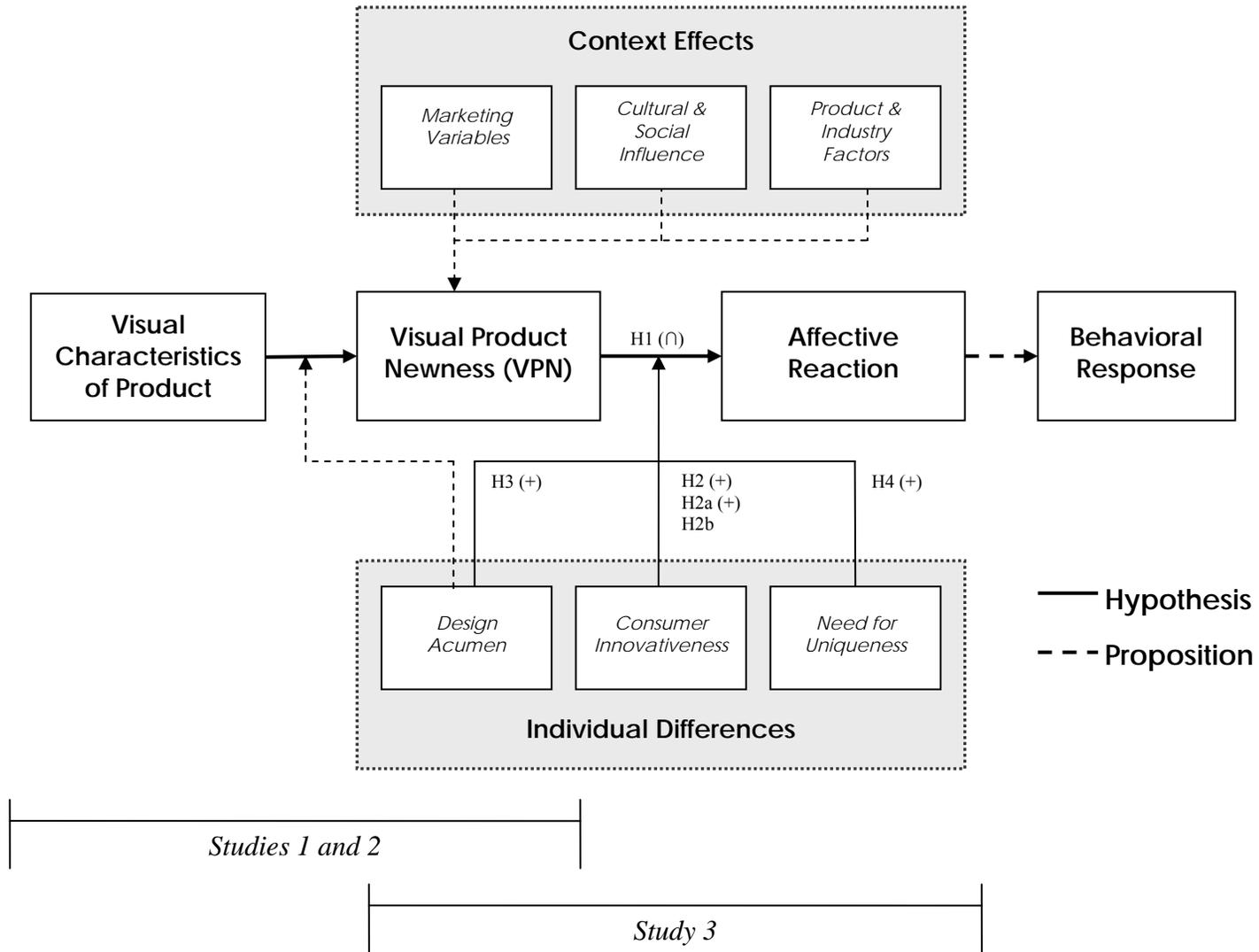
Consumers use the visual form of the product as one part of the overall product evaluation. When exposed to a new product they have affective and cognitive reactions to the product, and the buying decision will be an outcome of these reactions. Figure 2 provides a conceptual framework for this research, and includes both theoretical relationships and a priori hypotheses. A multi-method, multi-study approach is used to examine and test the proposed relationships in this model. Studies 1 and 2 are primarily exploratory in nature. The relationship between changes in the product form and

perceptions of newness has not been explored in the literature. Therefore, there is no way of proposing a priori hypotheses. Instead, this portion of the research is more inductive in its approach, and is interested in uncovering and revealing these relationships. Study 3 is more deductive in its approach. There are a number of research streams that propose the relationship between novelty or innovativeness, and consumer responses. Therefore, this second part of the model will propose a number of a priori hypotheses that will be tested with a between-subjects experiment.

Neither consumers, nor products, are homogenous, so the model also accounts for individual differences and contextual dimensions that may lead to different reactions to the visual dimensions of product newness. In this context, the industry, product, and cultural dimensions are recognized, but not tested. While the individual differences of the respondents will be tested in study 3.

Finally, this model represents only one part of the product purchase decision. While it is recognized that consumers may demonstrate a preference for visual product newness, it is unlikely that this alone will lead to product adoption. Therefore, the model notes that preference for the aesthetic form may lead to product adoption, but it does not test this, because purchase decisions will also be influenced by cognitive evaluations of the product functionality. This extends beyond the scope of this dissertation. The following sections will expand on the elements of the model and will provide theory that supports the proposed hypotheses.

Figure 2: Conceptual Model



## Visual Characteristics of the Product

In *de Architectura*, Vitruvius stated that a structure must exhibit three qualities; *firmitas, utilitas, and venustas*; that is, it must be durable, useful, and beautiful (Vitruvius and Smith 2003). These same three dimensions also apply to consumer products.

Consumers want a product that will last, that will perform, and that is pleasing to them.

Therefore, when introducing a new product, marketers are concerned with how they can communicate these attributes to consumers. Numerous studies have explored how marketers communicate the first two dimensions of durability (Boulding and Kirmani 1993), and usefulness (Hoeffler 2003) with new products, but there are no studies in marketing that examine the link between product attractiveness and product newness. Just as usefulness and durability are useful signals to encourage new product adoptions, so too are beauty and aesthetics.

Aesthetics is central to the understanding how products are perceived. In the *Critique of Judgment*, Kant acknowledged the importance of perception and observation in aesthetic judgment (Kant and Bernard 1951). This Kantian view of beauty was adopted in the consumer research literature by Holbrook (1980), who proposed that the aesthetic response to a product is a response to the form of the product itself, and not to any utility associated with it. In a later study, he highlighted the importance of studying aesthetic responses because they command the interest of consumers (Holbrook 1986). The product form is a part of the consumed product, and understanding aesthetic responses to this form is an important aspect of understanding consumers' responses to products.

Given the absence of published work that addresses the role that product form takes in communicating newness, no attempt is made here to propose a priori hypotheses

of the characteristics of products that signal newness to the consumers. Instead, this dissertation will be primarily exploratory in nature. Several characteristics, and design styles, will be identified, because these are useful knowledge elements when judging and interpreting the results of the exploratory studies.

### **Newness Appraisal**

Consumers seek an optimal level of stimulation that balances boredom and information overload (Scitovsky 1992). Berlyne (1974) proposed that consumers seek increasing pleasure, and they are willing to delay immediate major hedonic pleasure from products. This proposition has been further examined by subsequent researchers who have found that consumers look for improving sequences (Ariely and Zauberger 2000; Baumgartner, Sujan, and Padgett 1997; Iyer 1988; Loewenstein and Prelec 1993), that consumers are continually seeking novel stimuli (Iyer 1988), and that consumers become fatigued with repetitive stimuli and seek novel alternatives (Martindale, Moore, and West 1988). In other words, consumers prefer products that are moderately incongruous from past offerings, and they will look for improving sequences of products. Moreover, consumers will adopt new products when the arousal potential that they perceive in these products is enough to satisfy their needs for stimulation, while at the same time not being so novel, that the product is not recognized as belonging to the class of objects which the consumer desires. Therefore, evaluations of newness involve a comparison with prior experiences in a category.

When exposed to a new product, consumers will compare this product either directly with other products, or with typical exemplars of the product category. In either

case, the consumer forms an evaluation based on their perception of the product's ability to deliver what is expected, this process of comparison has been studied extensively in research on congruity theory.

Congruity theory posits that consumers examine simultaneous stimuli and try to bring this disparate information together to make sense of it (Grewal et al. 1998; Sujan 1985). Consumers possess knowledge of past items or experiences which form expectations for new products. When judging products, one compares the product directly to others that are immediately available or stored memory. Therefore, when encountering a new object, consumers will try to categorize and make sense of it through a comparison set. Consumers will place a new object in a category if there is a strong overlap between the target stimuli and the category referents (Meyers-Levy and Sternthal 1993). When the target exhibits congruity between existing schema and new stimuli, then the object is assimilated and is not perceived as being new. For the object to be perceived as new there must be some disagreement between the referent categories and the target stimulus. This differentiation has been termed contrast and these contrast effects are necessary for judgments of newness.

Consumers are typically unaware of the processes that underlie these judgments. The perceptual categorization of visual stimuli tends to operate nonconsciously. Yet, consumers are able to infer a judgment of newness and they are able to identify that one product is newer than another (Hoeffler 2003). The challenge in this research is in measuring the level of newness, and then attempting to understand the underlying dimensions that consumers use to infer this newness. Studies 1 and 2 are primarily exploratory and focus on this relationship between product form and evaluations of

product newness. Since this analysis was performed post-hoc there are no hypothesized relationships, instead the research focuses on discovery.

### **Responses to Visual Product Newness**

New products may elicit both affective and cognitive responses, which in turn lead to a behavioral response toward the product (Bloch 1995; Crilly, Moultry, and Clarkson 2004). While both aesthetic and cognitive judgments are important to research on product design, there are numerous studies that examine cognitive responses to design, and very few that examine affective responses. Affective responses to product design occur nearly instantaneously, and consumers are generally unaware of the process that leads to this evaluation. Therefore, aesthetic judgment is primarily affective in nature and cognitive judgments tend to serve as a follow-up to these initial judgments (Leder et al. 2004; Page and Herr 2002).

Affective reactions to aesthetic stimuli have been described as the feeling, liking, or emotion engendered either by a stimulating object (Berlyne 1971) or environment (Mehrabian and Russell 1974). Research in art and psychobiology has focused on the increased levels of arousal and pleasure that are felt from experiencing a work of art (Holbrook and Anand 1992; Leder 2001) while only a few studies in aesthetics have been concerned with the cognitive response, in the form of meaningfulness or value (e.g., Russell and Milne 1997; Russell 2003).

It is proposed that increased levels of arousal with a product in turn lead to increased approach tendencies towards that object (Bloch 1995). These approach tendencies may include preference, liking, exploration, and willingness to buy

(Mehrabian and Russell 1974). It is important however to distinguish between these two states. The first, liking a product, is an emotional response, whereas approach, is the manifestation of this response in a particular behavior. While positive affect will likely lead to approach behaviors toward the product, it is not a sufficient condition. Therefore, the preference for moderate degrees of newness, and the affective reaction towards new products suggests the following hypothesized relationship.

**H1: Consumers prefer a moderate amount of visual product newness (VPN). ( $\cap$  relationship)**

### **Context Effects**

Products are introduced into a specific social and cultural environment and this context will influence the evaluation of the product (Adaval and Monroe 2002). Products cannot be divorced from this reality, and this reality will have an impact on the reactions that consumers have to a particular product design. This section examines three context factors that can shape consumers' evaluations of product newness: marketing variables, cultural and social influence, and product and industry factors.

#### *Marketing Variables*

There is an integrative relationship between the components of the marketing program and product design cues. For example, advertising and marketing communication may be used to signal product newness. Consumers use advertising as a tentative conjecture or cue about a product prior to evaluation (Hoch 1986; Mukherjee and Hoyer 2001) and advertising may play a powerful role in signaling the imagery of the new product (Dahl and Hoeffler 2004). In addition to verbal cues in the advertisement,

analogies and comparisons are another effective means of communicating the unique features of the product (Gregan-Paxton et al. 2002). Consumers will use images from current and past advertisements to form the category schema that they use to evaluate product newness. Therefore, both the current marketing communication associated with a new product and the past communication in the product category may influence consumers' evaluations of visual product newness.

### *Cultural and Social Influences*

Culture may also impact consumers' reactions toward product newness. McCracken (1986) notes that prior to the 18<sup>th</sup> century, goods were preferred for their patina; they were valued for their history. A transformation took place with the industrial revolution in the 18<sup>th</sup> century. As the aristocracy became enamored with new styles and fashions, this was emulated by the lower classes. A desire for the old was exchanged for a desire for the new. In this cultural context, newness was valued more highly than in the earlier period. Now, cultural values differ across nations as well as across times. While styles and trends in design are specific to time periods, many design styles also vary across cultures. Members of different nationalities will interpret product symbols in different ways. Design trends are specific to the cultural context and evaluations of visual product newness are dependent upon shared cultural understanding.

The social context in which the product is encountered may also have an effect on the appraisal of the product. The presence of others may influence a consumer's reaction to a product (Belk 1975). The social setting, in which a new product is encountered, may temper the affective reactions to the design of a product. If, for example, the other

members of a social group dismiss a product as ‘just like the last model’, it is less likely that the consumer will view the product as new. The consumer is still drawing from their past knowledge of the category to infer a judgment of newness, but the weight given to this knowledge may be influenced by the judgment of others.

### *Industry Factors*

Buyers’ expectations of newness will vary by industry. The auto industry, for example, expects minor incremental adjustments annually, mid-cycle freshening, and a complete redesign or replacement of a car every 5-7 years. Fashion, on the other hand, expects new styles two to four times a year. At the other end of the scale, industrial products may have an extremely long cycle time between innovations.

The type of product will have an impact on the importance that the individual places on aesthetic dimensions in product evaluations. For industrial products, one would expect that design plays a smaller part in the buyer’s evaluation. Research has found that aesthetic considerations still have an impact (Veryzer 1998a; Yamamoto and Lambert 1994). On the other end of the continuum, one would expect the evaluation of fashion items rely nearly exclusively on product design and aesthetics.

### **Individual Differences**

Visual newness tends to engender emotional responses in consumers and this response will be translated into a more positive approach tendency toward the product, a positive evaluation of the product, and a preference for the product. However, all consumers are not the same, and it is possible that there are some individual differences

in consumers that will elicit different responses to the same visual design. This section will examine some of these differences and the way that they moderate the relationship between visual newness and affective response.

The perception of newness is based on the observation of the new product by the consumer. It is important that the individual characteristics of the consumer are also considered. Most of the research on individual differences in adoption behaviors has focused on categorizing adopters into the Rogers (1962) diffusion groupings: innovators, early adopters, early majority, late majority, and laggards. This broad categorization is wholly unsatisfying and one may expect that a category that encompasses over 30% of the adopting population is unlikely to be completely homogenous. Instead, individuals that belong to these groups may have differing levels of trait variables that, together, tend to motivate their behavior. Therefore, the same product may be defined with varying degrees of newness by different consumers. There are numerous variables that could account for these differences, but this dissertation will focus on three variables that are likely to impact the perception and adoption of visual newness: consumer innovativeness, design acumen, and need for uniqueness.

### *Consumer Innovativeness*

From the earliest research on consumer innovation, it has been recognized that consumers vary in their willingness to adopt new products (Rogers 1962). There are really two approaches to studying the characteristics of these different adopters. The first is to examine individual levels on a variety of traits such as age, education, and opinion leadership (Dickerson and Gentry 1983; Lassar, Manolis, and Lassar 2005). The second

approach, proposes that consumer innovators can be identified by an exhibited individual predisposition towards innovations referred to as ‘innate consumer innovativeness’ (Hirschman 1980a; Midgley and Dowling 1978). For purposes of this dissertation, the latter approach is used.

Consumers who are high in innovativeness will seek higher levels of newness and will exhibit greater preference for products that they perceive as new. This preference will be tempered by consumers’ preference for moderate levels of stimulation. Therefore, it is expected that there will be a lateral shift in the placement of the inverse-U relationship between newness and preference, for those high and low in innovativeness.

Just as newness can be examined from a functional or aesthetic perspective, so too can the consumer innovativeness trait be examined from the functional or the visual. Venkatraman and Price (1990) proposed that innovativeness can be distinguished as cognitive or sensory. Consumers have an underlying predisposition toward either cognitive stimuli that is, those that stimulate the mind; or affective stimuli, that is, those that stimulate the senses (Hirschman 1984). Cognitive innovators enjoy new experiences that stimulate thinking. People in this category would be more interested in comparing the specifications of a new computer, and would be less interested in the design of the computer. On the other hand, sensory innovators have a higher level of optimal arousal, and seek experiences that will allow them to maintain this level of arousal. They prefer visually oriented strategies of processing information (Hirschman 1984). Sensory innovators therefore, will be more drawn to product design that is unique, novel, and atypical, as they will quickly become bored with prototypical product designs. This is consistent with the conceptualization examined in this dissertation, that sensory stimuli

are more closely related to affective states, whereas functional stimuli are more closely related to cognitive states.

Past research in this area tested the difference between cognitive and sensory innovativeness on the willingness to buy new products (Venkatraman and Price 1990). Cognitive innovativeness was found to have a much stronger relationship with degree of product newness than sensory innovativeness. Like other research on innovation, the researchers only provided the subjects with a written description of the product and no visual stimuli. It is not surprising that subjects who were high in sensory innovativeness did not exhibit a particularly high preference for newness. They were not presented with stimuli that reflected their preferred mental processing format. This dissertation will provide subjects with a visual stimulus. The opposite result is expected in this context; those high in cognitive innovativeness will exhibit a weaker preference relationship with visual product newness than those high in sensory innovativeness. Consumers who are high in sensory innovativeness will be more attuned to visual newness than consumers who exhibit cognitive innovativeness.

**H2: Consumers who are high in innovativeness will exhibit greater preference for products that are higher in VPN than consumers who are low in consumer innovativeness.**

**H2a: Consumers who are high in sensory innovativeness will exhibit a greater preference for products that are higher in VPN than consumers who are low in sensory innovativeness.**

**H2b: Sensory innovativeness will have a greater moderating effect on preference for VPN than cognitive innovativeness.**

### *Design Acumen*

Not all people are immediately drawn to aesthetic stimuli, nor do they appreciate or recognize aesthetics at the same level. One would expect that people who work in

fields for which aesthetics are important, such as artists, architects, and graphic designers, have a higher level of skill and interest in recognizing and appreciating visual stimuli. It has been recognized that there may be enduring differences in the capacity of individuals to recognize and appreciate aesthetics. This may be an innate tendency with which we are born – called the ‘good eye’ (Csikszentmihalyi and Robinson 1990).

While there may be an innate preference for visual stimuli, this appreciation is not static. The appreciation of aesthetic stimuli is a skill that may be cultivated through repeated exposure and interest (Osborne 1986). The self taught genius is a rare and unusual thing; most artists, designers, and architects attend schools where their skill is cultivated and developed. Therefore, appreciation of aesthetics begins with an innate interest in the visual, and is cultivated and refined over time as part of an active consumption of aesthetic works.

A few studies have aimed to measure the individual characteristics that distinguish a more aesthetic, from a less aesthetic individual. Childers et al. (1985) proposed that individuals differ in their information processing. Some process information in a more visual manner (visualizers), whereas, others process information in a more verbal manner (verbalizers). The authors suggested that visualizers are more attuned to the visual portions of marketing messages, such as pictures in advertisements, while verbalizers are more attuned to textual elements. Visual design plays an important role in consumers’ acquisition of product information and some consumers are more interested in processing this visual design imagery. There are a few response tools which attempt to capture these individual differences in visual processing such as the Vividness

of Visual Imagery Questionnaire (VVIQ) (Marks 1973) and the Verbalizer Visualizer Questionnaire (VVQ) (Richardson 1977).

Bloch et al (2003) introduced the concept of the Centrality of Visual Product Aesthetics (CVPA) which suggests that consumers place varying levels of value on product aesthetics in the task of product evaluation. CVPA is conceptualized as an individual difference variable that represents the importance of visual aesthetics in consumers' information acquisition and decision making concerning particular goods. This construct encompasses similar dimensions to the VVIQ and the VVQ scales, and thus captures the importance of visual processing. Consumers with a higher CVPA will be more drawn to appealing forms and will be more likely to ascribe a higher value to products that exhibit a more beautiful or pleasing aesthetic form. It is also likely that consumers who are high in CVPA will demand greater newness, and for a product to be perceived as new to them, the product will need to exhibit greater change than would be necessary for lower newness consumers. This is demonstrated in the model by the dashed line between CVPA and perceptions of visual product newness.

It is hypothesized here that design acumen will impact newness evaluations at two levels. First, it will effect consumers' evaluation of product newness. Consumers who are high in CVPA are more capable of distinguishing finer differentiation in product design. Therefore, they will be more capable of expressing the cues that triggered product newness, and will therefore draw from a more accurate set of product schema. CVPA will also moderate the importance and weight that consumers place on visual form. People who more frequently attend to aesthetics, like architects and designers, are much more likely to seek pleasing forms in all facets of their lives. It is anticipated that, consumers

who are high in CVPA, will also seek greater visual newness in their product evaluations. These consumers will be more capable of recognizing, and categorizing, products based solely on the visual design, and will be more attuned to slight changes in product design. Because of the importance placed on design, they will seek new products, even when those products are merely structural changes to the product design with little functional changes. However, they are also likely to become bored quickly with stimuli that do not exhibit much novelty or newness. Like innovativeness, it is expected that higher levels of CVPA will result in a shift in the inverse-U shaped curve representing attractiveness against degree of newness.

**H3: Consumers who are high in design acumen (CVPA) will exhibit greater preference for VPN than consumers who are low in CVPA.**

#### *Need for Uniqueness*

Some consumers have a need to feel different from other people, and this need may be expressed in the products that they purchase and consume. This desire to be different from others has been called the need for uniqueness (Snyder and Fromkin 1980). This construct has typically been recognized as a trait variable that leads to an enduring tendency to seek dissimilarity from others (Thompson and Haytko 1997; Tian, Bearden, and Hunter 2001). Tian and colleagues (2001) propose that need for uniqueness is composed of three distinct dimensions: creative choice counter-conformity, unpopular choice counterconformity, and avoidance of similarity. Creative choice counterconformity drives consumers to select brands and products that are different from those typically consumed, but still fall into a wider range of acceptability. Unpopular choice counterconformity occurs when the individual selects products that differ from

their usual reference group, and set them apart as distinct from the group. Finally, avoidance of similarity occurs when the individual merely avoids brands or products that are commonly used (Tian, Bearden, and Hunter 2001). Interestingly, even though Western society is generally quite individualistic, it is unusually to find individuals that exhibit extreme levels of counterconformity, and instead the distribution of responses on this scale tends to more closely approximate a normal curve. In other words, people tend to prefer a moderate degree of dissimilarity from others (Snyder and Fromkin 1980).

This need for uniqueness is often manifest in consumer buying habits and behaviors (Simonson and Nowlis 2000). Consumers often find that products offer an effective means of expressing their uniqueness, because, expressing one's differentness through material items offers the opportunity to satisfy one's need for uniqueness without risking severe social penalties (Snyder 1992). Studies have identified fashion as an area where this need for uniqueness tends to emerge quite frequently. Those that are higher in avoidance of similarity tend to want to lead the trends, and as the trend becomes more common, they will look for the next trend (Thompson and Haytko 1997). In other words, these consumers are constantly seeking the next new product or new pleasure. Moreover, because of the ability to communicate this newness to the individual and to others, the visual form of the product is critical motivating the decision to purchase in order to fulfill need for uniqueness desires.

Consumers who are high in uniqueness are constantly seeking products that exhibit greater degrees of newness to maintain their differentness from others. Therefore, these consumers will find products that are high in newness more appealing than consumers that exhibit low need for uniqueness. In other words, need for uniqueness will

have a positive moderating effect on consumer's preference for, and attractiveness ratings of, visual product newness.

**H4: Consumers that are high in consumer need for uniqueness will exhibit greater preference for VPN than consumers that are low in need for uniqueness.**

### **Chapter Summary**

Understanding the way that consumers use visual product cues to infer the newness of the product is an important question that has not been addressed by marketing researchers. As indicated in the prior chapters, consumers clearly use the visual form of the product to evaluate the product. In fact, consumers are likely forming a judgment of the product, based on the visual form, before they spend any cognitive effort evaluating the features and specifications of the product. This chapter introduced the conceptual model that is guiding this dissertation and provided literature to support the model. There is little research that provides an indication of the relationship between changes in product form and consumer judgments of visual product newness, therefore the first part of the model remains relatively exploratory. It was noted that there are several individual factors that will moderate the relationship between product newness and liking for the new product. While some cognitive dimensions were addressed, this model focuses specifically on the affective reactions to visual design. It, therefore, represents only a portion of the total process of evaluation that is undertaken by consumers when evaluating a new product. However, this is a portion of the evaluation of newness that has received very little attention in the literature and deserves further study. The following

chapters will describe the empirical studies that were undertaken to address the exploratory questions and hypothesized relationships.

To study this preference for new products 3 separate studies were employed, with each study building on the analysis and results of the prior study. The purpose of the next chapters is to report the findings of these studies, which test the effect of visual product newness on consumers' evaluations of, and preferences for, new products. The first study uses a Q-sort task to identify products that represent these different levels of newness and to explore the characteristics that consumers focus on when evaluating visual product newness. To further delve into the non-conscious algorithms that consumers use when evaluating new products the second study uses an attribute elicitation technique. The second study examines the types of responses engendered by new product forms and tests whether product newness or CVPA affects the type of responses that emerge. The third study uses a between subjects experiment to test the hypothesized relationships proposed in this chapter. Chapter 4 reports the procedures and analysis of the new product sorting studies (studies 1a and 1b), Chapter 5 reports the procedures and analysis of the attribute elicitation study (study 2), and Chapter 6 reports the pretest, experimental procedures, and analysis of the repeated measures experimental design (study 3). The final discussion of the results and their implications will be reserved for chapter 7.

## CHAPTER 4 – NEWNESS PRODUCT SORT

### Introduction

The procedure in the first study is adapted from the Q-methodology sorting procedure (Stephenson 1975). The Q-methodology is principally intended to identify the individual's attitude toward a particular subject, it is also useful for identifying general attitudes that exist in the world at large (Brown 1980). Q-methodology is particularly valuable for studying complex issues, where it may be difficult for the individual to articulate the reasons that motivate their attitude toward the subject. In past research, this method has been used to study self-referent statements about social issues (Brown 1980), to study preferences for advertising and news articles (Cropp 1996; Lollar 1981; Wilson 2002), or about activities and actions in a public policy context (Chamberlin 2006). There is, however, no research that uses Q-methodology in the context of visual product stimuli, yet the attitude toward objects used in past Q studies are similar to the attitude toward products. Judgments of product form are very subjective, and individual differences are likely to determine the way that consumers interpret the visual product form (DeBono, Leavitt, and Backus 2003). Therefore Q-methodology procedures are particularly suited to this study as an exploratory technique (Stephenson 1988) which captures subjective and relative judgments about stimuli.

As noted in the nonconscious processing literature, individuals are capable of demonstrating a preference for certain stimuli, even when unable to articulate the reasons for this preference (Veryzer 1999). Consumers are able to identify what they think is 'new,' but may be unable to articulate why they have made this particular assumption. It

is up to the researchers, to identify characteristics that emerge consistently from the data, and suggest certain formal characteristics.

The purpose of this study is three-fold; first, the study aims to identify visual stimuli for study 3. Study 3 requires visual stimuli that represent high, medium, and low levels of visual product newness. By assigning these products to categories, using the Q-sort technique, participants identify the relative newness of the stimuli. Second, this study offers the opportunity to study the sorting task in more detail using non-metric multidimensional scaling which uses Euclidian distances to identify clusters of products based on their similarities on the sorting dimension. Third, this study is interested in exploring the dimensions of the product that consumers use when making judgments of product newness.

### **Study 1A**

Four product categories were identified selected after an extensive review of a number of design and technology oriented journals and magazines (e.g. *I.D.*, *Wired*, *Popular Science*, *The Futurist*), discussion with other design researchers, and researching online design message boards. This approach is similar to that used by Hoeffler (2003) for identifying radical new products. This preliminary research revealed a number of product categories that exhibit high levels of design activity and a wide variety of product forms: bicycles, espresso machines, toasters, and hand vacuums.

## *Bicycles*

Advances in bicycle design have accelerated in the last 15 years as new materials, such as carbon fiber, have enabled designers to violate the two triangle structural constraints of older bicycle designs. As a result, bicycle design receives a great deal of attention in design communities. For example, *International Design Magazine* (ID) ran a feature on carbon fiber bicycle design (Moll 2004), Muller (2001) used bicycle riding position as a way to describe product form, and the *International Council of Societies of Industrial Design* hosts an annual “International Bicycle Design Competition.”<sup>2</sup> Bicycles are also a product that most consumers will be familiar with at a basic level, yet only a small number of subjects are expected to be avid cyclists.

Preliminary research identified 195 innovative bicycle designs which ranged from innovative production bikes such as Orbea’s Orca bicycle – which was named bicycle of the year by a number of media outlets – to fantasy bicycle designs entered in design competitions that push the envelope of the product form such as the Egypt Bicycle. To reduce this initial pool of items, a set of basic criteria were applied to the products: the bicycles must have only two wheels, the rider must be in an upright or forward leaning position, and the bicycle must have a saddle that the rider straddles. This eliminated 111 bicycles such as recumbents, tricycles, and scooters, leaving 75 potential items.

## *Espresso Machines*

Like bicycles, coffee makers have also been the subject of design school studies. Muller (2001) highlighted coffee makers as a means of understanding the relationship between the form of design and the needs and perceptions of consumers. Whereas most

---

<sup>2</sup> <http://global.japandesign.ne.jp/COMPE/report/ibdc10/>

participants will be somewhat familiar with coffee makers, it is unlikely that they will be product experts. Kozinets (2002) identifies coffee message boards as providing a forum for a relatively exclusive group of people who are highly committed to coffee as a hobby. Like bicycles, most people are familiar with coffee makers, but only a limited number are highly involved.

A preliminary search for coffee makers uncovered approximately 86 machines. There was a clear difference in price and function of two broad categories of coffee makers – drip coffee makers and espresso makers. Examination of the product designs suggested that espresso makers had much more varied design characteristics and integrated the function of the machine more effectively into the design of the product. Therefore, the initial pool of items was reduced to 29, to include only espresso machines.

### *Toasters*

Another small appliance that is frequently kept in view yet often receives little attention is the toaster. As with espresso machines, toasters exhibit a wide range of design styles, but in this case the product generates much less enduring involvement. Once again, most consumers are familiar with toasters, but there are very few experts. The product has a clear single function, and it is often in view. Toasters have also been used in past design studies. Bloch et al. (2003) used toasters in a conjoint analysis of product design. A preliminary set of 154 toasters was reduced to 81 by eliminating 4 slot toasters, toasters that used non-conventional materials such as glass, and toasters that were novelty products such as Mickey Mouse toasters.

### *Hand Vacuums*

Vacuum cleaners are another product receiving considerable attention from designers. Like the other three product categories, all consumers are somewhat familiar with vacuums. While, bicycles and espresso makers may have highly involved consumers, vacuum cleaners are more like toasters, in that they have a very specific function and there are unlikely to be many people who exhibit high enduring involvement with the product. There are a number of styles and designs for vacuum cleaners, all of which have varying features and characteristics.

Hand vacuums are a subset of the product category that has a more singular purpose. Rather than including added features such as spot removal and shampooing, hand vacuums tend to have fairly defined product requirements of portability and suction power. While not as diverse as the upright category, there is still a wide variety of products, ranging from the original Black & Decker “Dustbuster” to the more recently introduced Dyson Root 6. The preliminary search revealed 51 hand vacuums, which were reduced to 37, by eliminating products with nearly identical design form and small variations on the same style, such as the various models of Dustbusters.

### **Stimulus Reduction**

#### *Materials*

A clean photo was prepared for each product. In developing these photographs, any distinguishing brand names were digitally removed. Each image was scaled to fit a 4”x 6” card and every effort was made to select photographs that showed the product in a similar orientation. The products were all printed in grayscale, on standard weight white

paper by a professional printing service. At this stage, backgrounds and other features such as slices of toast were left in the photographs. It was felt that experts could ignore these artifacts when making their judgments and that removing these would be too time consuming given the large number of products (200) still under consideration.

### *Expert Ratings*

A procedure for reducing the items was adapted from scale development item reduction (e.g., Bearden, Hardesty, and Rose 2001; Zaichkowsky 1985) and from item selection procedures in visual product design studies (e.g., Hsiao and Chen 2006; Whitfield and Slatter 1979). Five doctoral students from the university of Missouri were shown the 200 products representing the 4 product categories: bicycles, toasters, espresso makers, and hand vacuums. For each product, the experts were asked to evaluate the newness (does not look new at all, looks somewhat new, looks very new), attractiveness (unattractive, somewhat attractive, highly attractive), and representativeness of the product category (not at all representative, somewhat representative, highly representative). The five experts chosen were not product design experts; however, it was felt that they would understand the constructs of newness, attractiveness, and representativeness better than a layperson.

The purpose of this task was to identify a set of 20 products to be used in studies 1 and 2. Ratings were assigned to each of the responses with 0 = “product does not look new at all” to 2 = “product looks very new” in each of the three rating categories. Ratings were summed for each product; items that received high newness rating from all judges received a value of 10, while those that received low ratings from all judges received a

value of 0. The products were then sorted by newness and then attractiveness. What became apparent was that similar products tended to group together. Based on the summed ratings two products were picked from each level of newness (10,9,8,etc..), and one high ( $\geq 6$ ) and one low attractiveness ( $< 6$ ) product was selected at each level. If no products received a particular newness rating then a high, medium, and low attractiveness product was selected from the newness levels immediately above or below. This resulted in a total of twenty product stimuli for each product category.

### **Stimuli**

For the bicycles, toasters, hand vacuums, and espresso makers, images of each of the 80 final products were adjusted for consistency. Background colors, objects, and shadows were removed and all products were presented on a plain white background. Each product was scaled so that they were approximately the same size and the color of each image was adjusted to ensure approximately consistent saturation, lightness, and contrast with other products in the same product category. Five copies of each photograph were then printed by a professional photography studio on 4"x 6" glossy photo paper. A small sticker was affixed to the back of each photograph that indicated the items reference number and a randomly assigned number between 1 and 20.

### **Participants**

Participants were recruited from a senior class in marketing at the University of Missouri. Each subject received 2 points of bonus course credit for participating in the study. The researcher visited the class, explained the general purpose of the study, and

invited them to participate. Participants then signed up for the study by logging onto a web based sign up system. Only students registered in the class could sign up for the study. Fifty students participated in the study. There were 26 female and 24 male students, with a mean age of 21 years old. The majority (62%) were marketing majors.

### **Procedure**

When participants arrived they were invited to sit at one of five tables. Each table was configured in an L-shape. In front of the participants were 5 tabloid sized sheets of paper representing five categories. On their right side subjects were provided with the photographs of bicycles, toasters, hand vacuums, and espresso makers each in a separate no. 10, 4-1/8" x 9-1/2" white envelope. Each envelope had a sticker on the outside that indicated the product category. The products in each envelope were shuffled by the researcher so they were in random order and the product categories were presented to the participants in random order.

A booklet was placed on each table which included the consent form, sorting instructions, and measurement instruments (Appendix B). Participants were invited to read and sign the consent form and read the sorting instructions. The experiment administrator then reviewed the instructions with the participants. Only procedural instructions were mentioned in this description, for descriptions of the sorting criteria participants were directed to read the instructions.

Participants were instructed to sort the products into five groups based on the perceived newness of the product, from +1 to +5. The size of each group was set to yield a similar response distribution for later analysis; each respondent was asked to place 3

products in newness +1, 4 products in newness +2, 6 products in newness +3, 4 products in newness +4, and 3 products in newness +5. This forced distribution is preferable in Q-sort tasks that have greater than 2 rank order categories and less than total rank order. This approach ensures that there is some consistency among the judges in their categorization of the products and avoids arbitrarily-operating response sets (Block 1961). This forced Q-sort is less demanding on participants than a full rank ordering and therefore, makes it possible for the judges to sort more product categories with less fatigue.

The administrator stayed nearby during the first sort to make sure that all participants understood the procedure. After they had sorted each category, participants returned the sorted pile to the table on their right and proceeded to the next product category. The experiment administrator and assistant recorded the product numbers on a recording sheet and removed the products from the table as they were completed.

Once participants completed the sorting task they were invited to turn to the next page in the instrument where they were asked, in an open response format, to explain the criteria that they used in the sorting task. They also completed an involvement inventory for each category, the CVPA scale, and some demographic questions. Participants took between 30 and 45 minutes total to complete these tasks.

### **Analysis**

Participants in this study sorted the data based on the Q-methodology sorting procedure, that is, each product was assigned a value between 1 and 5 that represented its relative degree of newness when compared to the other items under consideration.

Although the Q-sort method is primarily intended to study individual differences, the structure of the sort, and the assignment of values to the data, also allowed for global comparisons across items. This study is concerned with both exploring the dimensions of newness and with identifying high, medium, and low newness products to be used as stimuli in study 3.

Descriptive statistics on the four product category sorts reveal a definite sorting order for each product (Tables 1-4). The means of each item provide a level of newness, while the variance indicates the amount of agreement in the product category assignment. These tables provide a first tool to select high, medium, and low stimuli. The goal is to select stimuli with adequate variance in perceived newness. The selection of the products for study 3 is part science and part art, therefore, this section will just highlight the first statistical procedure; an MDS analysis was performed on the data before the products were selected for study 3.

### *Bicycles*

Bicycles showed the most consistency among observers and the smallest variance of the four product categories. A number of products that were evaluated as highest and lowest on product newness also exhibited ranges of 2 or 3. This suggests that there were few participants that placed this product at the opposite extreme and instead the stimulus was consistently placed at the same end of the newness scale. These smaller ranges were also reflected in variances that were consistently less than 1.00 and the difference between the average score of the newest product ( $\mu=4.66$ ) and the least new product

( $\mu=1.52$ ) was quite large ( $\Delta=3.14$ ). There was therefore easily enough differentiation to select three products from among these 20 stimuli.

Table 1: Descriptive Statistics Bicycles Sorting Task

Bicycle	N	Range	Mean	Std. Dev.	Var.
B39	50	2	4.66	0.59	0.35
B16	50	4	4.56	0.86	0.74
B65	50	2	4.06	0.71	0.51
B22	50	4	3.98	0.94	0.88
B9	50	4	3.86	0.93	0.86
B41	50	3	3.74	0.80	0.65
B50	50	3	3.56	0.84	0.70
B6	50	4	3.46	1.01	1.03
B58	50	4	3.06	0.84	0.71
B12	50	4	3.04	0.92	0.86
B60	50	4	2.94	0.77	0.59
B5	50	4	2.88	0.80	0.64
B74	50	4	2.82	0.92	0.84
B72	50	4	2.66	0.82	0.68
B47	50	3	2.24	0.74	0.55
B2	50	2	2.16	0.68	0.46
B36	50	4	1.7	0.95	0.91
B70	50	3	1.58	0.76	0.58
B73	50	3	1.52	0.74	0.54
B21	50	3	1.52	0.76	0.58

### *Espresso Makers*

Espresso makers exhibited the weakest consistency. The range exhibited between the product with the highest mean product position ( $\mu=4.42$ ) and the lowest ( $\mu=1.6$ ) was small ( $\Delta=2.82$ ). This was further evidence in the fact that there were very few products that were sorted into only 3 categories (5) and there were none that were sorted into only 2. The remaining products were assigned to four different levels of newness. This suggests that participants had a difficult time sorting these products and assigning them to different levels of newness. There were however, a number of products that had exhibited

relatively low variance ( $<1$ ) which suggests that there were a few products where most participants sorted them consistently, while one or two placed them in outlying categories. Therefore, there is still the possibility of selecting three levels of newness, although caution must be taken, as the differentiation among the three products is likely to be relatively small.

Table 2: Descriptive Statistics Espresso Makers Sorting Task

Espresso Maker	N	Range	Mean	Std. Dev.	Var.
EM30	50	4	4.42	1.07	1.15
EM16	50	4	4.08	1.12	1.26
EM24	50	4	3.98	1.00	1.00
EM7	50	3	3.88	0.92	0.84
EM15	50	4	3.62	1.21	1.46
EM18	50	4	3.44	1.03	1.07
EM29	50	4	3.4	0.97	0.94
EM19	50	4	3.34	1.08	1.17
EM27	50	4	3.28	0.97	0.94
EM2	50	4	3.2	1.11	1.22
EM21	50	4	2.98	0.91	0.84
EM20	50	4	2.94	1.15	1.32
EM12	50	4	2.62	0.90	0.81
EM28	50	4	2.6	1.25	1.55
EM35	50	3	2.5	0.76	0.58
EM9	50	4	2.16	1.06	1.12
EM37	50	3	2.04	0.86	0.73
EM17	50	4	1.96	0.95	0.90
EM14	50	3	1.96	0.86	0.73
EM36	50	3	1.6	0.76	0.57

### *Toasters*

Toasters also exhibited a good distribution. Once again, a large number of the stimuli (11), with a mean score near the top and the bottom, also showed relatively small ranges of 2 or 3. In fact, participants were more precise in this sense with their evaluation of toasters than they were in their evaluation of the bicycles. However, the overall variance was somewhat higher, particularly in the middle range, where a number of the products

exhibited variances in excess of 2.00. Participants were much less consistent in their evaluation of toasters, yet there are enough toasters with variance that approaches 1 or less that suggests that these products would be fairly consistently rated at this level of newness. Furthermore, the total difference between the average score of the newest product ( $\mu=4.58$ ) and the least new product ( $\mu=1.68$ ) was also reasonably large ( $\Delta=2.9$ ) suggesting that there was adequate discrimination in the data.

Table 3: Descriptive Statistics Toasters Sorting Task

Toaster	N	Range	Mean	Std. Dev.	Var.
T70	50	3	4.58	0.88	0.78
T9	50	3	4.1	1.04	1.07
T12	50	3	4.02	0.91	0.84
T5	50	2	3.62	0.67	0.44
T36	50	4	3.58	1.05	1.11
T23	50	4	3.38	1.09	1.18
T27	50	3	3.38	0.95	0.89
T7	50	3	3.36	0.88	0.77
T76	50	4	3.22	0.97	0.95
T75	50	4	2.94	1.53	2.34
T74	50	4	2.9	1.02	1.03
T38	50	4	2.78	1.47	2.18
T81	50	4	2.74	1.48	2.20
T26	50	3	2.58	0.84	0.70
T8	50	3	2.52	0.89	0.79
T63	50	3	2.46	0.81	0.66
T56	50	3	2.28	0.93	0.86
T51	50	3	1.98	0.82	0.67
T24	50	3	1.88	0.85	0.72
T77	50	3	1.68	0.94	0.88

### *Hand Vacuums*

The hand vacuums have the greatest total range of responses of the four categories. The difference between the products with the highest ( $\mu=4.7$ ) and lowest ( $\mu=1.4$ ) average newness ranking is quite large ( $\Delta=3.3$ ) and the products near the top and bottom of the average newness rating also had relatively small ranges of 2 and 3. However, all of the

remaining products have ranges of 4 and consistently have variance that is greater than 1. This suggests that participants easily identified a few products as belonging in the top or the bottom, but had a much harder time assigning the products in the middle categories. Once again, it may be easy to identify high and low newness stimuli, but more difficult to identify those that fall in the middle.

Table 4: Descriptive Statistics Hand Vacuums Sorting Task

Hand Vacuum	N	Range	Mean	Std. Dev.	Var.
HV1	50	2	4.7	0.65	0.42
HV30	50	3	4.36	0.88	0.77
HV12	50	4	3.88	0.92	0.84
HV8	50	4	3.54	1.05	1.11
HV7	50	4	3.46	1.05	1.11
HV13	50	4	3.36	0.90	0.81
HV27	50	4	3.26	1.14	1.30
HV14	50	4	3.18	1.00	1.01
HV26	50	4	3.16	1.15	1.32
HV18	50	4	3.06	0.96	0.91
HV2	50	4	3.04	0.92	0.86
HV15	50	4	2.96	1.01	1.02
HV3	50	4	2.94	1.17	1.36
HV34	50	4	2.9	1.15	1.32
HV21	50	4	2.88	1.21	1.45
HV24	50	4	2.4	0.90	0.82
HV20	50	3	2.32	0.89	0.79
HV4	50	3	1.74	0.80	0.65
HV23	50	2	1.46	0.65	0.42
HV22	50	2	1.4	0.67	0.45

### Multidimensional Scaling

Non-metric multidimensional scaling (MDS) is an exploratory technique which positions stimuli on a two-dimensional perceptual map that represents the relative distances of the stimuli to one another (Green, Tull, and Albaum 1988). The non-metric

approach allows this placement to be accomplished using ranking data and MDS uses Euclidian distance algorithms that place these stimuli in a perceptual space relative to one another. This approach is particularly useful in examining new products and product concepts (Green, Tull, and Albaum 1988), the design of optimal products (Carroll and Green 1997) and test marketing (Green, Carmone, and Marketing Science Institute 1970).

In marketing, multidimensional scaling, has received more attention as a tool for practitioners than it has in basic research, since its first appearance in the *Journal of Marketing* (Nedell 1969). MDS has received much more attention in psychology where it has been employed to examine how individuals organize perceptual stimuli (Nezlek, Austin-Lane, and Null 2001; Treat et al. 2002) and has been applied to a number of different types of stimuli including phonetic sounds (Francis and Nusbaum 2002), music (Bigand et al. 2005) or pictures (Kupke 2004; Viken et al. 2002). Moreover, the emphasis of data visualization in this technique (Van Wezel and Kusters 2004) makes it particularly suited to research on visual product stimuli.

According to the sorting task, each product is either similar or dissimilar with each other product. Using a Euclidian distance calculation, of the following form, enables the quantification of the average similarity (dissimilarity) of each product.

$$d = \left( \sum_{i=1}^n |x_i - y_i|^2 \right)^{\frac{1}{2}} \quad (1)$$

The distances between the stimuli were converted into a rank ordering. The stimulus pair that is most similar, i.e., they had the lowest distance value, was given a value of 1, the next most similar a value of 2, etc... The stimulus pairs were all assigned a rank from 1 to 190, these ordinal ranks are provided in Tables 5-8.

Table 5: Bicycles Ordinal Distance Ranks

	B50	B74	B12	B72	B47	B70	B60	B2	B41	B39	B22	B65	B5	B36	B73	B21	B58	B16	B6	B9
B50	-																			
B74	89	-																		
B12	82	33	-																	
B72	46	39	86	-																
B47	110	47	91	13	-															
B70	155	128	138	72	16	-														
B60	34	56	26	10	30	102	-													
B2	105	80	71	20	5	9	38	-												
B41	19	85	83	74	131	153	64	127	-											
B39	92	148	123	159	170	186	137	173	75	-										
B22	77	98	84	135	151	180	116	152	15	36	-									
B65	24	114	90	120	149	174	73	150	22	6	50	-								
B5	52	25	35	8	44	107	17	41	60	143	104	94	-							
B36	157	101	124	106	51	49	125	27	164	183	168	177	113	-						
B73	154	130	142	59	31	2	112	14	166	190	181	178	117	55	-					
B21	156	126	144	78	40	3	108	28	167	189	182	179	121	48	1	-				
B58	79	18	12	43	81	141	32	69	42	129	66	62	21	122	139	140	-			
B16	97	145	134	158	169	185	132	172	93	4	70	7	147	184	187	188	136	-		
B6	63	87	11	111	119	161	57	118	65	103	58	67	61	153	163	161	45	109	-	
B9	54	99	100	115	133	171	88	146	29	53	23	37	95	165	176	175	68	96	76	-

Table 6: Espresso Makers Ordinal Distance Ranks

	EM17	EM19	EM30	EM28	EM35	EM14	EM37	EM29	EM16	EM24	EM12	EM15	EM9	EM18	EM2	EM36	EM7	EM27	EM21	EM20
EM17	-																			
EM19	137	-																		
EM30	188	120	-																	
EM28	31	113	168	-																
EM35	34	80	176	85	-															
EM14	32	128	189	111	9	-														
EM37	22	129	185	92	7	2	-													
EM29	124	37	132	82	53	145	138	-												
EM16	184	115	15	166	156	182	180	51	-											
EM24	178	71	40	159	118	169	165	63	70	-										
EM12	43	86	177	68	1	26	27	39	150	134	-									
EM15	172	108	121	163	93	161	158	98	102	52	106	-								
EM9	11	125	183	23	54	46	29	136	173	174	76	164	-							
EM18	154	66	133	151	18	131	140	56	112	75	64	6	148	-						
EM2	130	61	73	59	89	141	105	60	78	99	100	135	67	107	-					
EM36	4	157	190	101	21	14	8	153	187	186	30	179	47	162	152	-				
EM7	170	57	96	147	97	167	160	12	41	45	90	28	175	13	122	181	-			
EM27	126	19	123	65	38	127	109	20	104	83	49	116	95	72	10	146	33	-		
EM21	87	55	144	88	24	44	62	48	103	84	25	79	91	58	35	114	74	16	-	
EM20	119	81	171	149	5	50	94	69	155	110	17	36	139	3	142	143	77	117	42	-

Table 7: Toasters Ordinal Distance Ranks

	T23	T56	T63	T76	T9	T74	T26	T12	T81	T24	T27	T38	T8	T75	T7	T36	T51	T77	T5	T70	
T23	-																				
T56	89	-																			
T63	82	33	-																		
T76	46	39	86	-																	
T9	110	47	91	13	-																
T74	155	128	138	72	16	-															
T26	34	56	26	10	30	102	-														
T12	105	80	71	20	5	9	38	-													
T81	19	85	83	74	131	162	64	127	-												
T24	92	148	123	159	170	186	137	173	75	-											
T27	77	98	84	135	151	180	116	152	15	36	-										
T38	24	114	90	120	149	174	73	150	22	6	50	-									
T8	52	25	35	8	44	107	17	41	60	143	104	94	-								
T75	157	101	124	106	51	49	125	27	164	183	168	177	113	-							
T7	154	130	142	59	31	2	112	14	166	190	181	178	117	55	-						
T36	156	126	144	78	40	3	108	28	167	189	182	179	121	48	1	-					
T51	79	18	12	43	81	141	32	69	42	129	66	62	21	122	139	140	-				
T77	97	145	134	158	169	185	132	172	93	4	70	7	147	184	187	188	136	-			
T5	63	87	11	111	119	160	57	118	65	103	58	67	61	153	163	161	45	109	-		
T70	54	99	100	115	133	171	88	146	29	53	23	37	95	165	175	176	68	96	76	-	

71

Table 8: Hand Vacuums Ordinal Distance Ranks

	HV30	HV8	HV21	HV18	HV26	HV1	HV27	HV4	HV7	HV20	HV3	HV14	HV34	HV13	HV23	HV2	HV22	HV12	HV15	HV24	
HV30	-																				
HV8	75	-																			
HV21	167	81	-																		
HV18	122	69	54	-																	
HV26	85	111	149	71	-																
HV1	6	72	162	138	163	-															
HV27	133	59	103	53	95	117	-														
HV4	185	169	99	92	161	187	142	-													
HV7	127	18	65	26	119	88	40	157	-												
HV20	179	134	13	30	121	182	96	8	83	-											
HV3	137	97	136	73	58	164	90	126	115	125	-										
HV14	102	34	104	64	14	156	109	155	74	89	35	-									
HV34	128	131	135	67	4	173	101	151	116	93	80	16	-								
HV13	94	29	21	7	86	106	41	146	10	28	108	32	66	-							
HV23	186	176	150	159	145	189	168	9	177	49	144	147	118	172	-						
HV2	114	82	120	12	39	152	42	110	52	55	3	11	33	23	141	-					
HV22	188	178	154	153	170	190	166	2	174	50	132	165	158	171	1	139	-				
HV12	15	45	129	76	27	51	107	181	63	143	113	20	46	24	183	61	184	-			
HV15	123	17	43	25	70	160	68	124	48	56	77	38	84	36	130	57	148	105	-		
HV24	175	112	22	19	98	180	91	31	100	5	87	78	79	60	37	47	62	140	44	-	

72

Non-metric multidimensional scaling can use ordinal rankings to position the relative distances between stimuli, and it has been shown that when metric data is

Table 9: Non-metric Multidimensional Scaling Fit indices

	S-stress	Matrix	
		Stress	RSQ
Bicycles	0.04847	0.06832	0.98103
Toasters	0.04711	0.06832	0.98905
Hand Vacuums	0.09682	0.12049	0.93267
Espresso	0.09257	0.09845	0.9494
Pens	0.05798	0.0795	0.97511
Toothbrushes	0.05542	0.07106	0.97967

converted to ordinal rankings the results tend to be quite robust (Shepard 1962).

The ordinal data was analyzed using the ALSCAL procedure in SPSS v15. The iterations were set to continue until the improvement in the S-stress value is less than .001. The fit of the model is

determined by inspecting the S-stress and the RSQ (Takane, de Leeuw, and Young 1977; Young and Harris 2004). The reported fit indices are provided in Table 9.

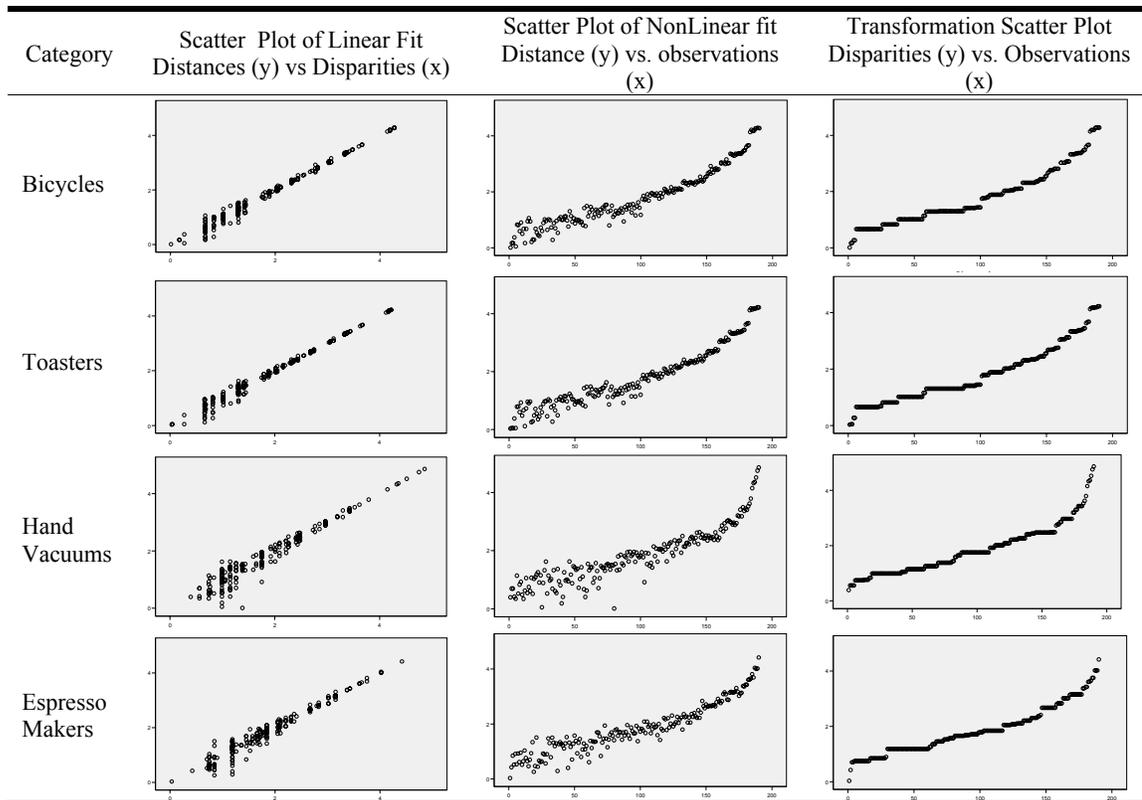
It is generally suggested that values that are at least .05 below the null hypothesis value, indicate rejection of the null hypothesis (Green 1975). In this study there are 20 objects, and 2 dimensions, which under this heuristic, suggests that .300 can be achieved under the null hypothesis, and anything below .250 indicates that there is structure to the data (Spence and Ogilvie 1973). According to this heuristic all four categories fall below the 0.25 heuristic for bicycles (S=.048), toasters (S=.047), espresso makers (S=.093), and hand vacuums (S=.097)

The second fit measure, RSQ, indicates a better fit as the value approaches 1. There are no established cutoff values in the literature. In this study, the RSQ was greater than 0.9 for all four product categories, which, combined with the Stress values, suggest a reasonable fit to the data. These results suggest that the dimensionality exhibits a

structure that differs from a merely random structure, and the organization, groupings, and dimensions that are indicated offer valid insights into the construct under study.

One final underlying test of the validity of the MDS results is performed by inspecting three scatter plots generated by the data fitting analysis (Figure 3). The three plots are; (1) the scatter plot of linear fit, which plots the monotonically transformed data (disparities) on the x axis against the distances on the y axis; (2) the scatter plot of nonlinear fit, which plots the raw data on the x axis against the distances on the y axis; and (3) the plot of transformation which plots the raw data on the x axis against the monotonically transformed data on the y axis (Young and Harris 2004).

Figure 3: MDS Plots of Disparity and linear fit



For the scatter plots an ideal demonstrates a monotonically increasing pattern with little dispersion. Patterns with greater linearity and smoothness exhibit good fit. There is some dispersion in each of the scatter plots, and it is most pronounced in the plots of the Espresso Makers and Hand Vacuums, which also demonstrate the greatest stress values. However, the dispersion in the scatter plot, occurs mostly for the small distances and disparities, and as the distances and disparities increase, the amount of scatter is minimal, and the pattern approaches a smooth monotonically increasing functions. This disparity in the smaller data is a common result and is an artifact of the S-stress fitting procedure, which tends to overfit large data values and underfit small ones (Young and Harris 2004). Therefore, this plot demonstrates that the derived solution exhibits reasonable fit in all 6 product categories.

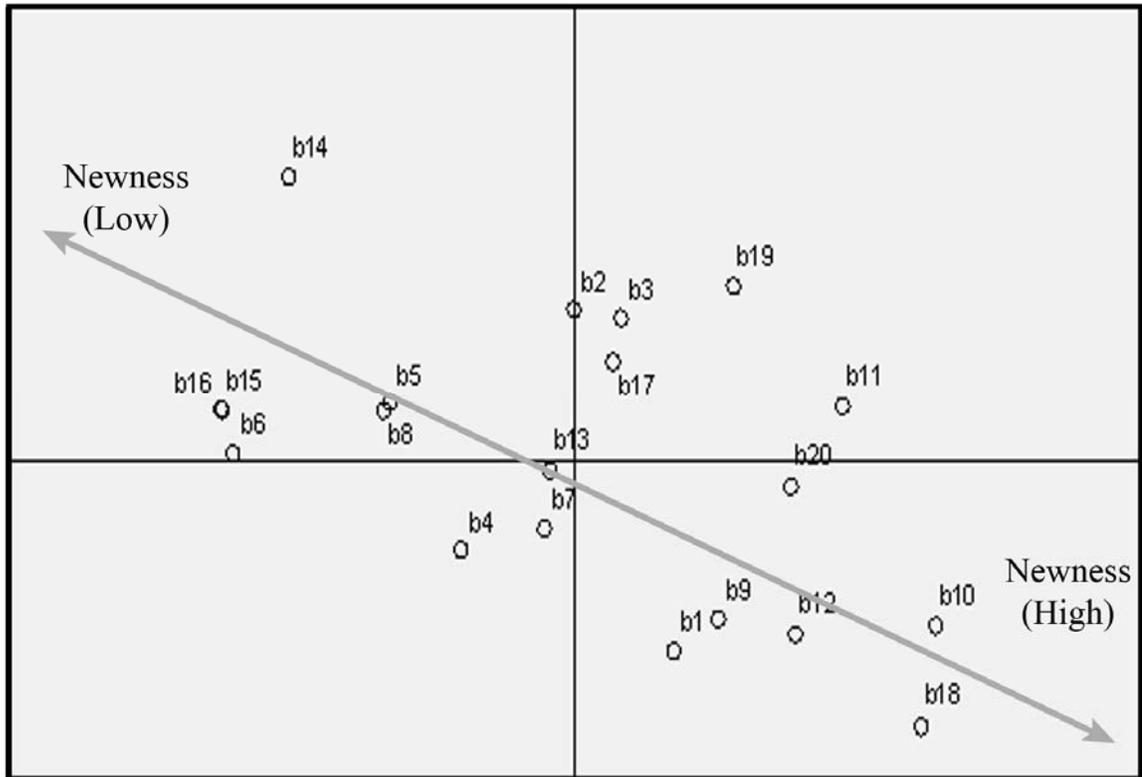
MDS requires that the researcher identifies dimensions upon which the participants have sorted the products. Researchers can choose between subjective and objective procedures for identifying the dimensions. Subjective procedures rely on the judgment of the researchers, other experts, or the participants themselves to interpret the dimensionality by inspecting the map. Objective procedures, on the other hand, rely on more formalized technique that collect attribute ratings for each object and finds the best correspondence of these attributes to the derived perceptual space (Hair et al. 1998). A subjective procedure is most appropriate in this instance for two reasons: first, a subjective procedure is more appropriate when data is affective, emotional, or highly intangible; and, second, this research is primarily exploratory, hence the number of established attributes variables was not established for use in an objective procedure.

Therefore, this data analysis clearly calls for a subjective approach to interpret and assign the dimensional axes.

To perform this task, the images of the products were placed on the derived, two-dimensional, perceptual space. These perceptual maps are shown in Figures 4-7. In each case the ALSCAL analysis assigned axes based on the final Euclidian iteration. It has been recognized that each dimension, as indicated in the two dimensional space, may actually represent a number of attributes, and it is not always clear that the x and y dimensions clearly belong to only one attribute. It is possible, however, that these axes are not the ideal positioning of the dimensionality and, instead, some rotation of the solution can help identify the attribute axes. The following sections will address the derived solution for each of the four product categories, and discuss the subjective dimensions being identified by the researcher. In all cases, the first and primary task was to define the axis of newness. When a second dimension also seemed to emerge from the data, an attempt was made to characterize and identify this dimension.

This section will also identify the product selection that was made for study 3 in conjunction with the descriptive statistics reported earlier. As a general procedure, once an axis of newness was identified, three products were identified that were as close to that axis as possible, without deviating along the other axis. It was felt that, by selecting products that differ in newness, but do not vary as much on another dimension, this would minimize the potential for confounding dimensions in study 3. In summary, the following sections will identify the subjective interpretation of the derived perceptual space, and select three stimuli for study 3.

Figure 4: Bicycles Multidimensional Scaling



### *Bicycles*

In the derived perceptual space of bicycles, there is a clear movement from left to right with a slight downward slope that suggests an axis of newness. On the far left are more traditional bicycles with the standard two triangle frame and spoked wheels. The first grouping away from these low newness objects maintains the basic triangle form, but begins to use the triangles in different ways. One of these bikes is composed of a number of smaller triangles and the other shrinks the main triangle. In both of these cases the triangle that connects the rear wheel to the seat and the hub, has been replaced by a single arm that suggests some sort of suspension system. Moving further along the axis the shape of the frame takes on a monocoque appearance, with bicycles such as the Cheetah (B5) and the Lotus (B74). These bicycles abandon the traditional tubular frame

construction in favor of more advanced materials, such as carbon fiber, and as a result, they have a more streamlined appearance and less traditional shape. Reaching the far right of the newness axis, are bicycles which challenge the traditional independent steering tube at the front of the bicycle. These products take the modern frame design and suggest a different, and perhaps even unusual or impossible, usage of the bicycle.

With the exception of the Rattan bicycle (B36) there was not a lot of variance from the proposed newness axis. This is consistent with the findings in the univariate statistics, that participants were actually relatively consistent in aligning these products along one clear newness dimension. Therefore, selecting products that represent high, medium, and low newness was relatively straightforward. This also meant that in addition to the placement along the line, there was some freedom to select bicycles with consistent photographic orientation. The Kestrel (B21) and the Robertson (B16) bicycles were both rendered in Photoshop by designer Scott Robertson, so they had a relatively consistent look and orientation. They are also at either ends of the newness axis, with the Kestrel (B21;  $\mu= 1.52$ ,  $\sigma= 0.76$ ) representing low newness and the Robertson (B16;  $\mu= 4.56$ ,  $\sigma= 0.86$ ) representing high newness. The Cheetah (B5;  $\mu= 2.88$ ,  $\sigma= 0.80$ ) was selected to represent medium newness as it sits in the newness axis, was sorted near the midpoint by most participants, and was also photographed with a very similar orientation to the two Robertson designed bicycles.

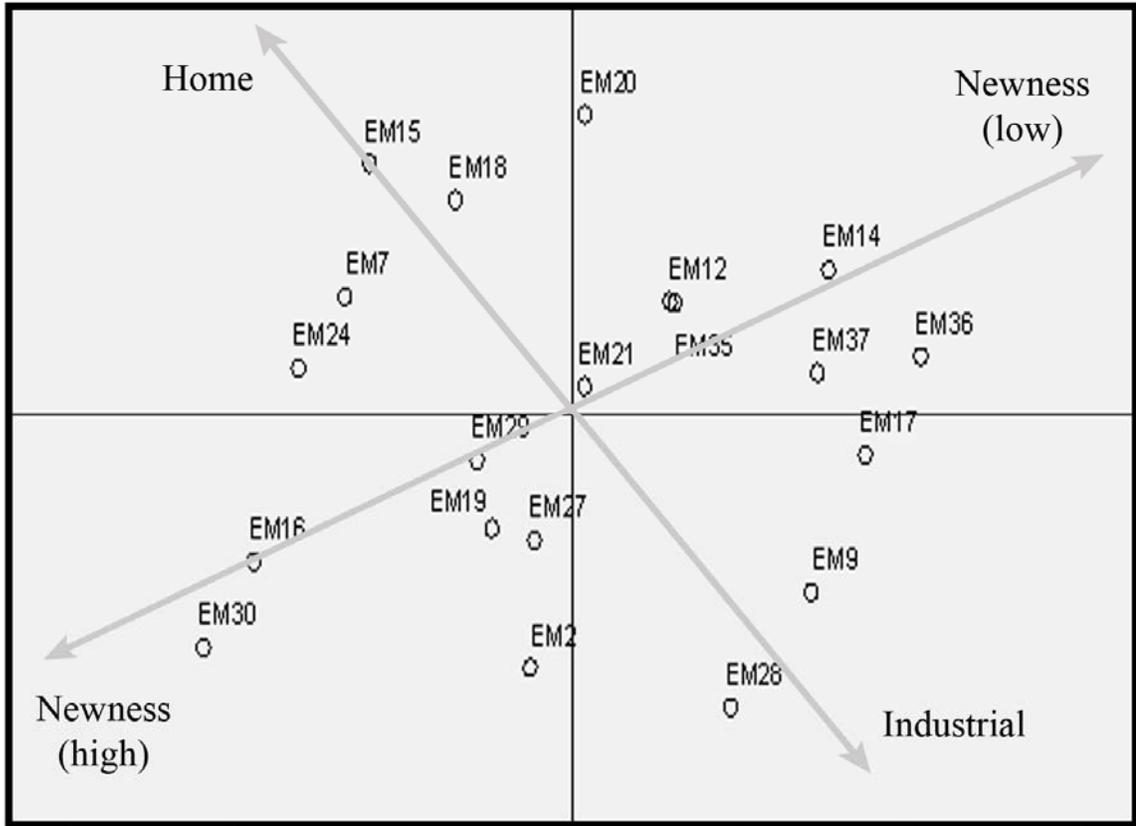
### *Espresso Makers*

While the espresso makers demonstrate greater S-stress than the bicycles, two axes emerge much more clearly from the MDS derived stimulus configuration. The first,

the newness axis, proceeds from the lower left quadrant to the upper right quadrant. At the high end of newness are the two espresso machines that were most novel, the ball espresso machine (EM30;  $\mu= 4.42$ ,  $\sigma= 1.07$ ) and the Bugatti cone shaped machine (EM16;  $\mu= 4.08$ ,  $\sigma= 1.12$ ). Each of these machines was fairly consistently assigned to the top newness category. These machines violated the conventional shape of kitchen appliances, which tend to be more boxy and angular. On the opposite end are a number of machines that meet this boxy and angular criteria EM36 ( $\mu= 1.6$ ,  $\sigma= 0.76$ ) and EM14 ( $\mu= 1.96$ ,  $\sigma= 0.86$ ). These machines are simple box machines with very few visible functions and a clear purpose as an espresso maker.

There is much more dispersion from this newness axis than was perceived in categories such as bicycles and this dispersion suggests a second, nearly perpendicular axis. This axis seems to suggest a range from products that are much more industrial and utilitarian at one extreme to products that are softer and more basic at the other extreme. The industrial products tend to have a more machined aesthetic with brushed metal finishes, novel metallic colors, and suggest more ruggedness in the design. At the other extreme are more homey products. These products are more organic in their form, with softer rounded edges and forms, with less harsh finishes such as plastics, and are typically in black or grey rather than the more metallic finishes. Those products at the extreme ends of the axis tend to have all of the characteristics while products that approach the center tend to have a combination of the characteristics from either end.

Figure 5: Espresso Maker Multidimensional Scaling



The product selection for the study 3 drew from products that were near the newness axis and did not approach one extreme of the other of the industrial/home axis. Therefore, the three products selected were the Bugatti Cone (EM16;  $\mu= 4.08$ ,  $\sigma= 1.12$ ) for the high newness stimulus; the La Pavoni LUSSO (EM21;  $\mu= 2.98$ ,  $\sigma= 0.91$ ) which appeared near the intersection of the two axes was selected for the medium newness stimulus; and the Briel Multipro Prestige (EM36;  $\mu= 1.6$ ,  $\sigma= 0.76$ ) which is positioned near the extreme end of the newness axis was selected for the low newness stimulus.

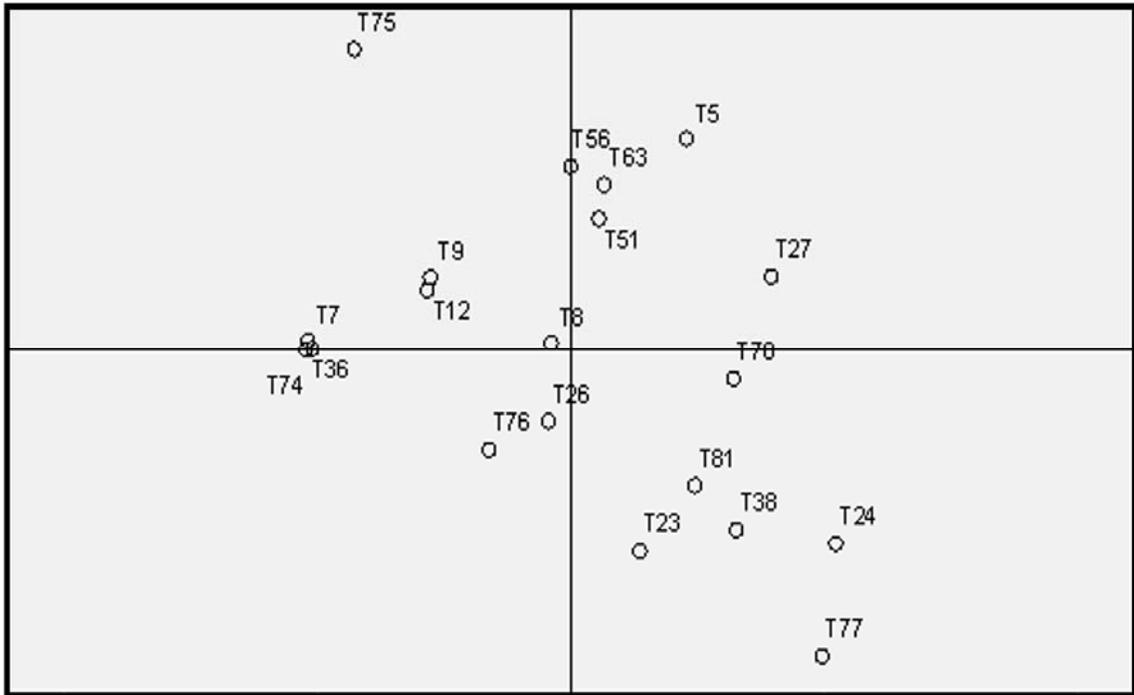
### *Toasters*

The derived stimulus configuration is much less revealing for the toasters. While the MDS stress indicates a significant solution, no clear axes emerge from the data. The most likely cause of this, is that, participants had a difficult time identifying and assigning products consistently to newness categories. As noted in the descriptive statistics, the toasters exhibited the greatest variance of all of the product categories, moreover, three of the stimuli exhibited a variance that exceeded 2.00. However, on a more positive note, the stimuli that appeared near the top and the bottom had relatively low variance and ranges. This suggests that there 3 or 4 toasters may have created some problems for respondents, and were therefore difficult to categorize. In particular the Phillips Yellow Toaster (T75;  $\mu= 2.95$ ,  $\sigma= 1.53$ ) appears in the upper left quadrant while the Porsche toaster (T70;  $\mu= 4.58$ ,  $\sigma= 0.88$ ) appeared near the midline of the graph in the right hand quadrant, not far from one of the oldest rated, retro styled toasters (T77;  $\mu= 1.68$ ,  $\sigma= 0.88$ ). As a result there is really no clear newness axis that emerges in the data. To ensure that a 2 dimensional scaling was most appropriate for this data, a 3 dimensional solution was also tested. However, this solution indicated a higher S-stress and lower RSQ than the two dimensional model and was therefore rejected.

The MDS model does not offer any additional insights to the descriptive statistics, and suggests that participants had a difficult time sorting these products. However, it was felt that selecting products with good discrimination in the mean sorts, would be adequate in selecting a product for study 3. In addition to this, products were selected based on some style similarities. Therefore, for the final study products that had a stainless steel finish, with either black, or no accents, were selected, that represented high medium and

low versions of the stimuli. Therefore, the Jenn Air (T9;  $\mu= 4.1, \sigma= 1.07$ ) was selected for the high newness stimulus, the Clatronic Lumina Toaster (T74;  $\mu= 2.9, \sigma= 1.03$ ) was selected for the medium newness stimulus, and the Cloer (T24;  $\mu= 1.88, \sigma= 0.72$ ) was selected for the low newness stimulus.

Figure 6: Toasters Multidimensional Scaling

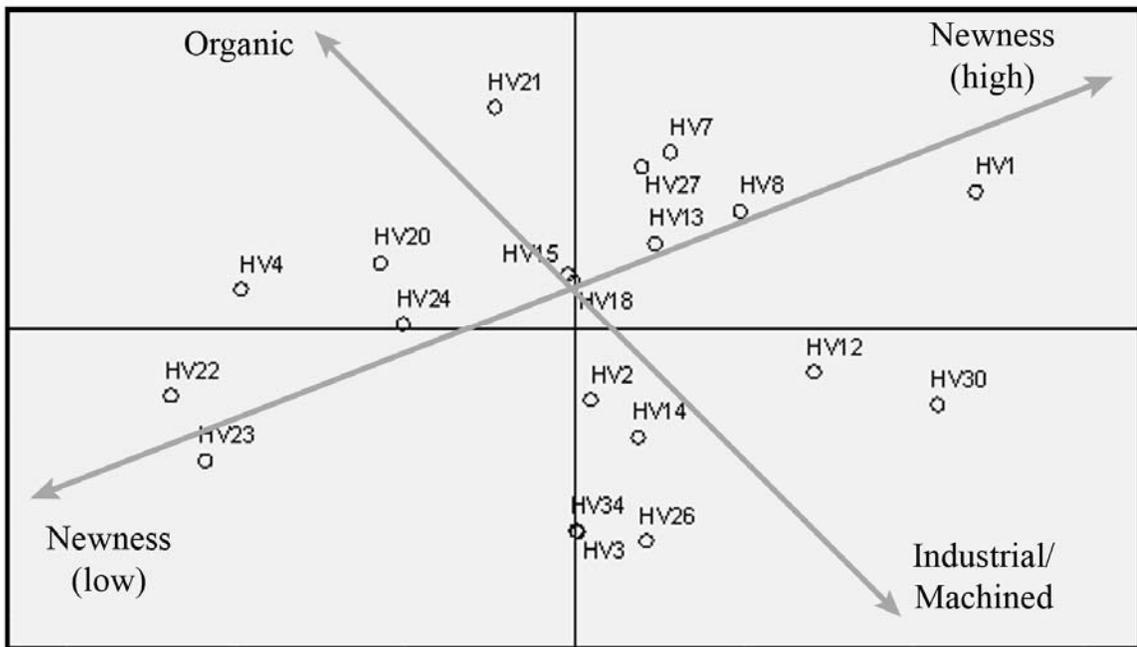


### *Hand Vacuums*

The hand vacuums derived perceptual plot indicated a clear newness axis, from low newness in the lower left quadrant to high newness in the upper right quadrant. At the high end of the axis is the Alesi hand vacuum (HV1;  $\mu= 4.7, \sigma= 0.65$ ), which was fairly consistently placed in the top category by most participants. At the opposite extreme are the traditional Dustbuster (HV22;  $\mu= 1.4, \sigma= 0.67$ ) and the Eureka (HV23;  $\mu= 1.46, \sigma= 0.65$ ). Interestingly both of these products had a light beige hue to them. It is also interesting that a different Dustbuster model (HV4;  $\mu= 1.74, \sigma= 0.80$ ) appears near HV22

but is off the axis. This product has a slightly different handle shape and is white with a light blue coloring. In addition to sitting slightly higher along the newness axis, the product form also begins to suggest a perpendicular axis. A similar deviation from the axis is also found on the high end. The Dyson Root 6 (HV30;  $\mu= 4.36$ ,  $\sigma= .88$ ) is also relatively high in newness but appears to deviate from the newness axis in the opposite direction from HV4. In this case, this vacuum has a much more angular and industrial look. It has clear canisters that show the dirt, and a form that suggests that it is quite powerful.

Figure 7: Hand Vacuum Multidimensional Scaling



Further examination suggests that there is some trend to this deviation from the newness axis. Vacuums in the bottom right quadrant appear more industrial. They have bright colors; they have exterior attachments and features; and they have clear components that enable the user to see the product functioning. On the other end of the axis are a number of products that are much more smooth and rounded in their form.

They tend to be more sleek and simple, and suggest a much more organic, form.

Therefore, this axis could be labeled as organic/industrial, or simple/complex.

Vacuums that varied less on the second dimension were chosen for study 3. HV1 it was felt was too extreme and the picture was shown in profile rather than a 3/4 view that was more common to the other products. Selecting the stimuli revealed another difference that could cause some confounding of the evaluation. That is, some of the products have simple nozzles while other products have brushes on the end of the nozzle. Therefore, a set of hand vacuums was selected that had brushes. This set included, the Eureka (HV23;  $\mu= 1.46$ ,  $\sigma= 0.65$ ) as the low newness stimulus, the Dirt Devil Classic (HV15;  $\mu= 2.96$ ,  $\sigma= 1.01$ ) as the medium newness stimulus, and the Fantom (HV12 ;  $\mu= 3.88$ ,  $\sigma= 0.92$ ) as the high newness stimulus.

### **Study 1B**

It is not uncommon in research on product design to use product pictures in place of real products. In fact, many studies of product design rely on line drawings in place of product pictures (e.g., Veryzer and Hutchinson 1998). A number of studies have shown that pictorial representations of products are appropriate for measuring marketing constructs (see Vriens et al. 1998), however, given the exploratory nature of this research, it was felt that using real products may offer some additional insights and further validation of the findings. Therefore, study 1a was replicated using real products: pens and toothbrushes.

## Stimulus Selection

A study by the Lemelson-MIT invention index <sup>3</sup> indicates that for Americans, the toothbrush was the most important invention of the 20<sup>th</sup> century. Americans are increasingly spending more money on oral hygiene and as a result innovation in toothbrushes is seen as a promising avenue for future market growth,<sup>4</sup> to the point where the ergonomics and features of the toothbrush have pushed the price of the product up to nearly \$5 (Johnson 2003). Firms use the styling and the design of the product to communicate the differences and the newness of their latest product. An item reduction was not necessary in this product category, because local retailers carried only about 25 different kinds of brushes, some of which represented very slight variations. Only manual brushes were considered for this research.

Similar to the toothbrush, pen manufacturers are frequently revising their pen designs to capture new market share. As they introduce a new product, that product is often also accompanied by styling shifts and changes to signal the newness of the product. For example, in the past 5 years, Pilot changed their “V-Ball” pen to a “V-Ball Grip” and then changed the design of both products again. In 5 years, Pilot has introduced 4 new versions of the same pen with no major functional improvement; most of the changes were cosmetic. The pens selected were disposable, with black ink, and a removable cap. Like toothbrushes, there was no item reduction necessary since local retailers only carry about 25 pens that fit these specifications, and several of these were slight modifications on the same product.

---

<sup>3</sup> <http://web.mit.edu/invent/n-pressreleases/n-press-03index.html>

<sup>4</sup> <http://www.cosmeticsdesign.com/news/ng.asp?id=61077-toothpaste-whitener-oral>

## **Stimuli**

From the twenty toothbrushes selected every attempt was made to ensure color consistency between products. However, because toothbrushes come in a variety of colors it was impossible to find enough toothbrushes of only one color. Blue and green were the most common toothbrush colors and were the most available. Two green and three blue toothbrushes were purchased for each of the 20 products and each subject received a full set of either green toothbrushes or blue toothbrushes. A small sticker was affixed to each toothbrush that covered the brand name while not covering the surface design. Each toothbrush was then randomly assigned to a number between 1 and 20, and this number was written on the sticker.

Five pens were purchased for each of the 20 pen styles. A small white sticker was used to cover the brand name on the pen. The sticker was cut so that it covered the brand name while minimizing the coverage of any surface design. Each pen was then randomly assigned to a number between 1 and 20, and this number was written on the sticker.

## **Procedure**

The Q-sort procedure from study 1a was replicated with the pens and toothbrushes as stimuli. The same participants completed the pens and toothbrushes sorts. Participants were presented with two 9x12 manila envelopes, one containing pens the other toothbrushes. The envelopes were presented in a random order. Participants were also provided with a small box with 5 compartments labeled +1 to +5. Once they had completed assigning the products to the 5 categories as described in study 1a, they

transferred the products to the box. The administrators then collected the box and recorded the sorting order.

## Analysis

### *Descriptive Statistics*

The descriptive statistics reveal a definite sorting order for both product categories (Tables 10-11). The pens and toothbrushes exhibited slightly greater differentiation than all four of the picture categories, and both exhibited strong consistency in the variance and range. The toothbrushes demonstrated a high level of consistency. Unlike the photographed categories, most of the products had relatively small ranges, between 1 and 3. There were only 7 products with ranges of 4.

Table 10: Descriptive Statistics Toothbrushes Sorting Task

Toothbrush	N	Range	Mean	Std. Dev.	Var.
tb4	50	3	4.62	0.70	0.49
tb13	50	2	4.52	0.68	0.46
tb20	50	3	4.28	0.70	0.49
tb12	50	4	4.2	0.81	0.65
tb18	50	4	4.12	0.82	0.68
tb1	50	3	3.64	0.83	0.68
tb14	50	3	3.6	0.81	0.65
tb17	50	3	3.14	0.67	0.45
tb11	50	3	3.12	0.72	0.52
tb19	50	3	3.06	0.65	0.42
tb10	50	4	2.84	0.77	0.59
tb9	50	4	2.82	1.08	1.17
tb7	50	4	2.72	0.73	0.53
tb6	50	4	2.46	1.09	1.19
tb3	50	3	2.32	0.71	0.51
tb15	50	3	2.2	0.86	0.73
tb16	50	3	2.12	0.75	0.56
tb2	50	4	1.54	0.89	0.78
tb8	50	2	1.4	0.67	0.45
tb5	50	1	1.28	0.45	0.21

This suggests that respondents were relatively consistent in their placement of the products. Moreover, there was even one product with a range of 1 (TB5,  $\mu=1.28$ ,  $\sigma=.45$ ). Unlike the photographed categories, the products with larger ranges were not clustered around the middle, and instead they were appeared throughout, in fact the product that was sorted as the third from the

bottom, had a range of 4 (TB2,  $\mu=1.54$ ,  $\sigma=.89$ ). Overall, there was relatively strong consistency among the sorts and good differentiation among the products. Only two products had variance greater than 1 and the difference between the mean of the highest newness product ( $\mu=4.62$ ) and the lowest ( $\mu=1.28$ ) was larger ( $\Delta=3.34$ ) than any of the photographed product categories.

Like the toothbrushes, the pens also demonstrated fairly high similarity among the sorts.

Table 11: Descriptive Statistics Pens Sorting Task

Pen	N	Range	Mean	Std. Dev.	Var.
p1	50	4	4.72	0.88	0.78
p15	50	3	4.18	0.85	0.72
p20	50	3	3.94	0.74	0.55
p17	50	2	3.9	0.76	0.58
p2	50	4	3.74	0.92	0.85
p11	50	4	3.74	1.07	1.14
p4	50	4	3.56	0.93	0.86
p14	50	4	3.38	0.88	0.77
p9	50	4	3.26	0.88	0.77
p6	50	3	3.24	0.85	0.72
p10	50	4	3.2	0.86	0.73
p13	50	4	2.84	1.17	1.36
p16	50	4	2.82	0.90	0.80
p12	50	4	2.42	0.84	0.70
p19	50	4	2.12	0.90	0.80
p8	50	3	2.1	0.81	0.66
p3	50	3	1.94	0.84	0.71
p5	50	3	1.82	0.87	0.76
p7	50	2	1.56	0.67	0.46
p18	50	3	1.38	0.75	0.57

Only two products had variances greater than 1. There was still however, a number of products with fairly large ranges. Even the product with the highest newness rating (P1,  $\mu=4.72$ ,  $\sigma=.88$ ) had a range of 4. This means that it was placed in both the highest and lowest newness categories. This is a particularly interesting finding because pen #1 is a very novel product called the *Pen Again*. Unlike the other products, this is an ergonomically designed pen that is shaped

like the letter Y. It is held in a unique way with the index finger resting on top. Even with the novelty of this product, at least one respondent placed the product in the lowest newness category. Overall, the pens, like the toothbrushes, demonstrated difference between the highest ( $\mu=4.72$ ) and the lowest ( $\mu=1.38$ ) mean sorts that was greater ( $\Delta=3.34$ ) than any of the photographed product categories.

Study 3 in this dissertation is an online study, and it does not lend itself to using these real products. Therefore, there is no need to select products for study 3. Nevertheless, a full analysis of these products was completed, like the other products as the results may be informative in understanding the construct of newness, and they may be of some value to future research.

### Multidimensional Scaling

The relative distances between the stimuli were converted to ordinal distance ranks using the same Euclidian distance approach as described in study 1a. The ordinal rankings between 1 and 190 are provided in Tables 12 and 13. A nonmetric MDS analysis using the ALSCAL procedure in SPSS v15 was used to test the data. The following sections report the fit of the model (Figure 8) and the interpretation of the derived stimulus set.

Figure 8: MDS Plots of Disparity and Linear Fit – Toothbrushes and Pens

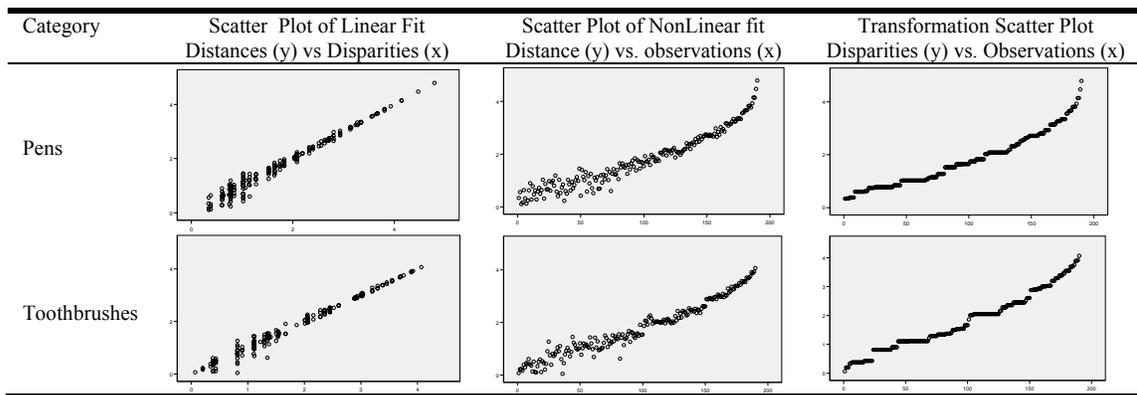


Table 12: Toothbrushes Ordinal Distance Ranks

	TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB9	TB10	TB11	TB12	TB13	TB14	TB15	TB16	TB17	TB18	TB19	TB20
TB1	-																			
TB2	160	-																		
TB3	114	85	-																	
TB4	94	188	167	-																
TB5	170	6	59	190	-															
TB6	111	115	72	171	98	-														
TB7	73	112	24	149	102	51	-													
TB8	164	1	46	189	3	118	103	-												
TB9	100	132	80	154	139	82	18	128	-											
TB10	45	124	33	144	121	43	14	116	61	-										
TB11	26	146	25	125	145	86	9	133	52	17	-									
TB12	66	180	148	7	183	153	107	181	140	109	84	-								
TB13	71	185	159	2	187	168	147	186	151	134	104	21	-							
TB14	36	161	108	83	169	122	77	166	99	53	42	48	79	-						
TB15	126	50	37	175	55	38	60	74	90	68	97	165	172	105	-					
TB16	136	32	27	174	47	65	56	40	87	54	95	162	173	106	4	-				
TB17	28	130	69	119	141	64	20	143	41	23	15	91	113	30	58	70	-			
TB18	67	176	142	13	179	152	117	178	138	110	76	22	10	49	156	155	92	-		
TB19	39	120	34	123	135	93	29	129	75	35	16	88	101	31	62	44	5	78	-	
TB20	63	177	150	8	184	157	131	182	137	127	96	12	11	57	158	163	89	19	81	-

06

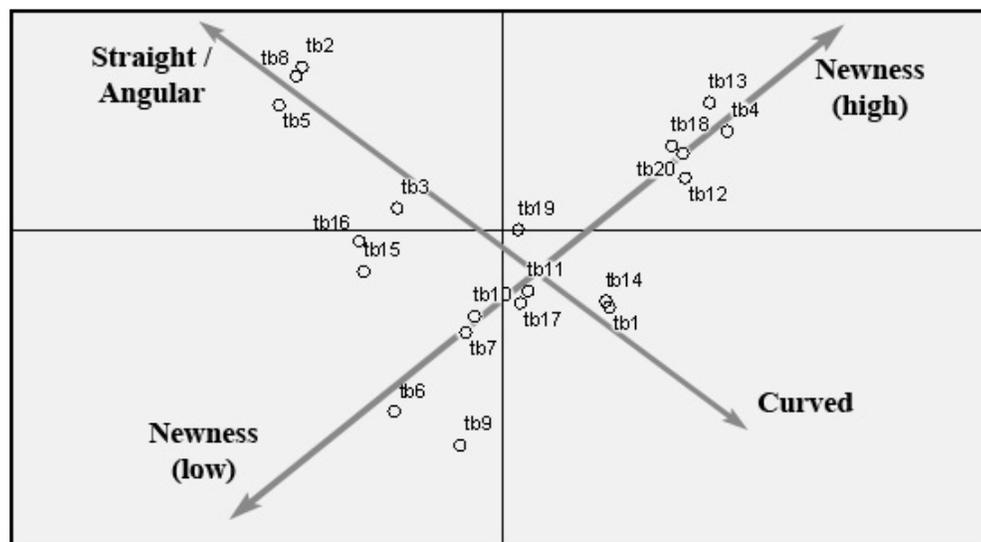
Table 13: Pens Ordinal Distance Ranks

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20
P1	-																			
P2	79	-																		
P3	186	156	-																	
P4	115	74	144	-																
P5	188	161	15	149	-															
P6	128	57	108	45	119	-														
P7	189	170	5	164	19	138	-													
P8	185	146	11	124	2	103	44	-												
P9	127	53	125	80	126	8	134	96	-											
P10	131	72	111	62	114	4	140	83	3	-										
P11	95	26	157	39	173	75	174	150	97	89	-									
P12	177	130	36	99	63	58	30	16	54	77	117	-								
P13	172	93	122	87	135	84	121	110	91	81	105	78	-							
P14	118	38	137	50	142	32	143	106	9	31	41	49	94	-						
P15	29	14	171	70	179	76	183	169	85	92	48	158	139	68	-					
P16	152	88	66	51	71	59	109	33	64	42	107	65	100	69	116	-				
P17	56	21	159	10	167	43	175	147	28	40	67	132	120	12	18	90	-			
P18	190	178	27	166	22	154	6	20	160	155	180	82	136	163	187	113	181	-		
P19	184	141	13	133	35	112	23	37	104	98	151	60	86	129	165	61	145	25	-	
P20	73	7	162	24	168	46	176	148	47	52	55	123	101	17	34	102	1	182	153	-

## *Toothbrushes*

The toothbrush analysis has good S-stress (.055) and RSQ (.980) values, however, inspection of the transformation scatter plot suggests that there may be some problems with the derived solution (Figure 9). This scatter plot demonstrates some step like characteristics, which indicate a discontinuous, and possibly degenerate, solution (Young and Harris 2004). A few steps is acceptable, like that seen in the espresso makers, however, this solution demonstrates a number of wider steps, which suggests that the derived solution should be viewed with some caution.

Figure 9: Toothbrushes Multidimensional Scaling



There were a number of clear groupings in this data, which is one possible source of the somewhat discontinuous result. For example, the top right quadrant and top left quadrant contain clusters of similar products without a clear bridge to the neighboring product clusters. Even with these disparate groupings there do seem to be some clear axes. The products in the top right quadrant are the more advanced toothbrushes with

gum massagers, tongue scrapers, and varied styles of bristles – such as the Colgate 360 (TB13) and the Aquafresh Max Active (TB18). While those in the bottom left quadrant are more simple and generic forms with few advanced features, like the Oral B Indicator (TB6). This organization seems to suggest a newness axis that proceeds from the bottom left quadrant to the top right quadrant.

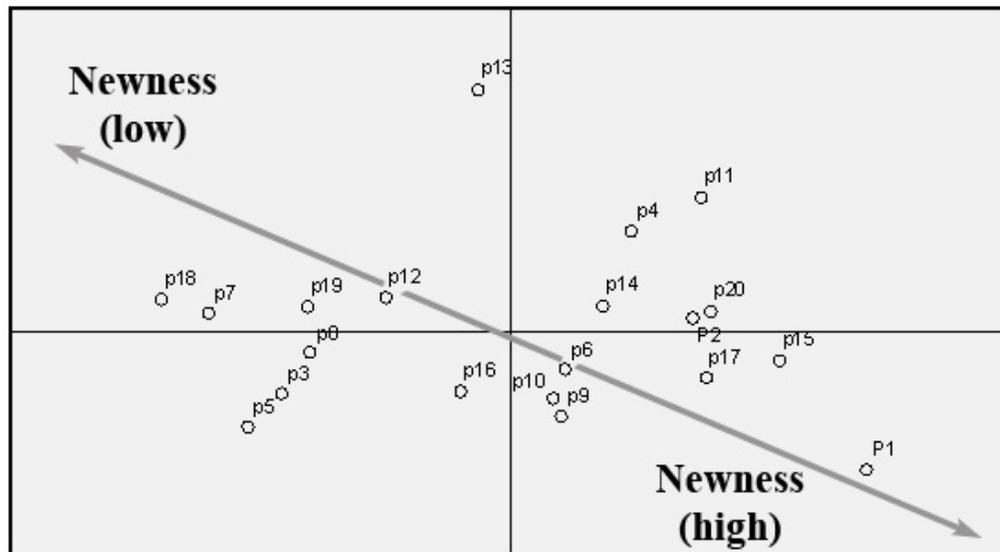
Another axis is suggested by this derived perceptual map may be straight/curved. Products that were grouped in the top left quadrant were much more straight and angular, such as the Reach Bi-level bristles (TB5). The product was not necessarily rated as low on newness, like the Oral-B indicator, because there were a number of advanced features, such as the multicolored, multilevel bristles, however, the angular form tends to push it away from the axis. On the other end of the curved axis, while still exhibiting a similar amount of newness, are product such as the Butler GUM Technique Toothbrush (TB17), like the Reach it has multi-colored, multilevel bristles, but has a much more curved and substantial brush body.

### *Pens*

The final product category, pens, exhibits a similar fit to the toothbrushes on both the S-stress (0.5798) and RSQ (0.975), but unlike the toothbrushes, the scatterplots suggest a much stronger fit for the derived solution. There is one relatively clear axis of newness suggested by the perceptual map. This runs from low newness in the upper left quadrant, to higher newness in the lower right quadrant (Figure 10). The variation among the pens was often at the level of surface design, and it is evident that products in the lower right quadrant are generally silver in color, and tend to have more complex and

interesting designs such as the Pilot Vball Grip (P2) and the Uniball Vision Elite (P20). At the other end of the axis are products that are much more simple and plain, such as the Jimmie Rollerball (P16) and the Uniball Grip (P12).

Figure 10: Pens Multidimensional Scaling



### Sorting Descriptions

At the end of the sorting task, participants were asked to describe the process that they used to identify product newness and sort the product. This was an open ended question that returned varied responses. This question was intended to further elucidate the characteristics of the products that respondents focus on when they are first exposed to new products. The responses were quite short, normally 4 – 5 lines and the data was not really rich enough to follow a full grounded theory approach (Strauss and Corbin 1998). Data in this format offers the researcher the opportunity to identify patterns and themes in the responses (Miles and Huberman 1984). Several recurring themes that emerge from consumers' descriptions of their sorting task are; organizing strategies, the

structure of aesthetic responses and the difficulty that consumers demonstrate when articulating their processing algorithms.

### *Organizing Strategies*

Several respondents highlighted the strategies that were used to sort the products. Generally the respondents tended to identify the products with higher and lower newness first. In other words, products that vary most from the norm were the easiest for them to identify. Once the lowest and highest categories were identified, then the leftovers were placed in the middle.

I placed the hand vacuums that looked like they were from the 60s in the +1 category. Then the +2 I put the vacuums that looked like the ones we had when we grew up. For +5 I put the really sleek ones and defined (looked like they came from the future). Then in +4 I put the ones that still had a design that was different. Then in the +3 I put the two that looked like steam cleaner because those are newer, but they've been around for a bit. The rest I just mixed into +3. (*Handvac, W2\_2*)

In this example, the participant highlights that they jumped from the lowest category to highest category before they decided how to place the middle categories. Every participant that provided details about their organizing strategies stated that they began with the extremes and worked toward the middle. This has a few implications for this research. First, as noted in the sorting analysis, the products on the ends tended to have much smaller variance and range than those products in the middle. If most of the participant completed the sorting task in the manner explained here, it provides some explanation for the higher consistency at the extremes and less consistency in the middle. Second, this may also provide some evidence that consumers tend find it easier to categorize a product when it is contrasted with items that are very different.

### *Structure of Consumers' Aesthetic Response*

Consumers demonstrate a variety of different responses to products: emotional, aesthetic, semantic, and symbolic (Crilly, Moultry, and Clarkson 2004). In their descriptions of the sorting task, participants demonstrated that all four of these responses were used to form their judgments of product newness. It was unusual for participants to demonstrate all four, and instead the responses tended to focus on one or two. At times, in fact, their description of the response seemed to diverge from the instructions of sorting the products based on newness. This was particularly evident in the emotional responses. A number of participants highlighted that their sorting was based on how boring or interesting the product was, rather than trying to assess the newness of the product.

I did not like the boxy ones they looked too “traditional” (*Espresso, T10\_3*)

I was looking for designs that got away from a boxy look and that were more aesthetically pleasing. I did however, prefer simple designs over those with “too much going on” (*Toaster, T10\_4*)

I first placed the boring/ordinary pens (+1) then the few that looked the “newest”, the rest were hard to place. (*Pen, T10\_4*)

The most common response to the product form seemed to come in the form of the aesthetic dimension of product response. The aesthetic dimension includes responses that refer to the order, the form, and the concinnity of the product design. Comments about the novelty or uniqueness of the design, as well as reference to specific design elements also fall into this category.

To me, it seemed that technology once again. The older machines still had non-digital thermometers and were very boxy in shape. Again, the uniquely shaped machines seemed newer. (*Espresso, W4\_2*)

The ones with lots of metal spokes I assumed were oldest. The bicycles that had different designs than the metal spoke bikes, I guessed were newer (*Bike, W3\_5*)

Often the function or usability of the product is important to consumers as they evaluate a new product form, Crilly et al. (2004) referred to this as the semantic dimension. This dimension includes responses to the product function, utility, or purpose. This dimension was particularly evident with the pens and toothbrushes, as the participants were able to hold the product and were much more familiar with the function of the product. More advanced ergonomics and features tended to elicit judgments of newness.

A lot of the pens' decision was based on past experience/knowledge. Most of the pens were liquid which makes them automatically appear newer than ball points. I looked at the caps and the grips. Most that were clear on the outside look older. This decision was less based on what I thought looked newer (because that was hard to tell) but more on which liked better, looked most durable and with the best product (how the writing looks). (*Pen, T8\_2*)

Flat straight toothbrushes just seem outdated. Although design certainly isn't everything, it does convey a sense of some sort of technological advancement (which is important in personal hygiene matters). I tried choosing those brushes that seemed comfortable to hold and that had some flexibility in their heads and handles. These brushes seem more reliable and thus an improvement on existing toothbrushes. (*Toothbrush, W4\_3*)

The fourth, category of aesthetic response to the product category, is the symbolic response. Symbolic responses involve reference to the shared meaning of the product. Typically, styles of design would fall into this category, if a product is referred to as 'futuristic' or 'avant-garde' these may be thought of as symbolic, as they represent a

reference to the shared public meaning of objects. Once again, there are a number of cases where participants provided symbolic responses as a means of identifying and sorting the product newness. For example;

The newer looking models had a rounded shape, while older looking models tended to be square. In some ways, the squareness reminds me of an old square Chevy truck or car and therefore makes me think it is old.  
(*Espresso, T2\_9*)

I placed the hand vacuums that looked like they were from the 60s in the +1 category (*Handvac, W2\_2*)

It is evident that consumers exhibit all four of Crilly et al.'s (2004) responses to product design when forming judgments of product newness. As an exploratory exercise, this section of the dissertation did not perform any quantitative analysis of the appearance of these responses. However, the next section will describe study 2, which used an attribution elicitation technique to elicit responses to new products and quantify these responses.

### *Nonconscious Processing Algorithms*

The literature on nonconscious processing proposes that, while consumers may be able to form judgments about product designs, they are often incapable of articulating the motivation behind these judgments (Veryzer 1999). Consumers are thought to possess a set of nonconscious processing algorithms that enable them to make complex judgments, but the reasons behind these judgments are often quite opaque to the consumer. A number of participants displayed this type of difficulty in expressing their judgments. They struggled when asked to explain why they made these judgments and often they

reverted to tautological statements, such as ‘it was new, because it was new’, and in many cases it was not clear that they felt these statements were virtually meaningless.

First I glanced through all of the pictures. After doing so I put all the modern looking bikes as the newest. Mostly they looked futuristic, sleek and simple. (*Bike, W1\_1*)

I put toasters in new category that had modern shapes (*Toaster, W3\_5*)

In effect all of these statements are merely stating that if it looked new then it was categorized as new. Consumers seem to rely on some sort of instinctual impression of the overall design, and often used terms such as trendy, modern, contemporary, or futuristic to describe this overall impression.

### **Chapter Summary**

This chapter offered a first step in the exploration of consumer perceptions of product newness. A number of interesting findings emerged that set the stage for the next two studies. First, a qualitative study of consumers open ended statements provided some evidence that consumers exhibit a number of difference responses to product newness. These findings provide the foundation for the empirical study undertaken in the next chapter. Second, the relative newness of a number of products were identified in all 6 product categories, providing stimuli for the subsequent studies.

## **CHAPTER 5 – PRODUCT ATTRIBUTE ELICITATION**

### **Introduction**

An attribute elicitation technique was employed to explore consumers' cognitive representation of visual product stimuli (Johnson and Fornell 1987). A free elicitation procedure was chosen because it generates more responses, both at the abstract and concrete level, than alternate elicitation methods such as hierarchical dichotomization and the repertory grid task (Steenkamp and van Trijp 1997). The theory that underlies this technique is spreading activation; this theory suggests that activation spreads between related concepts via linkages between the cognitive concepts (Collins and Loftus 1975). Once a prime is used to activate the cognitive structure, then subjects should be able to report this activated content verbally (Kanwar, Olsen, and Sims 1981).

Free elicitation is similar to the free recall technique employed in cognitive psychology with a few differences (Olson and Muderrisoglu 1979). In marketing, free elicitation, uses product primes to trigger stored attribute knowledge and is therefore more directive in its approach (Steenkamp and van Trijp 1997). Free elicitation is also particularly concerned with studying the content and organization of existing knowledge rather than triggering learning experiences (Olson and Muderrisoglu 1979). With this method, consumers are asked to identify attributes and characteristics of products that first come to mind when they are exposed to a product stimulus. Most of the studies in this area have focused on verbal descriptions of products or brands (Breivik and Supphellen 2003; Harte and Koele 1995; Johnson and Fornell 1987; Olson and Muderrisoglu 1979), however, a few studies have provided participants with visual

stimuli as the memory probe (Steenkamp and van Trijp 1997). This study used visual product cues as the memory probes, and asked consumers to identify the most salient attributes or design elements that they see in the product. The analysis of this data focused on understanding the memory structures that emerge when consumers are seeing a new product for the first time. The analysis of free elicitation data follows similar procedures as content analysis, where open ended responses that are collected from participants are coded based on a predefined, theoretically based coding scheme.

This study had two primary objectives; the first objective was to examine the types of visual processing that consumer's employ when they are first exposed to new products. Does this exposure tend to engender emotional, aesthetic, semantic, or symbolic responses, as they attempt to understand and categorize the product? The first part of the study, assigned participant's responses from the free elicitation task based Crilly et al.'s (2004) structure of aesthetic perception. The second objective was to examine the impact of product newness and individual differences on the type of response engendered by the visual product stimuli. For this component of the analysis, the level of newness identified in study 1 served as the basis for determining the newness of the product along with a number of individual difference variables.

### **Stimuli**

A random subset of the products used in Study 1 was selected for this study. Six products were randomly selected from the four visually represented categories – bicycles, toasters, hand vacuums, and espresso makers – and four products were randomly selected from the physical product categories – pens and toothbrushes. Only four pens and

toothbrushes were used for a number of reasons; first, the physical products required more time to complete in the administration of the study than the photographs; second, there was a significant cost associated with acquiring enough products; and, third, it was a challenge to find enough toothbrushes at local stores to meet the demands of the study. In fact, it was necessary to deviate from using only green and blue toothbrushes as only 10 exclusively green or blue toothbrushes were available for sale. Alternative colors were chosen including purple and pink, the next two most common colors.

All of the product photographs were reduced in resolution to the maximum screen resolution of 72 dpi and a size of 288 x 432 pixels. The products were approximately the same size and appeared on a white background. The four toothbrushes and four pens were placed in white no. 10, 4-1/8" x 9-1/2" envelopes. Each envelope was labeled with a sticker that indicated the number of the product inside (e.g. TB#20 or P#5). The pens and toothbrushes had a sticker and number on them similar to the one in study 1.

### **Participants**

Participants were recruited from a senior class in marketing at the University of Missouri. Each subject received 2 points of bonus course credit for participating in the study. The researcher visited the class, explained the general purpose of the study, and invited them to participate. Participants then signed up for the study on a web based enrollment system. Only students registered in the class could sign up for the study. Students could only sign up for one of the two studies, therefore, while recruited from the same class the participants in this study were all different from those in study 1. Sixty students participated in the study; 58% were marketing majors, with a mean age of 21.

The number of subjects is consistent with published free elicitation work. Typically conference papers have between 30 (Olson and Muderrisoglu 1979) and 40 (Walker, Celsi, and Olson 1987) participants while journal studies tend to have slightly more, between 30 (Steenkamp and van Trijp 1997) and 85 (Green, Wind, and Jain 1973). The number of participants is partially dependent on the intensity of the task. Longer tasks tend to use fewer participants while shorter tasks tend to use more. Given the length of the task, and the subsequent coding demands, 60 was deemed to be an acceptable number.

### **Procedure**

Fourteen laptop computers were placed along two rows in a classroom. Next to each laptop were 8 envelopes that contained the pens and toothbrushes. Participants were seated in a way that they could not easily look at another participant's screen. After signing in, the participants selected a computer and the administrator explained the purpose of the 8 envelopes.

Participants first saw a welcome screen and consent form. Once they agreed to participate they navigated to a second page that explained the procedures and the purpose of the study. Each participant then saw all 32 products in one of 5 randomly assigned orders, to minimize possible order effects. Participants were presented with a picture of the product on screen and they were asked to indicate, in an open response format, the features or characteristics of the product that they felt were most salient. For the pens and toothbrushes, a text based photograph appeared that directed them to select the pen (toothbrush) from the appropriate envelope and base their response on that product. Once

participants had completed the 32 products they were asked to complete the CVPA questionnaire and a few demographic questions. Sample screen captures from the complete online study are provided in Appendix C.

### **Measures**

In marketing, free elicitation has typically followed the basic procedure advocated by Fishbein (1967), which gives subjects specific instruction about the types of concepts desired and, therefore, the emergent responses by consumers tend to be relatively abstract. However, the use of visual images in addition to specific attribute salience questions has been shown to engender more concrete image responses (Olson and Muderrisoglu 1979; Schank and Abelson 1977). Therefore, using image primes, it was important to employ a content coding framework that encompassed both abstract concepts and more concrete physical responses.

One important distinction between content analysis and free elicitation resides in the focus of the analysis. While there are some similarities in the research techniques, particularly in the coding process, the two methodologies are oriented differently. Content analysis is concerned primarily with understanding the characteristics of the stimulus itself, while free elicitation is more concerned with understanding the individual's experience with the attribute (Neuendorf 2002). There have been a number of studies that employed content analysis in the context of consumer responses to visual stimuli. For example, Fenton (1985) examined meaning dimensions that emerged when consumers were exposed to landscape photographs, and Neuendorf (2002) suggests that Berlyne's (Berlyne 1971) collative variables offer another means of examining receiver's

responses to aesthetic stimuli. While Berlyne's collative variables may offer an interesting framework for study of consumer's response to aesthetic stimuli, a more recent theoretical framework, that incorporates Berlyne as one component, was chosen instead.

As noted previously, Crilly and his colleagues (2004) propose a theoretical framework of the process that consumers use when they are exposed to a visual stimulus. This work draws together a number of diverse literature streams in aesthetics and proposes an interactive framework, where each theoretical position can coexist. Crilly et al. (2004) integrate research in emotion (Desmet 2003), design (Coates 2003), psychobiology (Berlyne 1971), and semantics (Monö 1997) to create a comprehensive framework. To date, this model has not been tested empirically. As indicated in the first study, all four of these responses tend to emerge when consumers are asked to articulate descriptions or categorizations of new products.

When faced with a new product, consumers will focus on different product dimensions and this research aims to understand the cognitive structures that are most prevalent when consumers are evaluating a new product. Crilly et al. (2004) propose that there are four different types of aesthetic evaluation; Emotional Response, Aesthetic Impression, Semantic Interpretation, and Symbolic Associations. These four are not mutually exclusive; there are possible interactions between the categories. However, for coding purposes, each category was treated as exclusive and each statement was categorized as most belonging to one category. The coding instructions, with a description of each category, that were provided to each coder are provide in Appendix D.

### **HLM (Mixed Model) Analysis**

The data were organized by product and then by respondent. For each product, there were sixty responses, listed one after the other. Two coders were employed for each set of data; however, because of the size of the data four total coders were used. One coder, the primary researcher, coded all of the data sets, the remaining six product categories were divided among three coders. The coders were marketing doctoral students and a post-doc in psychology. The coders completed 4 (coder1), 1 (coder 2), and 1 (coder 3) complete product categories.

Once the coding scheme was designed, each coder was provided with the instruction sheet and met with the primary researcher. Each coder would code a subset of responses (5-10) and then compare these results with those of the primary researcher. This offered the opportunity to address any questions and ensure that there would be agreement between the coders. This process was repeated until the coder was comfortable with the process. The coders were then asked to code the complete category. The total coding time took approximately 15-20 minutes per product.

#### *Inter-rater reliability*

Once the coding was completed, the category assignment of the primary researcher was compared with the second coder for each product category. Coders assigned the clauses to one of four categories, therefore the data is nominal and Perrault and Leigh's (1989) procedure for interrater reliability ( $I_r$ ) was employed to determine the level of agreement. Table 14 provides a summary of the total number of clauses coded

and the agreement in these clauses. The total interrater reliability was acceptable across all of the product categories with values between 83.8 % and 90.8%. These ratings are particularly good given that there are interactions between the product categories.

Table 14: Inter-rater Reliability

Product Category	Coder	Ind. Judge	# of Statements	Frequency of Observed Agreement	% Agreement	I <sub>r</sub> Estimate of Reliability
Toasters	1	3	1224	1056	0.863	0.904
Hand Vacuums	1	3	1213	1037	0.855	0.898
Toothbrushes	1	3	848	736	0.868	0.908
Pens	1	3	805	671	0.834	0.882
Bicycles	2	1	1332	1046	0.785	0.845
Espresso Makers	3	1	1246	968	0.777	0.838

To resolve disagreements between coders, one of the two alternate coders was used as an independent judge for a category that they did not code originally. While it would be preferable to use another coder that was not familiar with the original coding, most of the coders stated that they became more proficient as they progressed with their coding, and this tradeoff in efficiency lowered the total work required of the coders. It was also unnecessary to train a new judge, and in effect, these judges were more familiar with the coding scheme than a new judge could hope to become given the limited number of disagreements that they would be asked to code. Each independent judge was presented with the contested statement and the two identified categories. They would then select the category that they felt best represented the statement. These independent evaluations were substituted for the disagreements.

## Results

The first purpose of this study was to identify if different levels of visual product newness elicited different types of responses from consumers. The second purpose was to identify if there are individual differences in these response elicitations. The impact that variables at the product level (newness and product category) and at the individual level (CVPA, gender, and age) would have on the elicitation of attributes in each response category was examined with a restricted maximum likelihood Hierarchical Linear Model (HLM). The HLM model was tested using the PROC Mixed procedure in SAS (v.9) as described by Singer (1998). This model treats the product as the first level within subjects, at the second level, according to the following model.

$$R_{ij} = \beta_{0j} + \beta_{1j} (\text{Newness}_j) + \beta_{2j}(\text{Cat.Dummy}_j) + \varepsilon_{ij} \quad (2)$$

where

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CVPA}_i) + \gamma_{02}(\text{Gender}_i) + \gamma_{03}(\text{Age}_i) + v_i \quad (3)$$

$$\beta_{1j} = \gamma_{10} + \eta_{1j} \quad (4)$$

$$\varepsilon_{ij} \sim N(0, \sigma_a^2), v_j \sim N(0, \sigma_b^2), \text{ and } \eta_{0j} \sim N(0, \tau_{00})$$

$i =$	Individual
$j =$	Product
$R =$	Response in category (e.g., emotional, semantic, etc.)
Newness =	Newness ranking from study 1
CatDummy =	Product Category (Bicycle, Espresso, etc...)
CVPA =	Centrality of Visual Product Aesthetics
Gender =	Gender of respondent
Age =	Age of Respondent

An incremental, forward, model building approach was used, that compared the deviance ( $\chi^2$  distributed log likelihood difference) between two nested models, where the degrees of freedom equals the difference in the number of estimated parameters (e.g., Palmatier, Gopalakrishna, and Houston 2006). The model was built in ascending

sequence starting with product variables: newness (M1) and category (M2); followed by individual variables: CVPA (M3), Gender (M4), and Age (M5) that were modeled so as to affect the random intercept. Finally, in the sixth model, newness was tested as a random effect, that allowed newness perceptions to vary due to other unobserved reasons. Tables 16-18 report estimated coefficients and the fit statistics of nested models.

### *Model Selection*

Each analysis began with a model that included a random intercept and newness as a main effect. The intercept was allowed to vary randomly for all of the models. For emotion, the addition of product category to the model, significantly improved the model fit ( $\Delta \text{deviance}_{(1)} = 7.3, p < .01$ ), and there was no significant improvement in the model as the additional variables were added. In this model, the intercept suggested that there is a grand mean of 0.264 ( $\gamma_0 = 0.2644, t = 3.49, p < .001$ ) emotional responses elicited by the attribute elicitation task. This mean value was subject to the newness of the product; an increase of 1 in the product newness, led to an increase of 0.065 emotional elicitations ( $\gamma_1 = 0.065, t = 3.79, p < .001$ ). These results suggested that newness exhibits a main effect on product emotional response, with greater newness eliciting more affective judgments, such as interest, boredom, liking, and disgust.

Table 15: Results of Hierarchical Linear Estimation – Emotion

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	0.278 **	0.264 **	-0.330	-0.305	-2.323 **	-1.754 *
	0.070	0.076	0.364	0.367	0.742	0.695
Newness	0.065 **	0.065 **	0.065 **	0.065 **	0.065 **	0.065 **
	0.017	0.017	0.017	0.017	0.017	0.017
Category		0.004	0.004	0.004	0.004	0.004
		0.009	0.009	0.009	0.009	0.009
CVPA			0.172 *	0.145	0.080	0.097
			0.103	0.110	0.104	0.098
Gender				0.088	0.159	0.151
				0.117	0.112	0.105
Age					0.104 **	0.075 *
					0.034	0.032
-2ll	4067.1	4074.4	4074.4	4076.2	4072.3	4064.9
ll diff		7.3	0	1.8	-2.1	-9.5
df for Evaluating $\Delta$		1	1	2	3	4
		sig.	no sig	no sig	no sig	no sig

The table indicates the coefficient estimate on the first line and the standard error on the second line.  
 \*  $p < .05$ , \*\*  $p < .01$

For the aesthetic response to the product, model 1 represented the best fit of the data and no additions to the model produced a significant change in the deviance. The intercept suggests a mean of 1.615 semantic attributes elicited per product ( $\gamma_0 = 1.615$ ,  $t = 14.94$ ,  $p < .001$ ). It is not surprising that there were many more semantic responses than emotional, as the study instrument asked participants to indicate the features or characteristics that were most salient. Like emotions, newness had a positive direct effect on the number of aesthetic responses elicited. An increase of 1 in the value of newness of the product resulted in an increase of 0.059 aesthetic responses in the product category ( $\gamma_1 = 0.059$ ,  $t = 2.33$ ,  $p = .020$ ). Therefore, products with more newness tended to elicit more responses concerning the design of the product.

Table 16: Results of Hierarchical Linear Estimation - Aesthetic

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	1.615 **	1.496 **	2.132 **	2.116 **	4.004 **	3.695 **
	0.108	0.117	0.601	0.608	1.301	1.273
Newness	0.059 *	0.058 *	0.058 *	0.058 *	0.058 *	0.058 *
	0.025	0.025	0.025	0.025	0.025	0.028
Category		0.038 **	0.038 *	0.038 **	0.038 **	0.038 **
		0.014	0.014	0.014	0.014	0.014
CVPA			-0.184	-0.167	-0.106	-0.069
			0.171	0.182	0.183	0.179
Gender				-0.056	-0.123	-0.161
				0.195	0.196	0.192
Age					-0.097	-0.087
					0.060	0.058
-2ll	5566.1	5565.4	5566.0	5567.3	5568.5	5565.0
ll diff		-0.7	-0.1	1.2	2.4	-1.1
df for Evaluating $\Delta$		1	2	3	4	5
		no sig				

The table indicates the coefficient estimate on the first line and the standard error on the second line.  
 \*  $p < .05$ , \*\*  $p < .01$

For the semantic response to the product, model 2 represented the best fit of the data. This model was significantly different from model 1, ( $\Delta deviance_{(1)} = 7.00$ ,  $p < .01$ ), and in addition to the intercept, included newness and product category. Although the model represented the best fit, neither of the coefficients were significant. The mean of the semantic responses elicited by the product is 0.828 ( $t = 9.72$ ,  $p < .001$ ), this value was not significantly affected by any other variables, and remained relatively stable. Therefore, newness had no effect on the number of semantic responses elicited, such as durability and utility.

Table 17: Results of Hierarchical Linear Estimation - Semantic

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	0.832 **	0.828 **	0.821 *	0.885 *	0.614	0.585
	0.086	0.093	0.449	0.445	0.971	0.971
Newness	0.005	0.005	0.005	0.005	0.005	0.005
	0.021	0.021	0.021	0.021	0.021	0.022
Category		0.001	0.001	0.001	0.001	0.001
		0.012	0.012	0.012	0.012	0.011
CVPA			0.002	-0.067	-0.075	-0.070
			0.127	0.133	0.137	0.137
Gender				0.226	0.236	0.239
				0.142	0.146	0.146
Age					0.014	0.014
					0.044	0.044
-2ll	4903.6	4910.6	4912.9	4912.5	4916.8	4916.4
ll diff		7.00	2.30	1.90	6.20	-0.40
df for Evaluating $\Delta$		1	1	2	3	4
		sig	no sig	no sig	no sig	no sig

The table indicates the coefficient estimate on the first line and the standard error on the second line.  
 \*  $p < .05$ , \*\*  $p < .01$

The final category, symbolic response, exhibited the best fit with model 1. The intercept indicates a mean of 0.385 responses in this category ( $\gamma_0 = 0.385$ ,  $t = 7.45$ ,  $p < .001$ ). Once again, the best fit of the model occurred with the inclusion of the newness parameter; however, the coefficient was not significant, therefore there is no effect of newness on symbolic responses to the product.

Table 18: Results of Hierarchical Linear Estimation - Symbolic

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	0.385 **	0.613 **	0.481 *	0.489 *	0.704	0.698
	0.052	0.057	0.220	0.223	0.480	0.476
Newness	-0.003	0.000	0.000	0.000	0.000	0.000
	0.015	0.014	0.014	0.014	0.014	0.014
Category		-0.072 **	-0.072 **	-0.072 **	-0.072 **	-0.072 **
		0.008	0.008	0.008	0.008	0.008
CVPA			0.038	0.030	0.037	0.034
			0.062	0.066	0.067	0.067
Gender				0.029	0.021	0.027
				0.070	0.072	0.072
Age					-0.011	-0.011
					0.022	0.022
-2ll	3406.4	3330.9	3334.3	3337.6	3343.2	3342.1
ll diff		-75.5	-72.1	-68.8	-63.2	-64.3
df for Evaluating $\Delta$		1	2	3	4	5
		no sig				

The table indicates the coefficient estimate on the first line and the standard error on the second line.  
 \* p<.05, \*\* p<.01

### Chapter Summary

This chapter examined the types of responses elicited by consumers when they are exposed to new products. The four categories that are suggested by Crilly et al. (2004), and that also emerged in the open ended questions in studies 1a and 1b, were employed as a framework to code the responses generated by the attribute elicitation task. It was clear that, even though the elicitation asked participants to identify features or characteristics that were most salient to them, they did not reserve their comments only to the design of the product. Instead, consumers made affective statements about the product, inferred the durability and usefulness of the product, and drew reference to the shared cultural meaning of the objects. While the individual differences, such as CVPA and gender, did not seem to impact the types of product evaluations, it was shown that the

newness of the product did tend to elicit more affective reactions and more aesthetic evaluations of the product. When consumers first see products with higher levels of visual product newness they tended to react with more emotional and aesthetic responses than when they were exposed to products with lower levels of newness. This finding is consistent with the theoretical position of this dissertation that higher levels of newness tend to engender more affective reactions to the product. This finding leads into the third study which proposes that the affective reaction to the product form is affected by the newness of the product.

## **CHAPTER 6– CONSUMER RESPONSE TO VISUAL PRODUCT NEWNESS**

### **Introduction**

The purpose of the third study was to link the perception of product newness with evaluations of new products, and product preferences. This study addressed the hypothesized relationships from chapter 3, and is concerned with understanding how some individual differences moderate preferences for visual product newness. This study used a between subjects, experimental design with stimuli chosen to represent high, medium, and low levels of newness. The study evaluates the responses to product design using attractiveness and product attitude measures. The results were analyzed using ANOVA and multiple regression.

This chapter reports the procedures and the results of this experiment. First, this chapter describes the procedures used in two pretests, which were undertaken to test the reliability of the measures used in the study. Second, the chapter describes the measures used in the final study and reports the reliability results from the two pretests. Third, the experimental procedure is described in detail, and the results of ANOVA and multiple regression are reported.

### **Pretest 1**

The purpose of the first pre-study was to identify scale items that could be used to measure the dependent variable in the experiment, and some as a manipulation check to measure consumer's perception of visual product newness. This section will report the

procedures used in this first study, but the measures will be described in more detail in the next section.

### *Stimulus Selection*

Two products were selected from the espresso product category stimuli. The two products were selected to represent the greatest possible differentiation in one product category, to engender as much variance as possible in the measures. To select the products, all instances of positive and negative statements were identified in participants' responses to the attribute elicitation task in study 2. Espresso machines, received far more positive and negative responses than any other category, and also received the greatest variance in these responses. Espresso machines were also chosen because in study 1 and 2 there were more statements about not being familiar with espresso machines or never using espresso machines, than any other product category. It was felt that participants were less likely to possess past prior product knowledge; therefore their evaluations were more likely to be based on the visual stimuli alone.

The total number of positive and negative statements for the six espresso makers

Table 19: Positive and Negative comments from Attribute Elicitation Task

Espresso maker	Negative comments	Positive Comments
EM2	21	7
EM15	1	26
EM16	3	24
EM21	1	17
EM28	5	10
EM36	6	11

in the attribute elicitation task are provided in

Table 19. EM2 received more negative

comments than any of the other espresso

machines, so this product was selected. Selecting

the product with the most positive comments was

a little bit more difficult, because there was not a

large difference between three machines: EM15,

EM16, and EM21. Turning to the perceptual map created in study 1, EM15 sits at the opposite end of the industrial/homey continuum that was suggested by the derived stimulus configuration. Therefore, in addition to having a large number of positive comments, and few negative comments, EM15 was selected because it was also stylistically different from EM2.

### *Procedure*

Thirty six copies of each product photograph were printed by a professional photography studio on 4"x 6" glossy photo paper. The two photographs were then placed in a no. 10, 4-1/8" x 9-1/2" white envelope. Half of the envelopes showed EM2 first and half of the envelopes showed EM15 first, to minimize potential order effects. The envelopes were attached to a paper and pencil measure and provided to the participants. Each participant was informed that they must look at one photograph at a time in the order that they were provided. A code on the envelope and the survey ensured that the researcher could identify in which order the participants were presented with the stimuli. Participants were 36 students in an upper level marketing class.

### **Pretest 2**

The final electronic survey was prepared prior to administering the study with the final participants. Students in three upper level marketing classes were invited to participate in the study for course credit and the opportunity to be entered in a draw for \$100. This study was intended to test the final measures, and to test the online survey system. In the email that invited them to participate, the students were provided with a

URL address. Once they navigated to the link they were provided with a description of the survey, and a consent form. The survey then followed the complete survey procedure that will be described in the next section. A total of 80 useable responses were obtained, to test the measures.

## **Method**

### *Participants*

Participants were recruited from a pool of 800 undergraduate students in an introductory level marketing course at the University of Missouri. This class is a prerequisite for the courses that were used in studies 1 and 2, and the pretests, therefore, there is no likelihood that the participants in this study also participated in any of the prior studies. Each subject received 1 point of course credit and were entered into a draw to win one of 2, \$100 cash prizes. The researcher visited the class, explained the general purpose of the study, and invited them to participate. Participants then signed up for the study by logging into a web based sign up system. Only students registered in this class could sign up for the study.

Of the total responses generated, 10 were removed because they were incomplete – 7 completed one or two pages and withdrew, 3 signed in and did not complete any studies. The procedure in the randomization algorithm assigned a set of products to participants after they signaled their intent to participate in the study; if they withdrew at a later point a blank record was recorded. There were 4 responses where the participants completed all of the data, except for the final page, which collected demographic and

respondent identification data. Because there was no way of ensuring that these three responses were not repeated, they were also removed from analysis.

A frequency analysis revealed a number of missing values where subjects had not answered one question. Two records indicated that participants did not answer at least 4 questions. These records were removed. Of the remaining records there were 83 missing variables distributed randomly throughout the data. There were no variables with more than 2 missing responses and no respondents with more than two variables missed. A series mean missing values replacement was performed on these missing values. A total number of 212 useable responses were obtained. There were 134 female and 78 male students, with a mean age of 20.31 years.

### *Procedure*

This study was designed as web based instrument. When participants signed up for the study, an automated system sent them an email with a link to the study and instructions for following the link to complete the study. Because it was possible that participants could be using different web browser software, the functionality and look of the instrument, was tested by the web designer and the primary researcher on the most popular platforms (PC and Mac), and web browsers (IE, Firefox, Safari). While there were some slight stylistic differences, particularly between Windows and Macintosh, these did not affect the layout or the function of the study. Screen captures of the study instrument are provided in Appendix E.

The first page of the study explained the purpose of the study and provided some instructions for completing the study and the second page provided the consent form.

Once participants had agreed to participate in the study, the software randomly assigned the order of the stimuli, and they were directed to the first page. Participants were shown four pictures drawn from the 12 pictures selected for analysis. Each participant would see a picture from all four of the product categories: bicycle, toaster, espresso machine, and hand vacuum. The products were assigned in random order to mitigate order effects, and participants would not see the same level of a stimulus back to back. In other words, if they were first assigned to the bicycle category, and then the toaster category, if they saw a high newness bicycle, then they would see either a low or medium newness toaster. The randomization algorithm assigned the products so that the size of the cells remained approximately even.

Each participant was shown a picture and asked first to respond to the semantic differential questions that represented trendiness and product attractiveness. Advancing to the next page, the same product remained on screen and they answered the attitude measure and the product attractiveness (Likert-type) measure. Showing the products on two screens ensured that the participants did not have to scroll away from the product picture when answering the questions. Each picture remained visible while they answered all of the questions on the page.

After completing the evaluations of the five products, the participants then completed the CVPA, the adapted KAI, the DUCP, and the cognitive and sensory innovativeness scales. On the final page they provided some demographic information including age, gender, and major. Finally, they were invited to enter their student number to receive course credit, and their email address to be entered into the prize draw. The study took 15-20 minutes to complete.

## *Measures*

### *Dependent Variable*

The dependent variable in this study was buyer's affective reaction to visual product newness. There is no scale of visual product attractiveness in the marketing literature, so it was necessary to draw from some different literature streams to assemble an affective product preference measure.

The most closely related stream of literature that measures affective reactions to physical features are the studies of physical attractiveness in psychology, advertising, and marketing. Typically, in these studies, a one item measure of product attractiveness is used (e.g., Martin and Gentry 1997; Smith, Cornelissen, and Tovee 2007; Swami, Greven, and Furnham 2007). Subjects are generally provided with a stimulus, and asked to rate, on a nine-point likert-type scale, their level of agreement with the statement 'this person is attractive' (Tovee et al. 2006). There are also a few studies in the design literature that address the consumer perceived attractiveness of a product form. Once again, like the research on physical attractiveness, these studies use a one item measure of attractiveness (e.g., Carbon and Leder 2005; Leder and Carbon 2005).

Single item measures tend to categorize people into a relatively small number of groups and have greater measurement error, whereas multi-item measures allow finer distinctions among respondents and exhibit greater reliability (Churchill 1979). It is surprising that researchers have relied so extensively on a single item measure of product or person attractiveness, particularly given the recognition of the limitations of single items measures. Therefore, the single item, nine point Likert-type measures were collected in this study, however, to address the limitations of single item measures,

additional measures were also collected to provide greater reliability and finer distinctions. The items tested are provided in Table 20.

The first source of multi-item measurement of product attractiveness was drawn from the research on industrial ergonomics. This literature is particularly concerned with the interaction between the consumer and the product. Evaluation of the consumers' demands for the total ambiance of the product, including both the usability and the styling of the product, has been called Kansei Engineering (Jindo and Hirasago 1997). This work has received a great deal of attention in Japan and China, but has received little attention elsewhere. Typically, this research works with consumer's verbal description of product attributes (e.g., Tanoue, Ishizaka, and Nagamachi 1997) or uses semantic differential scales to create factor structures (e.g., Hsiao and Chen 2006). It is the latter approach that is of most value here.

There is no specific measure of product attractiveness, however, researchers in industrial ergonomics have updated Osgood's (1962) evaluation dimension. A number of attractiveness measures that typically load together in factor analyses were selected to represent the attractiveness dimension (Chang, Lai, and Change 2007; Coates 2003; Hsiao and Chen 2006; Nakada 1997). Typically, the factor that they load on is described as the evaluation of, the attractiveness of, or the pleasure derived from the product. In the first pretest these items had an alpha of 0.95 and in the second pretest the alpha was 0.94.

Table 20: Dependent Variables for Final Study Results of Pretest 1

Item Description	Range	Mean	Std. Dev.	Var	Item-tot. corr.
<i>Trendiness</i>					
futuristic/nostalgic	6	2.91	1.77	3.13	0.86
contemporary/traditional	6	2.72	1.96	3.85	0.85
avant-garde /conservative	6	3.41	1.88	3.55	0.74
dazzling/ordinary	6	3.79	1.82	3.32	0.78
innovative/imitative	6	2.86	1.71	2.93	0.87
$\alpha = .87$					
<i>Evaluation</i>					
interesting/boring	6	3.40	1.82	3.30	0.72
appealing/unappealing	6	3.09	1.89	3.55	0.90
impressive/unimpressive	6	3.24	1.68	2.82	0.85
attractive/unattractive	6	3.50	1.96	3.83	0.94
pleasant/unpleasant	6	3.43	1.82	3.30	0.92
likeable/unlikable	6	3.43	1.86	3.44	0.90
beautiful/ugly	6	3.88	1.73	2.99	0.86
good/bad	6	3.17	1.52	2.32	0.84
$\alpha = .95$					
<i>Attitude Toward Product Idea</i>					
would consider buying	6	4.53	2.19	4.78	0.97
overall opinion is unfavorable/favorable	6	4.55	2.01	4.04	0.97
is very bad/ very good	6	4.81	1.74	3.03	0.87
$\alpha = .93$					
<i>Physical Attractiveness</i>					
visually attractive	8	5.81	2.53	6.40	1.00

N= 58 for all items

All scales are seven point semantic differential scales except for physical attractiveness which is a 9 point Likert-type scale

\* Item to total correlation are all significant at  $p < .001$

In the marketing literature, there is one example of consumers' evaluation of a new product concept (Ratneshwar and Chaiken 1991). This, work is somewhat different than the current research, because it focuses on consumers attitude towards a product concept. Moreover, the stimuli provided consisted of a verbal description of the product

rather than a visual stimulus. However, given that this work was tested with innovative products, it may be valuable in this research context as well. In the first pre-test this three item measure had an alpha of .93 and in the second pre-test the alpha was .92.

The dependent variable, consumer's reaction to the product consists, therefore, of three distinct measures, that are highly correlated (Table 21). However, each of these measures has demonstrated effectiveness, and together they represent a more complete measure of consumer's evaluation of new products. They include both more cognitive, attitude measures such as the evaluation of the product concept and the one item physical attractiveness measures, as well as semantic differential measures that are more often used as measure of consumer's affective reactions to a product. These measures are analyzed as a composite measure of consumer's affective reaction toward the product. The composite measure has a reliability of .95.

Composite measures were formed for each of the multi-item measures. Since most authors did not report the procedure that they used to form a single item composite, both an additive and a standardized regression weight composite was created. In general there were only small differences between the regression weights, so the correlation between the additive model and the standardized regression model was compared. The correlation was in excess of .975 for all of the composite variables, suggesting there was very little difference between the two approaches. Therefore, for ease of computation, and to maintain the same approach across all of the composite measures, an additive approach was used to form the following composite measures. Descriptive statistics of these measures and a correlation analysis are provided in Table 21.

Table 21: Correlation of Study 3 Variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1	CVPAC	1																					
2	KAIC	.28	1																				
3	DUCPC	.50	.41	1																			
4	Coginnovc	.30	.42	.31	1																		
5	Sensinnovc	.10	.29	.11	.25	1																	
6	battract	.13	.16	.10	.14	.02	1																
7	emattract	.10	.09	.10	.17	.00	.11	1															
8	hvattract	.03	-.03	-.01	.01	.00	-.01	.02	1														
9	tattract	.04	.01	.04	.08	-.07	.18	.28	-.05	1													
10	btrendy	.05	.02	.01	.02	.00	.39	.06	-.01	.11	1												
11	emtrendy	.12	-.03	.02	.11	.02	.00	.61	.13	.10	.00	1											
12	hvtrendy	-.08	-.02	-.03	.06	.01	-.10	-.02	.76	.00	.03	.07	1										
13	ttrendy	.05	-.07	-.01	-.02	-.04	.22	.07	.00	.65	.04	.12	.03	1									
14	batt	.15	.15	.05	.13	.14	.84	.05	-.03	.05	.23	-.03	-.08	.10	1								
15	ematt	.12	.08	.06	.12	.00	.06	.83	-.02	.19	.06	.52	-.05	.01	.09	1							
16	hvatt	.05	-.05	-.06	-.04	-.05	-.05	.05	.83	-.04	.03	.13	.56	-.04	-.06	.09	1						
17	tatt	.03	.01	-.07	.00	-.11	.12	.23	-.08	.84	.10	.06	-.03	.48	.09	.22	-.04	1					
18	bpattract	.09	.17	.07	.10	.11	.84	.05	-.05	.09	.22	-.08	-.12	.11	.86	.04	-.07	.09	1				
19	empattract	.09	.01	.08	.12	.02	.06	.78	.03	.17	.06	.52	-.02	-.02	.08	.79	.10	.16	.11	1			
20	hvpattract	.05	-.05	.00	-.02	-.03	-.02	.01	.84	-.05	.00	.06	.60	-.02	.00	.02	.84	-.06	.00	.10	1		
21	tpattract	.01	-.05	-.10	.00	-.11	.10	.14	-.03	.78	.09	.00	.04	.51	.04	.10	.00	.79	.06	.07	.01	1	
	Mean	3.64	3.62	3.39	3.51	3.38	4.49	5.22	4.26	5.16	5.25	5.14	4.45	4.75	3.68	5.04	4.16	5.23	5.62	6.54	4.74	6.61	
	SD	.63	.50	.65	.59	.69	1.28	1.10	1.43	1.00	1.28	1.18	1.54	1.22	1.62	1.41	1.66	1.28	2.60	2.18	2.54	1.84	

N = 212, items in bold are significant at  $p < .05$ , items in italic are significant at  $p < .1$

### *Independent Variable*

While the product stimuli were selected from the results of the sorting task in study 1, the perceived newness of the product was also measured to serve as a manipulation check. Once again, there is no scale of visual product newness in the literature; however, there are some related measures that can serve this purpose.

Hsiao and Chen (2006) identified a factor structure of product evaluation and the relationship of these factors to some specific design elements. One of their most robust factors, *trendiness*, is of particular interest here. This trendiness dimension includes semantic items such as innovative/imitative, futuristic/nostalgic, and avant-garde/conservative that suggest the perceived product newness. In pretest 1, with a high and low-attractiveness item, the scale exhibited an alpha of .87, in the second pretest the item demonstrated an alpha of .86. The trendiness and the affective measures were mixed in together in the study instrument.

### *Moderating Variables*

The moderating variables in this study were all measured using existing measures, or minor adaptations of existing measures. The following measures were pre-tested in the second pretest, and were subsequently collected in the administration of the experiment.

#### *Innovativeness*

The two most commonly used scales for consumer innovativeness are a six item, self-report measure that is founded on attitudes and behaviors towards a specific product category (Goldsmith and Hofacker 1991) and the Venkatraman and Price (1990)

cognitive and sensory innovativeness scale. The first scale is category specific and not really suited to multiple category research such as this. Moreover, the scale was originally designed around the purchase of music records, and the scale items do not translate well to the context of this research with infrequently purchased items. Instead, more global measures of innovativeness are preferred. Kirton's (1976) *originality* dimension, from the Kirton Adaptiveness/innovativeness Inventory, has been shown to more effectively measure overall innovativeness than the *general* dimension of the Goldsmith and Hofacker scale (Im, Bayus, and Mason 2003). This scale is a copyrighted scale, so the scale was adapted for use, by making slight modification to each question. This adapted version of the KAI scale exhibited an alpha of 0.87 in the second pretest.

The second, commonly used scale (Venkatraman and Price 1990) differentiates between cognitive and sensory innovativeness. Cognitive innovativeness tends to involve interest in solving puzzles or problems, while sensory innovativeness comprises questions about sensory experiences, such as having vivid dreams and riding a raft down the Colorado River. This scale demonstrated alphas of 0.77 (cognitive) and 0.80 (sensory) in the second pretest.

### Design Acumen

The Bloch et al. (2003) centrality of visual product aesthetics (CVPA) scale was designed to capture consumers' interest in design and their visual or verbal processing style. The CVPA scale is a continuous scale that is composed of four theoretical facets; (1) *personal and social value of design* – good design positively impacts their life; (2) *acumen* – an ability to recognize and categorize product designs; (3) *level of response* –

will have greater magnitude of response to aesthetics; and (4) *design determinancy* – extent to which aesthetics is used as an evaluation criteria (Bloch, Brunel, and Arnold 2003). Even though these four facets were used to develop the construct, analysis determined that the scale was unidimensional and loads on one factor. Therefore, a composite measure of the scale may be used for analysis. This scale demonstrated an alpha of 0.916 in the second pretest.

#### Desire for Unique Consumer Products

There are a number of measures available in the uniqueness literature, including the consumer need for uniqueness scale (Tian, Bearden, and Hunter 2001). Each of these scales examines uniqueness as an enduring trait variable and its impact on an individual's actions. The consumer desire for unique consumer products (DUCP) (Lynn and Harris 1997), is a more specific application of the uniqueness trait variable to the consumer product acquisition process. The work on DUCP has identified that consumers who are high in DUCP are more likely to acquire and use innovative products (Lynn and Harris 1997), yet this has not been explored empirically with visual product forms. This scale exhibited an alpha of 0.87 in the second pretest.

#### **Manipulation Check**

The trendiness dimension was used as a manipulation check to verify that the newness manipulations selected from the first study actually represent three different levels of newness. A one way ANOVA of the dependent variable, trendiness, was tested for differences between the levels of the product stimulus factor: high, medium, low. The

results of the analysis (Tables 22-24) revealed that there was a significant difference across all three levels for bicycles ( $Trendy_{low} = 4.18$  ,  $Trendy_{med,} = 5.43$ , and  $Trendy_{high} = 6.22$ ;  $F(2,211) = 78.79$ ,  $p < .001$ ) and espresso machines ( $Trendy_{low} = 4.28$  ,  $Trendy_{med,} = 5.26$ , and  $Trendy_{high} = 5.93$ ;  $F(2,211) = 52.96$ ,  $p < .001$ ). For the hand vacuums ( $Trendy_{low} = 2.85$ ,  $Trendy_{med,} = 5.28$ , and  $Trendy_{high} = 5.31$ ;  $F(2,211) = 130.35$ ,  $p < .001$ ) and Toasters ( $Trendy_{low} = 4.15$  ,  $Trendy_{med,} = 5.08$ , and  $Trendy_{high} = 5.02$ ;  $F(2,211) = 12.43$ ,  $p < .001$ ), there is a significant difference between the low and high manipulations, and between the low and medium manipulations, however, there is no difference between the medium and the high manipulations.

Of most concern was the manipulation for toasters. The derived stimulus plot in the first study did not reveal a clear axis of newness. Therefore, for product selection, a number of toasters were selected that had relatively high differences in the plot, and exhibited some distance on the newness sorts. Because of this lack of clarity in the MDS results, an effort was made to ensure that the three toasters had similar stainless steel finishes. While the medium and low newness toasters were stainless steel, the high newness toaster (Jenn Air) was actually copper colored. In black and white the experts had rated this toaster as high newness, so it was felt that the form of the product was playing a larger role than the color in the newness perception. Therefore, the stainless steel version of the same toaster was substituted for study 3. Clearly, the copper color played a much greater role in perceptions of newness than first thought, and the stainless steel version was rated very low in the manipulation check. Therefore, this manipulation appears problematic and the toasters were removed from the ANOVA analysis.

Table 22: Manipulation Check ANOVA Model Fit

	Sum of Squares	df	Mean Square	F	Sig.
Bicycles	149.08	2.00	74.54	78.79	0.001
Espresso	99.10	2.00	49.55	52.96	0.001
Handvac	227.45	2.00	113.73	130.35	0.001
Toaster	34.36	2.00	17.18	12.43	0.001

Table 23: Manipulation Check Means of Trendiness at Different Factor Levels

Factor Level	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
<i>Bicycles</i>								
1	72	4.18	1.16	0.14	3.90	4.45	2.00	7.00
2	72	5.43	1.05	0.12	5.18	5.67	1.60	7.00
3	68	6.22	0.60	0.07	6.07	6.36	4.00	7.00
Total	212	5.25	1.28	0.09	5.08	5.43	1.60	7.00
<i>Espresso Machine</i>								
1	74	4.28	1.29	0.15	3.98	4.58	1.40	6.60
2	69	5.26	0.91	0.11	5.04	5.48	2.00	6.80
3	69	5.93	0.52	0.06	5.81	6.05	3.60	6.80
Total	212	5.14	1.18	0.08	4.98	5.30	1.40	6.80
<i>Hand Vacuum</i>								
1	73	2.85	1.11	0.13	2.59	3.10	1.00	5.80
2	70	5.28	1.04	0.12	5.03	5.52	2.00	7.00
3	69	5.31	0.88	0.11	5.10	5.52	2.60	6.60
Total	212	4.45	1.54	0.11	4.24	4.66	1.00	7.00
<i>Toaster</i>								
1	71	4.15	1.20	0.14	3.87	4.44	1.00	6.80
2	70	5.08	1.12	0.13	4.81	5.35	2.20	7.00
3	71	5.02	1.12	0.13	4.75	5.28	2.00	7.00
Total	212	4.75	1.22	0.08	4.59	4.91	1.00	7.00

Table 24: Post Hoc Analysis of Manipulation Check

(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.
<i>Bicycle</i>				
1	2	-1.27	0.20	0.001
	3	-2.10	0.20	0.001
2	1	1.27	0.20	0.001
	3	-0.83	0.19	0.001
3	1	2.10	0.20	0.001
	2	0.83	0.19	0.001
<i>Espresso Machine</i>				
1	2	-0.83	0.18	0.001
	3	-1.50	0.19	0.001
2	1	0.83	0.18	0.001
	3	-0.67	0.19	0.001
3	1	1.50	0.19	0.001
	2	0.67	0.19	0.001
<i>Hand Vacuum</i>				
1	2	-2.48	0.18	0.001
	3	-2.53	0.18	0.001
2	1	2.48	0.18	0.001
	3	-0.05	0.18	0.960
3	1	2.53	0.18	0.001
	2	0.05	0.18	0.960
<i>Toaster</i>				
1	2	-1.08	0.23	0.001
	3	-0.83	0.22	0.001
2	1	1.08	0.23	0.001
	3	0.26	0.23	0.520
3	1	0.83	0.22	0.001
	2	-0.26	0.23	0.520

## Results

*Hypothesis 1:* The main effect of product newness on the affective reaction to the product was tested using a one-way ANOVA with the composite measure of affect as the depended variable, across the fixed factor level of newness. This test was performed for all three products, and was intended to address H1, that there is an inverse-U relationship

between newness and affect towards the product. A post hoc Scheffé multiple comparison procedure was used to identify the differences between different levels of the stimulus (Neter et al. 1996). Results of the analysis are provided in Tables 25-27.

Table 25: Results of ANOVA Model Fit For Dependent Variables

	Sum of Squares	df	Mean Square	F	Sig.
<i>Bicycle</i>	25.511	2	12.756	7.22	0.001
<i>Espresso Machine</i>	48.96	2	24.48	21.67	0.001
<i>Hand Vacuum</i>	174.90	2	87.45	66.37	0.001

There was significant main effect across all three product classes: Bicycles ( $Affect_{low} = 4.20$  ,  $Affect_{med,} = 3.80$ , and  $Affect_{high} = 4.65$ ;  $F(2,211) = 7.22$ ,  $p < .0001$ ), espresso machines ( $Affect_{low} = 4.51$  ,  $Affect_{med,} = 5.50$ , and  $Affect_{high} = 5.54$ ;  $F(2,211) = 21.67$ ,  $p < .0001$ ), and hand vacuums ( $Affect_{low} = 2.94$  ,  $Affect_{med,} = 4.70$ , and  $Affect_{high} = 4.98$ ;  $F(2,211) = 66.37$ ,  $p < .0001$ ). For the bicycles this difference comes primarily from the difference between the low and high variables. Even though the difference is not significant, the mean of the medium stimulus was lower than that of the low stimulus, and well below the high stimulus. This result does not support H1, but this result suggests that respondents prefer high newness to low newness in bicycles. The results for the espresso machines were much closer to the hypothesized inverse-U relationship. There was a significant difference between the means of the dependent variable for the medium and low levels of the newness manipulation and for the high and low levels of the newness manipulation. While the difference between medium and high is not significant, the means plot begins to suggest an inverse U relationship. Therefore, there is mixed support for H1, with espresso makers.

For the hand vacuums the mean affective reaction to the stimuli differs significantly between the low and medium newness stimulus and between the low and high newness stimulus. However, the difference between means of the affect variables on the medium and high levels of the newness manipulations was not significant, and inspection of the means plots suggests that the mean of the dependent variable was higher for the high newness stimulus. Therefore, the hypothesis was partially supported, medium newness engendered higher positive affective reactions than low newness; however, an inverse-U relationship with high newness was not found.

Table 26: Mean of Affect

	Newness Level	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Bicycle	Low	72	4.20	1.06	.125	3.96	4.45	1.13	6.69
	Medium	72	3.80	1.47	.173	3.46	4.15	.98	7.00
	High	68	4.65	1.43	.173	4.31	5.00	1.65	6.92
	Total	212	4.21	1.37	.094	4.03	4.40	.98	7.00
Espresso Machine	Low	74	4.51	1.35	0.16	4.20	4.82	0.98	6.83
	Medium	69	5.50	0.83	0.10	5.30	5.70	2.86	7.00
	High	69	5.54	0.90	0.11	5.32	5.76	1.98	6.83
	Total	212	5.17	1.16	0.08	5.01	5.32	0.98	7.00
Hand Vacuum	Low	73	2.94	1.13	0.13	2.68	3.21	1.05	6.50
	Medium	70	4.70	1.22	0.15	4.41	4.99	1.90	6.83
	High	69	4.98	1.09	0.13	4.72	5.24	2.63	6.83
	Total	212	4.19	1.46	0.10	3.99	4.38	1.05	6.83

Table 27: Post hoc Comparisons of Affect

Product	(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.
Bicycle	1	2	0.40	0.22	0.19
		3	-0.45	0.22	0.14
	2	1	-0.40	0.22	0.19
		3	-0.85	0.22	0.01
	3	1	0.45	0.22	0.14
		2	0.85	0.22	0.01
Espresso Machine	1	2	-0.99	0.18	0.01
		3	-1.03	0.18	0.01
	2	1	0.98	0.18	0.01
		3	-0.04	0.18	0.97
	3	1	1.03	0.18	0.01
		2	0.04	0.18	0.97
Hand Vacuum	1	2	-1.76	0.19	0.01
		3	-2.03	0.19	0.01
	2	1	1.76	0.19	0.01
		3	-0.27	0.19	0.37
	3	1	2.04	0.19	0.01
		2	0.27	0.19	0.37

Overall the direct effects are somewhat mixed. While there are no clear cut differences or relationships between high, medium, and low newness stimuli, there are a few trends that were consistent across nearly all product categories. First, the medium and high newness manipulations were generally viewed more favorably than the low newness manipulations. Second, there was some suggestion of an inverse-U relationship, that was manifest in a diminishing increase between medium and high, however this was rarely significant. Finally, the relationship between the high and medium stimulus varied across each category, in some cases the high stimulus was preferred while in other categories the medium was preferred.

There are a few possible explanations for this lack of significance between the medium and high levels of the newness manipulation. It is possible that participants were not able to make fine enough distinctions between these two higher level stimuli or that

the stimuli chosen do not represent a high enough newness. While these were the highest newness stimuli from among those real products identified, they may not be new enough to cause a decline in the consumer response. Therefore, there may not be a great enough difference between the medium and high stimuli to generate the inverse-U relationship that was proposed in past literature. Simply identifying the product as belonging to the category may be enough to ensure that the uncertainty of category membership is not generated. Therefore, for the interaction effects, a regression model was used that treated newness as a continuous variable, rather than 3 categorical variables, by drawing from participants' trendiness evaluation. The next step of the analysis will examine the moderating effect of the individual differences using multiple regression.

#### *Interaction Effects*

The model proposes that there are 3 individual difference variables, CVPA, DUCP, and Innovativeness, that have moderating effects on the preference for new products. The low, medium, and high stimulus levels, which were selected in the prior studies, were based on relative rankings of the product relative to a finite defined subset. While it is assumed that these products differ because of their distance in these rankings, it is possible that some categories required finer distinctions than others. Therefore, for the regression analysis a continuous measure of the newness evaluation is preferable. To test the interaction effects, the independent variable, trendiness, was used to signal the participants' newness evaluation of the product. Products that were higher on this variable were deemed to be newer than products that were lower. As noted in the

manipulation checks these evaluations were generally consistent with those indicated in the first study, particularly with bicycles and espresso makers.

To test the interaction of the individual difference variables, the composite measure of affective reaction to the product was regressed on the independent variables; trendiness, CVPA, DUCP, and KAI, the interaction of trendiness with the three individual difference variables, and two control variables; age and gender. Therefore, the following model was tested for each of the four product categories.

$$Y_i = \beta_0 + \beta_1 X_{(\text{trendy})i} + \beta_2 X_{(\text{cvpa})i} + \beta_3 X_{(\text{DUCP})i} + \beta_4 X_{(\text{KAI})i} + \beta_5 X_{(\text{age})i} + \beta_6 X_{(\text{gender})i} + \beta_7 X_{(\text{CVPA})i} X_{(\text{trendy})i} + \beta_8 X_{(\text{DUCP})i} X_{(\text{trendy})i} + \beta_9 X_{(\text{KAI})i} X_{(\text{trendy})i} + \varepsilon_i \quad (3)$$

Where

$Y_i$	=	Product Attractiveness
$X_{(\text{trendy})}$	=	Trendiness composite measure
$X_{(\text{CVPA})}$	=	Centrality of Visual Product Aesthetics
$X_{(\text{DUCP})}$	=	Desire for Unique Consumer Products
$X_{(\text{KAI})}$	=	Kirton Adaptiveness/Innovativeness Inventory – Originality Dimension
$X_{(\text{age})}$	=	Participant Age
$X_{(\text{gender})}$	=	Participants Gender (1=female)

The model exhibits reasonable fit across all four product categories explaining approximately 18% of the variance in bicycle affective reaction ( $R^2_{(\text{adj})} = .182$ ,  $F(9,202)=6.220$ ,  $p<.001$ ), 36% of the variance in espresso affective reaction ( $R^2_{(\text{adj})} = .365$ ,  $F(9,202)=14.472$ ,  $p<.001$ ), 52% of variance in hand vacuum affective reaction ( $R^2_{(\text{adj})} = .525$ ,  $F(9,202)=26.865$ ,  $p<.001$ ), and 39% of the affective reaction toward Toasters ( $R^2_{(\text{adj})} = .394$ ,  $F(9,202)=16.222$ ,  $p<.001$ ). Considering that this affective evaluation of products is extremely subjective, the variance explained is relatively strong. Turning to the coefficients in the regression model, the results are less robust, and less

consistent, but offer some support for the hypotheses. The overall model fit measures are provided in Table 32 and the individual coefficients are provided in Table 33.

Table 28: Regression Model Fit

	Bicycle	Espresso	Handvac	Toaster
R Square	0.217	0.392	0.545	0.420
Adjusted R Square	0.182	0.365	0.525	0.394
Std. Error of the Estimate	1.237	0.926	1.007	0.815
Sum of Squares	85.603	111.732	245.333	97.068
df	9	9	9	9
Mean Square	9.511	12.415	27.259	10.785
F	6.220	14.472	26.865	16.222
Sig.	0.001	0.001	0.001	0.001

*Hypothesis 2:* Consumers who are high in innovativeness prefer greater levels of visual product newness than consumers who are low in innovativeness. Innovativeness was measured using the originality dimension of the KAI. There was no support for this hypothesis. Neither the direct effect of KAI, nor the moderating effect was supported in this study.

*Hypothesis 3:* Hypothesis 3 proposed that consumers who are higher in design acumen prefer greater levels of visual product newness. Design acumen was measured using the CVPA scale. There was support for this hypothesis across 3 of the 4 product categories. First, in bicycles, both the direct effect of CVPA ( $B_2=-2.525$ ,  $t = -3.086$ ,  $p=.002$ ) and the interaction of CVPA with trendiness were significant ( $B_7=.494$ ,  $t = 3.466$ ,  $p=.001$ ). However, what is perhaps most interesting is the direction of the hypothesized relationship. The CVPA on its own demonstrates a negative relationship with the affective reaction to the product stimulus. That is, consumers that were high in

CVPA tended to rate the products as less favorable than consumers who were low in CVPA. This is not the type of relationship that would be expected. One would expect that consumers who are high in CVPA would be more likely to rate product favorably. However, given the demonstrated relationship between CVPA and product attractiveness (Bloch et al. 2003) this negative relationship suggests that there may be some spurious attractiveness effects that are stronger than the newness dimension, and people that are higher in CVPA will be more attuned to these effects. The interaction effect is, positive as hypothesized. That is, consumers who are higher in CVPA prefer greater levels of visual product newness. A similar relationship was revealed with the hand vacuums ( $B_7=.196$ ,  $t = 2.017$ ,  $p=.045$ ) and toasters ( $B_7=.218$ ,  $t = 2.621$ ,  $p=.009$ ). Therefore, H3 is supported, there is a positive moderating effect of CVPA on consumer preference for visual product newness.

*Hypothesis 4:* It is proposed in hypothesis 4 that consumers who are high in need for uniqueness will exhibit a greater preference for visual product newness than consumers who are low in need for uniqueness. This construct was measured using the consumer desire for unique consumer product (DUCP) scale. There is no support for this hypothesis; DUCP did not demonstrate a interaction with consumer's affective reaction to visual product newness.

Table 29: Regression Coefficients

Coefficients	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
<i>Bicycle</i>					
(Constant)	2.092	3.245		0.645	0.520
trendy	-0.403	0.547	-0.378	-0.737	0.462
CVPA	-2.535	0.822	-1.174	-3.086	0.002
DUCPC	0.762	0.655	0.365	1.164	0.246
KAI	1.346	0.909	0.494	1.480	0.140
Age	0.113	0.066	0.108	1.710	0.089
Gender	-0.308	0.183	-0.109	-1.686	0.093
trendyxcvpa	0.494	0.142	2.168	3.466	0.001
trendyxdupc	-0.151	0.120	-0.630	-1.259	0.209
trendyxKAI	-0.151	0.161	-0.603	-0.936	0.351
<i>Espresso</i>					
(Constant)	0.086	3.050		0.028	0.977
trendy	-0.079	0.129	-0.344	-0.614	0.540
CVPA	-0.389	0.421	-0.212	-0.924	0.357
DUCPC	0.082	0.492	0.046	0.166	0.868
KAI	0.597	0.675	0.258	0.884	0.378
Age	0.044	0.049	0.049	0.886	0.377
Gender	0.066	0.137	0.027	0.480	0.632
trendyxcvpa	0.077	0.084	0.374	0.916	0.361
trendyxdupc	0.003	0.093	0.013	0.031	0.975
trendyxKAI	0.603	0.528	0.614	1.142	0.255
<i>Handvac</i>					
(Constant)	1.826	2.200		0.830	0.407
trendy	0.326	0.379	0.345	0.862	0.390
CVPA	-0.517	0.432	-0.224	-1.199	0.232
DUCPC	0.127	0.382	0.057	0.332	0.741
KAI	0.068	0.512	0.023	0.133	0.894
Age	0.022	0.054	0.020	0.417	0.677
Gender	0.172	0.145	0.057	1.187	0.237
trendyxcvpa	0.169	0.084	0.735	2.017	0.045
trendyxdupc	-0.042	0.080	-0.176	-0.529	0.597
trendyxKAI	-0.034	0.106	-0.142	-0.318	0.751
<i>Toaster</i>					
(Constant)	6.081	2.106		2.888	0.004
trendy	0.059	0.100	0.275	0.590	0.556
CVPA	-0.998	0.392	-0.603	-2.547	0.012
DUCPC	-0.161	0.429	-0.101	-0.376	0.707
KAI	-0.141	0.476	-0.067	-0.296	0.768
Age	0.067	0.044	0.084	1.530	0.127
Gender	0.162	0.120	0.075	1.344	0.180
trendyxcvpa	0.218	0.083	1.169	2.621	0.009
trendyxdupc	0.021	0.089	0.107	0.238	0.812
trendyxKAI	-0.594	0.398	-0.691	-1.491	0.138

Even though there was no support for H2, it is possible that the KAI measure does not adequately capturing the construct. Innate consumer innovativeness may be comprised of both cognitive and sensory components (Venkatraman and Price 1990). To test H2b and H2c the composite affective response was regressed on trendiness, cognitive innovativeness, and sensory innovativeness, the interaction between these variables, and two control variables; age and gender.

$$Y_i = \beta_0 + \beta_1 X_{(\text{trendy})i} + \beta_2 X_{(\text{coginnov})i} + \beta_3 X_{(\text{senseinnov})i} + \beta_4 X_{(\text{age})i} + \beta_5 X_{(\text{gender})i} + \beta_6 X_{(\text{coginnov})i} X_{(\text{trendy})i} + \beta_7 X_{(\text{senseinnov})i} X_{(\text{trendy})i} + \epsilon_i \quad (4)$$

Where

- $Y_i$  = Product Attractiveness
- $X_{(\text{trendy})}$  = Trendiness composite measure
- $X_{(\text{coginnov})}$  = Cognitive Innovativeness
- $X_{(\text{senseinnov})}$  = Sensory Innovativeness
- $X_{(\text{age})}$  = Participant Age
- $X_{(\text{gender})}$  = Participants Gender (1=female)

The overall model fit measures are provided in Table 34 and the individual

coefficients are provided in Table 35.

Table 30: Regression Model Fit Cognitive and Sensory Innovativeness

	Bicycle	Espresso	Handvac	Toaster
R Square	0.159	0.389	0.525	0.404
Adjusted R Square	0.130	0.368	0.508	0.384
Std. Error of the Estimate	1.275	0.924	1.024	0.822
Sum of Squares	62.859	110.966	236.274	93.483
df	7	7	7	7
Mean Square	8.980	15.852	33.753	13.355
F	5.524	18.580	32.173	19.758
Sig.	0.001	0.001	0.001	0.001

Table 31: Regression Coefficients Cognitive and Sensory Innovativeness

Coefficients	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
<i>Bicycle</i>					
(Constant)	3.351	3.004		1.116	0.266
trendy	-0.353	0.487	-0.331	-0.725	0.469
Cognitive innov	-0.105	0.591	-0.045	-0.177	0.860
Sensory innov	-0.652	0.551	-0.329	-1.184	0.238
Age of Respondent	0.091	0.068	0.087	1.339	0.182
Gender of respondent	-0.279	0.193	-0.099	-1.448	0.149
trendy x coginnov	0.073	0.112	0.298	0.650	0.516
trendy x senseinnov	0.128	0.102	0.536	1.258	0.210
<i>Espresso</i>					
(Constant)	0.260	2.422		0.107	0.915
trendy	0.751	0.387	0.763	1.940	0.054
Cognitive innov	0.768	0.434	0.389	1.768	0.079
Sensory innov	-0.408	0.449	-0.242	-0.908	0.365
Age of Respondent	0.028	0.050	0.032	0.564	0.574
Gender of respondent	0.003	0.140	0.001	0.022	0.983
trendy x coginnov	-0.114	0.084	-0.533	-1.364	0.174
trendy x senseinnov	0.071	0.085	0.334	0.833	0.406
<i>Handvac</i>					
(Constant)	0.964	1.731		0.557	0.578
trendy	0.660	0.292	0.697	2.264	0.025
Cognitive innov	0.014	0.351	0.006	0.041	0.967
Sensory innov	-0.141	0.293	-0.067	-0.481	0.631
Age of Respondent	0.023	0.055	0.021	0.423	0.673
Gender of respondent	0.215	0.153	0.071	1.403	0.162
trendy x coginnov	-0.030	0.073	-0.129	-0.411	0.681
trendy x senseinnov	0.038	0.064	0.160	0.597	0.551
<i>Toaster</i>					
(Constant)	4.153	1.844		2.253	0.025
trendy	0.022	0.311	0.025	0.069	0.945
Cognitive innov	0.069	0.355	0.039	0.195	0.845
Sensory innov	-0.738	0.356	-0.487	-2.075	0.039
Age of Respondent	0.037	0.044	0.046	0.828	0.409
Gender of respondent	0.060	0.124	0.028	0.486	0.627
trendy x coginnov	0.019	0.073	0.091	0.256	0.798
trendy x senseinnov	0.130	0.071	0.646	1.824	0.070

This second regression model also exhibits a reasonable fit to the data. The independent variables explain approximately 13% of the variance in bicycle affective reaction ( $R^2_{(adj)} = .130$ ,  $F(7,204)=5.524$ ,  $p<.001$ ), 37% of the variance in espresso affective reaction ( $R^2_{(adj)} = .368$ ,  $F(7,204)=18.580$ ,  $p<.001$ ), 50% of variance in hand vacuum affective reaction ( $R^2_{(adj)} = .508$ ,  $F(7,204)=32.173$ ,  $p<.001$ ), and 38% of the affective reaction toward toasters ( $R^2_{(adj)} = .384$ ,  $F(7,204)=19.758$ ,  $p<.001$ ).

*Hypothesis 2a:* Hypothesis 2a proposed an interaction effect of sensory innovativeness. There is some weak support for the hypothesis. In the toasters category, sensory innovativeness exhibits a significant direct relationship on the affective reaction to the product ( $B_3=-.738$ ,  $t = -2.075$ ,  $p=.039$ ), however this relationship is in the opposite direction to what would be expected. This is, however, somewhat similar to the negative direct relationship that was discovered between CVPA and affect in the prior model. Like CVPA this negative direct effect is accompanied by a small interaction effect that is only marginally significant ( $B_7=.130$ ,  $t = 1.824$ ,  $p=.070$ ). This suggests that consumers who are high in sensory innovativeness, actually tended to rate product as less attractive than those who were low in sensory innovativeness, but, that they were more attracted to products that they rated as high in VPN. This relationship however, is inconsistent and quite weak, which offers little support for H2a.

*Hypothesis 2b:* Cognitive innovativeness was not supported across any of the product categories, either as a main effect or an interaction effect. Although there was some marginal support for a main effect of cognitive innovativeness in the espresso category ( $B_2=.768$ ,  $t = 1.768$ ,  $p=.070$ ) but this relationship is too weak to draw any

conclusions. Therefore, since there are no statistically significant effects of cognitive and sensory innovativeness, it is impossible to support or refute H2b.

Perhaps the most interesting finding of this third study is the emergence of the trendiness dimension as a main effect in two product categories espresso ( $B_1=.751$ ,  $t = 1.940$ ,  $p=.05$ ) and hand vacuums ( $B_1=.660$ ,  $t = 2.264$ ,  $p=.025$ ). The relationship is in the expected positive direction, that is, consumers evaluate product with higher amounts of newness more favorably. While this dimension was found to be significant in the first part of this study it tended to vanish when the additional individual difference variables were introduced into the model. This suggests, perhaps, that the perception of newness only represent a very small part of the evaluation of new products, and when combined with a number of other variables, the small effects of this variable are lost among the stronger individual difference variables. Moreover, the appearance of the variable as significant in this context is also consistent with the findings of the ANOVA and means plots. In the first step of the analysis, espresso makers and hand vacuums exhibited a more linear, monotonically increasing relationship, while the medium newness bicycle was not rated very favorably, and so a U-shaped relationship, was obtained in the data.

### **Chapter Summary**

This study found marginal support for some of the proposed hypotheses. In particular the relationship between visual product newness and product preference received mixed support in both the ANOVA and regression analysis. While consumers varied in their preference for high and medium stimulus, there was clearly a difference between the low stimuli, which was universally rated less favorably than the higher

newness stimuli. It was also clear that consumers who are more attuned to, and interested in, design tended to prefer higher degrees of visual product newness. The other hypothesized relationships did not receive any substantial support. While the lack of significance was somewhat disappointing, given the exploratory nature of much of this work, the findings still offer some valuable insights, and represent a strong first step in this track of research. The next section will discuss the implications of this dissertation, will highlight some of the limitations, and will propose a number of avenues for future research.

## **CHAPTER 7 - DISCUSSION AND FUTURE RESEARCH**

### **Introduction**

This research was primarily concerned with understanding and exploring the construct of visual product newness. While there is a long history of research on innovation and the adoption of innovation, much of this research has focused on the firms' creation and introduction of innovative products and has invested little time in examining buyers' perceptions of these innovations. One key dimension of buyers' perception of new products is the visual form of the product, and the way that buyers react to changes in the visual form that communicate product newness.

This research drew from three disparate literature streams – managerial research on innovation and research on aesthetics and design – to propose a theory of visual product newness. The study reveals that visual product newness is an important part of consumers evaluations of new products, and that buyers infer the quality, value, and utility of new products by drawing from cues in the product form.

The specific objectives of this chapter are as follows; 1) to summarize the key findings and implications of this research; 2) to describe the contribution of this research to academics and practitioners; and 3) to discuss the limitations and future research opportunities that are suggested by this work.

### **Summary of Key Findings**

This research demonstrates that newness is one component of consumer's product evaluations and is certainly worthy of future study. While consumers may not be aware

of the features of the design that they use for evaluating product newness, it was clear in study 1, that they sorted products in a relatively consistent way. This was particularly evident for products that were high and low in newness. Consumers more effectively identified the products that deviated the most from the mean, and hence, represented the two ends of the spectrum, but they demonstrated much less certainty with products that exhibited more moderate changes in newness. In summary, it can be inferred that consumers are capable of assessing the newness of a product, and there seem to be some commonly held characteristics of the product that are driving these judgments.

It is interesting that buyers are somewhat consistent in their newness inferences, yet they are not very adept at articulating the signals of cues that assist them in making these judgments. When consumers were asked to report the criteria that motivated their assignment of visual product newness, it was quite revealing how few of them specified concrete product features. Instead, they relied on more holistic impressions of the product. This finding lends some support for the primacy of visual design. While consumers were able to assign products to categories with confidence, when they were asked to evaluate their actions in terms of cognitive structures, they were much less adept. This work does not attempt to characterize this gap, but it is consistent with the work on nonconscious processing; that is, consumers employ nonconscious processing algorithms, but have difficulty articulating these devices.

Newness was shown to impact the focus of consumers' attention when asked to identify the features of the product. The second study demonstrated that products that were high in newness tended to elicit more affective and aesthetic responses than products that were lower in newness. This begins to suggest that the memory processing

and retrieval that consumers use when confronted with products with greater newness are different than when they are evaluating products that exhibit less newness.

Consumers exhibited a clear preference for more newness. The preference for moderate novelty, as first hypothesized in this work, was not supported, but it was nearly uniformly shown that consumers were not interested in products that looked old or traditional. These products were denounced as looking boring, cheap, and ugly. While products that appeared newer were seen as fascinating or interesting. While this research did not test the impact of these reactions on purchase intention, it did indicate that high newness products were capable of engaging the buyer in more effortful processing. If only enough for them to ask “what is it?” If visual product newness can engender this type of response in the consumers, one could interpret this as a success. Buyers are unlikely to purchase a product solely on the merits of the visual design, but if the design can break through the clutter and catch their attention, then it means that the product may then be evaluated on the merits of its function.

This dissertation established that there is a relationship between visual product newness and consumer’s preferences for a product. While the results were not extremely robust, they offer the first evidence of the relationship. Moreover, there was also some evidence that this relationship is moderated by individual differences. While these relationships were not overly strong, there are a number of possible explanations that will be discussed in the limitations and future research.

## **Contribution**

The first contribution of this dissertation was in identifying and conceptualizing the construct of newness. While the term has been used, often interchangeably with innovation, there are clearly a number of differences. A case has been made for studying this construct and understanding how consumers' perception of newness will affect product preference and subsequent adoption. This is not a radically new idea, as the importance of the adopting unit was highlighted in the earliest work on the diffusion of innovation; however, there has often been some confusion in the discipline about the term innovation. This work takes a first step towards resolving this confusion.

Research on product design, in the marketing discipline, is still in its infancy. This dissertation provides some empirical findings that advance the theoretical and empirical studies from design and marketing. Study 2 advances Crilly et al.'s (2003) theoretical model by providing empirical evidence that there are 4 distinct categories of product perception that are elicited by new products. Moreover, this work advances the research, by showing that the types of attributes elicited tend to vary by product characteristics. This work also examines the centrality of visual product aesthetics in a new context.

Like many of the other empirical studies cited in this dissertation, work on nonconscious processing has often focused on verbal descriptions and attitude statements. This research provides evidence that the nonconscious processing algorithms may have some applications to a product design context. It was clear in the first study that participants were capable of providing confident and consistent judgments based on thin slice assessment of product photographs, but when asked to explain the method they

used, most participants were unable to clearly articulate their process. This research, therefore, highlights consumers' ability to make thin slice judgments of product form and opens a new avenue for future research in nonconscious processing.

This study introduced two methods to the study of product visual design that have not been used in this context: Q-methodology and multidimensional scaling (MDS). The Q-sort method enabled consumers to sort several different sets of products without the cognitive burden that is involved in complete sorts, while still yielding valuable data for examining visual product newness. The other exploratory method, non-metric MDS, provided some interesting perceptual maps. This method is well suited to research in visual product design for three reasons. First, MDS offers a visual means of comparing visual stimuli. This is particularly useful in exploratory research. The differences and similarities between products are clearer when the relationships are presented graphically than they would be with numeric results. Second, this visual form of interpretation is consistent with the skills of the researcher. Much of the research in product design is being undertaken by researchers that have experience and training in related fields such as industrial design and art (Schroeder 2006). This format allows them to draw from their experience and training to provide valuable insights. Third, the derived stimulus configuration assists in the communication of the results. As research in design gains momentum, tools that facilitate the explanation and communication of the results in a way that non design experts can understand will become even more valuable to researchers.

## **Limitations and Future Research**

Visual product newness is only one piece of a total product evaluation. In this study physical products, and product prototypes, were used instead of the line drawing used in past studies on design. While this may have yielded more rich evaluations of product newness, it also introduced more variance and additional aesthetic factors into the product that may have had an impact on the evaluation of the product, thus minimizing the effect of newness. For example, in the bicycle product category, the Cheetah bike, which was rated as moderately new, was compared with two bicycles designed by Scott Robertson. The Robertson bikes used more color than the Cheetah bike, which was entirely black. Whereas, the Cheetah was evaluated as more new than the Robertson 'Klein' bike, it was not viewed as significantly more appealing. This suggests two interesting things. The first is that clearly the use of real products has the possibility of introducing additional covariates, and second, it suggests that color may be a major element in product preference. There is still some value in using real products as opposed to line drawings; however, it may be advantageous to use products that morph between two different shapes. Also, given that color may be a factor in product assessment, either keeping a more consistent color in the products, or providing black and white photos only in future research may limit the effect of this variable.

Most of the prior studies in product design have employed line drawings of the product shapes. While these forms allow the researcher to impose control on the visual stimuli, they also remove the product an additional step from reality. One of the strengths of this study was the use of real product photos and real products. However, the use of real products also meant that the study sacrificed some of the control that is possible with

line drawings. Line drawings offer the opportunity of creating products that extend beyond the realm of believability or practicality, much more simply. With real products, the designs were much more restricted by non visual design constraints such as cost, reliability, and useability. The preliminary item reduction focused on removing products that varied too much from the core product function. For example, bicycles with more than two wheels and recumbent riding positions were removed from the consideration set. This removal, though, may have served to limit the range of products, and may partially explain the lack of decrease in preference for higher newness products.

Berlyne (1971) posited that the reason that high novelty products do not arouse the senses as much is because these products are not easy to categorize. While a number of participants in the second study made statements such as “I didn’t know it was an espresso machine at first”, including a category prime ensured that participants had a basis of comparison. This limitation of range may partially explain why the expected inverse-U relationship was not achieved, and future research should provide a wider range of products with greater variance. Moreover, particularly in tasks like the attribute elicitation and the experiment, where consumers were not comparing among products, it may be worthwhile not to state the category, and instead force respondents to draw from their own memory and experience to categorize the product. It may also be possible that the negative effect of high levels of visual newness may not be exhibited at the affective level, but instead, may emerge at the behavioral level. In other words, buyers may like products that are high in newness, but it is not until they come to purchase them, that they are less likely to purchase those that are high in newness.

Student subjects were used for a number of reasons. The first was that it provided a sample that was easily accessible with minimal costs to the researcher. The second was that it was felt that consumers would represent a relatively homogeneous set of respondents in terms of their experience and involvement with the product categories. The product categories were selected because it was expected that consumers would not have much experience with the them, and hence would base their judgments primarily on the visual form. Yet, students do not have the market experience that older adult subjects would have, and because of their age, they are drawing from a shorter knowledge span of product design. They have not been exposed to Avocado and Harvest Gold appliances, and therefore, they are drawing from a smaller memory set of comparison products. Future research may benefit from replicating these studies with a group of older, more experienced consumers.

The sorting task was adapted from Q-methodology, but a Q-method analysis was not attempted in this data. The complete methodology was not attempted for a number of reasons that also provide avenues for future studies. The first is the number of items that were being sorted. Because, this research was somewhat exploratory, participants were asked to sort 6 different product categories. Therefore, 20 products were selected in each category to lower the burden on the participants. To perform a complete Q-methodology a larger data set with more categories would be needed. For example, instead of sorting 20 product from 1-5, 60 products could be sorted from -5 to +5, therefore providing 11 categories that range in size from 2 or 3 products to 7 or 8 products. This would also allow a greater range of newness to be evaluated by the consumers, as already noted, not only at the high end, but perhaps also with more, older looking products.

Another technique used in Q-methodology involves preloading the products. Typically, the Q-methodology has been used as a means of assessing individual subjective responses to opinion statements. These opinion statements are usually designed to represent a number of concepts. For example, when examining political issues a statement could be written to include one portion of the statement that is conservative versus liberal social position, and another portion that represents conservative versus liberal economic position. In this case 4 different statements can be constructed that are known to contain certain characteristics. The same could be done in this research. Instead of taking a sampling of bicycles, the same bicycle could be modified to represent different levels of design elements. For example, a bicycle could be modified to have 4 different colors, the shape of the frame could vary from angular edges to something more rounded also in 4 steps, and finally 4 different wheels could be substituted, including clear plastic, traditional spokes, and two styles of multispoke mag wheels. Therefore, the same product could have 64 different variations. This has been done with line drawings (e.g., Carbon and Leder 2005; Veryzer and Hutchinson 1998), but has not been done in the past with actual product photographs.

The Q-methodology is designed to cluster respondents based on individual subjective assessments. Because of the burden of the number of sorts, only the CVPA was collected, indeed it was only postulated prior to the study that CVPA would affect the preference for products. The Q-methodology uses a principal components factor analysis to cluster respondents into similar groups. Additional trait variables would enable researchers to identify individual differences that affect the perception of visual

product newness. A more heterogeneous sample would also create much more differentiation on individual variables.

Finally, Q-methodology offers a means of comparing the same stimulus on different attributes. Using this approach, the same set of products could be sorted on both newness, and then on the attractiveness of the product, or the usefulness; both of which can affect consumers' judgment of new products. Therefore, as a first step, the Q-sorting task served the purpose of identifying levels of product newness, however, the complete Q-methodology is a rich technique that can be employed with a larger data set, a more varied set of subjects, and more controlled variation in the product stimuli to more fully identify both universal characteristics of newness, and individual differences in their evaluations.

For the third study, it was quite surprising that there was no real measure of product attractiveness in the literature. The dependent variable in this study was therefore a combination of a number of different measures of preference for the product. Similarly, the trendiness dimension of Hsiao and Chen's (2006) affective reaction factor analysis was used as a proxy for perceptions of product newness, yet this is still not a complete scale. There, is definitely some value in developing a scale of product attractiveness and a scale of product newness, both of which would facilitate future research in design.

In the attribute elicitation task it was clear from the number of responses on the semantic dimension that consumers use the visual form to infer the usefulness of the product. Similarly, newness may stem, not only from the product's visual form, but also from the perception that the product can perform tasks that could not be accomplished with existing products, or were performed ineffectively by these products. Therefore, the

interaction of the visual form and the functional form of the product offers a valuable direction for future research. A conjoint analysis of the dimensions that make up the visual and functional dimensions of the product, could offer a means of examining the importance placed on each dimension.

It was clear in the sorting study, that, while consumers were able to sort with confidence and consistency, they were unable to clearly articulate the reasons for these judgments. In this research the primary researcher, examined the derived MDS plots and inferred characteristics that were used to place products in this way. Designers tend to be more attuned to product form, and hence may be more capable of articulating the reasons for the sort. Designers could be used as research participants in one of two ways. First, designers could complete the same sort task as consumers, and using the Q-methodology, they could be compared with the consumer sorts. A second, and likely more valuable technique, may be to elicit designers' perceptions of the dimensions that make up the derived MDS solution. Given that they are more attuned to design, they may be more capable of identifying fine distinctions that characterize the arrangement of the products.

As noted in the model, different product categories will have different expectations for product newness. The product categories were selected so that the participants were somewhat familiar with the products, but were unlikely to be experts. However, it is possible that the product categories differ substantially in the desired level of visual product newness. The expectations of visual product newness for the category could be tested in subsequent research. Future research could also examine the characteristics of the product category; dimensions such as the hedonic and utilitarian importance of the product category, and buying cycle times may impact the desire for

visual product newness and consumers preference for products that are high in visual newness.

Three individual difference variables were selected for this study because of their close affiliation with new product adoption and visual design. However, there are a number of additional individual difference variables that may exhibit a moderating effect. For example, risk aversion (propensity), product expertise, and enduring involvement. Each of these variable could be examined in future research studies.

When firms introduce new products, they frequently combine the product launch with advertising coverage. The newness and quality of the advertising may have an effect on consumers' perception of product newness and may also moderate the affective reaction toward this research. A 2x2 experiment of product (old, new) and advertising novelty (old, new) may be an interesting means of examining these effects.

Product newness is also of interest to brand managers. As this research shows, consumers tend to prefer products with higher perceived newness than those that seem old or dated. Brand managers face a challenge in maintaining their brand characteristics within the context of the new product. Betty Crocker for example has repeatedly updated the imaginary representation of the character Betty Crocker, but has made changes that fall under the just noticeable difference threshold. The product has been updated repeatedly while still remaining recognizable to the consumer (Schiffman and Kanuk 2004). A similar challenge is faced by brand managers; how can they meet consumers' desire for newness, while at the same time maintaining the image and style that is characteristic of the brand?

This work was performed in a Midwestern college, where there is relative cultural homogeneity among the participants. However, product design preferences are culturally specific. Many of the products that were selected for this task were drawn from European brands. These brands were often perceived as being very new by consumers. It is anticipated that members of different cultures will value newness in varying degrees, and will appreciate different levels of newness. A cross cultural study of product newness is an interesting avenue for future research.

### **Conclusion**

Consumers use visual product design as a means of inferring the quality, value, durability, and of course newness of a product. Consumers were relatively adept at inferring product newness based only on the visual form of the product. This perception and judgment of product form occurs relatively quickly and below the level of most consumers' conscious awareness. Therefore, evaluations of visual product newness tend to occur before consumers have the opportunity to evaluate the more functional dimensions of the product. At a general level, consumers exhibit a preference for products that demonstrate higher levels of visual product newness. It is important therefore for marketers to understand the impact that changes in design can have on consumer's perception of newness, and how newness can be used to engage consumers in further evaluations of the product. This study is a first step toward understanding the dimensions of and consumers' preference for visual product newness.

## REFERENCES

- Adaval, Rashmi and Kent B. Monroe (2002), "Automatic Construction and Use of Contextual Information for Product and Price Evaluations," *Journal of Consumer Research*, 28 (March), 572-88.
- Adler, Ronald B. and George R. Rodman (2003), *Understanding Human Communication* (8th ed.), New York, Oxford University Press.
- Ali, Abdul (2000), "The Impact of Innovativeness and Development Time on New Product Performance for Small Firms," *Marketing Letters*, 11 (May), 151-63.
- Amason, Allen C., Rodney C. Shrader, and George H. Tompson (2006), "Newness and Novelty: Relating Top Management Team Composition to New Venture Performance," *Journal of Business Venturing*, 21 (January), 125-48.
- Ariely, Dan and Gal Zauberman (2000), "On the Making of an Experience: The Effects of Breaking and Combining Experiences on Their Overall Evaluation," *Journal of Behavioral Decision Making*, 13 (Apr/Jun), 219-32.
- Atuahene-Gima, Kwaku (1995), "An Exploratory Analysis of the Impact of Market Orientation on New Product Performance: A Contingency Approach," *Journal of Product Innovation Management*, 12 (September), 275-93.
- Atuahene-Gima, Kwaku and Felicitas Evangelista (2000), "Cross-Functional Influence in New Product Development: An Exploratory Study of Marketing and R&D Perspectives," *Management Science*, 46 (October), 1269-84.
- Barksdale, Hiram C. and Bill Darden (1971), "Marketers' Attitudes toward the Marketing Concept," *Journal of Marketing*, 35 (October), 29-36.

- Baumgartner, Hans, Mita Sujun, and Dan Padgett (1997), "Patterns of Affective Reactions to Advertisements: The Integration of Moment-to-Moment Responses into Overall Judgments," *Journal of Marketing Research*, 34 (May), 219-32.
- Bearden, William O., David M. Hardesty, and Randall L. Rose (2001), "Consumer Self-Confidence: Refinements in Conceptualization and Measurement," *Journal of Consumer Research*, 28 (June), 121-34.
- Belk, Russell W. (1975), "Situational Variables in Consumer Behavior," *Journal of Consumer Research*, 2 (December), 157-64.
- Berlyne, Daniel E. (1971), *Aesthetics and Psychobiology*, New York,, Appleton-Century-Crofts.
- \_\_\_\_\_ (1974), *Studies in the New Experimental Aesthetics: Steps toward an Objective Psychology of Aesthetic Appreciation*, Washington,, Hemisphere Pub. Corp.
- Bigand, E., S. Vieillard, F. Madurell, J. Marozeau, and A. Dacquet (2005), "Multidimensional Scaling of Emotional Responses to Music: The Effect of Musical Expertise and of the Duration of the Excerpts.," *Cognition & Emotion*, 19 (December), 1113-39.
- Blake, Brian, Robert Perloff, and Richard Heslin (1970), "Dogmatism and Acceptance of New Products," *Journal of Marketing Research*, 7 (November), 483-86.
- Bloch, Peter H. (1995), "Seeking the Ideal Form: Product Design and Consumer Response," *Journal of Marketing*, 59 (July), 16-29.

- Bloch, Peter H., Frederic F. Brunel, and Todd J. Arnold (2003), "Individual Differences in the Centrality of Visual Product Aesthetics: Concept and Measurement," *Journal of Consumer Research*, 29 (March), 551-65.
- Block, Jack (1961), *The Q-Sort Method in Personality Assessment and Psychiatric Research*, Springfield, Ill., Thomas.
- Blythe, Jim (1999), "Innovativeness and Newness in High-Tech Consumer Durables," *The Journal of Product and Brand Management*, 8 (5), 415-29.
- Bonner, Joseph M. and Orville C. Walker Jr. (2004), "Selecting Influential Business-to-Business Customers in New Product Development: Relational Embeddedness and Knowledge Heterogeneity Considerations," *Journal of Product Innovation Management*, 21 (May), 155-69.
- Booz-Allen and Hamilton (1982), *New Product Development for the 1980s*, New York, Booz-Allen Hamilton Consultants.
- Boselie, Frans (1991), "Against Prototypicality as a Central Concept in Aesthetics," *Empirical Studies of the Arts*, 9 (1), 65-73.
- Boulding, William and Amna Kirmani (1993), "A Consumer-Side Experimental Examination of Signaling Theory: Do Consumers Perceive Warranties as Signals of Quality?," *Journal of Consumer Research*, 20 (June), 111-23.
- Breivik, Einar and Magne Supphellen (2003), "Elicitation of Product Attributes in an Evaluation Context: A Comparison of Three Elicitation Techniques," *Journal of Economic Psychology*, 24, 77-98.

- Brentani, Ulrike de (2001), "Innovative Versus Incremental New Business Services: Different Keys for Achieving Success," *The Journal of Product Innovation Management*, 18 (May), 169-87.
- Brown, Steven R. (1980), *Political Subjectivity : Applications of Q Methodology in Political Science*, New Haven, Yale University Press.
- Budesheim, Thomas Lee and Stephen J. DePaola (1994), "Beauty or the Beast? The Effects of Appearance, Personality, and Issue Information on Evaluations of Political Candidates," *Personality and Social Psychology Bulletin*, 20 (4), 339-48.
- Callahan, John and Eytan Lasry (2004), "The Importance of Customer Input in the Development of Very New Products," *R & D Management*, 34 (March), 107-20.
- Cann, Arnie, William D. Siegfried, and Lorena Pearce (1981), "Forced Attention to Specific Applicant Qualifications: Impact on Physical Attractiveness and Sex of Applicant Biases," *Personnel Psychology*, 34 (1), 65-75.
- Carbon, Claus-Christian and Helmut Leder (2005), "The Repeated Evaluation Technique (RET). A Method to Capture Dynamic Effects of Innovativeness and Attractiveness," *Applied Cognitive Psychology*, 19 (July), 587-601.
- Carbonell, Pilar, Ana Isabel Rodriguez Escudero, and Jose Luis Munuera Aleman (2004), "Technology Newness and Impact of Go/No-Go Criteria on New Product Success," *Marketing Letters*, 15 (July), 81-97.
- Carroll, J. Douglas and Paul E. Green (1997), "Psychometric Methods in Marketing Research: Part II, Multidimensional Scaling.," *Journal of Marketing Research*, 34 (May), 193-204.

- Chamberlin, Emily Carter (2006), "Perspectives on Grizzly Bear Management in Banff National Park and the Bow River Watershed, Alberta: A Q-Methodology Study," *Thesis*, School of Resource and Environmental Management: Simon Fraser University, Burnaby.
- Chandy, Rajesh, Brigitte Hopstaken, Om Narasimhan, and Jaideep Prabhu (2006), "From Invention to Innovation: Conversion Ability in Product Development.," *Journal of Marketing Research*, 43 (August), 494-508.
- Chandy, Rajesh K. and Gerard J. Tellis (1998), "Organizing for Radical Product Innovation: The Overlooked Role of Willingness to Cannibalize," *Journal of Marketing Research*, 35 (November), 474-87.
- \_\_\_\_\_ (2000), "The Incumbent's Curse? Incumbency, Size, and Radical Product Innovation," *Journal of Marketing*, 64 (July), 1-17.
- Chang, Hua-Cheng, Hsin-Hsi Lai, and Yu-Ming Change (2007), "A Measurement Scale for Evaluating the Attractiveness of a Passenger Car Form Aimed at Young Consumers," *International Journal of Industrial Ergonomics*, 37, 21-30.
- Childers, Terry L., Michael J. Houston, and Susan E. Heckler (1985), "Measurement of Individual Differences in Visual Versus Verbal Information Processing," *Journal of Consumer Research*, 12 (September), 125-34.
- Churchill, Gilbert A., Jr. (1979), "A Paradigm for Developing Better Measures of Marketing Constructs," *Journal of Marketing Research*, 16 (February), 64-73.
- Clifford, Margaret M. and Elaine Walster (1973), "The Effect of Physical Attractiveness on Teacher Expectations," *Sociology of Education*, 46 (Spring), 248-58.
- Coates, Del (2003), *Watches Tell More Than Time*, New York, McGraw-Hill.

- Collins, Alan M. and Elizabeth. F. Loftus (1975), "A Spreading-Activation Theory of Semantic Processing," *Psychological Review*, 82 (November), 407-28.
- Cooper, R. G. (1979), "The Dimensions of Industrial New Product Success and Failure," *Journal of Marketing*, 43 (Summer), 93-103.
- Cooper, Robert G. and Elko J. Kleinschmidt (1993), "Major New Products: What Distinguishes the Winners in the Chemical Industry?," *Journal of Product Innovation Management*, 10 (March), 90-111.
- Cox, Dena and Anthony D. Cox (2002), "Beyond First Impressions: The Effects of Repeated Exposure on Consumer Liking of Visually Complex and Simple Product Designs," *Journal of the Academy of Marketing Science*, 30 (2), 119-30.
- Cox, Dena Saliagas and William B. Locander (1987), "Product Novelty: Does It Moderate the Relationship between Ad Attitudes and Brand Attitudes?," *Journal of Advertising*, 16 (Fall), 39-44.
- Crilly, Nathan, James Moultry, and P. John Clarkson (2004), "Seeing Things: Consumer Response to the Visual Domain in Product Design," *Design Studies*, 25 (6), 547-77.
- Cropp, Frederick (Fritz) William, IV (1996), "Perceptions of Japanese Advertising: A Q-Methodological Study of Advertising Practitioners in Japan," *Dissertation, Journalism: University of Missouri - Columbia, United States -- Missouri.*
- Crozier, W. Ray (1994), *Manufactured Pleasures: Psychological Responses to Design*, New York, Manchester University Press.

- Csikszentmihalyi, Mihaly and Rick Emery Robinson (1990), *The Art of Seeing: An Interpretation of the Aesthetic Encounter*, Los Angeles, Calif., J.P. Getty Museum; Getty Center for Education in the Arts.
- Csikszentmihalyi, Mihaly (1996), *Creativity: Flow and the Psychology of Discovery and Invention*, New York, Harper Collins Publishers Inc.
- Dahl, Darren W., Amitava Chattopadhyay, and Gerald J. Gorn (1999), "The Use of Visual Mental Imagery in New Product Design," *Journal of Marketing Research*, 36 (February), 18-28.
- Dahl, Darren W. and Steve Hoeffler (2004), "Visualizing the Self: Exploring the Potential Benefits and Drawbacks for New Product Evaluation," *Journal of Product Innovation Management*, 21 (July), 259-67.
- Danneels, Erwin and Elko J. Kleinschmidt (2001), "Product Innovativeness from the Firm's Perspective: Its Dimensions and Their Relation with Project Selection and Performance," *The Journal of Product Innovation Management*, 18 (November), 357-73.
- Davis, Robert H. (2003), *Jung, Freud, and Hillman: Three Depth Psychologies in Context*, Westport, Conn., Praeger.
- De Kluyver, Cornelius A. (1977), "Innovation and Industrial Product Life Cycles," *California Management Review*, 20 (Fall), 21-33.
- DeBono, Kenneth G., Amy Leavitt, and Jennifer Backus (2003), "Product Packaging and Product Evaluation: An Individual Difference Approach," *Journal of Applied Social Psychology*, 33 (3), 513-21.

- Debruyne, Marion, Rudy Moenaert, Abbie Griffin, and Susan Hart (2002), "The Impact of New Product Launch Strategies on Competitive Reaction in Industrial Markets," *The Journal of Product Innovation Management*, 19 (March), 159-70.
- Desmet, Pieter M. A. (2002), *Designing Emotions*, Published Doctoral Dissertation,
- Desmet, Pieter MA (2003), "A Multilayered Model of Product Emotions," *The Design Journal*, 6 (2), 4-13.
- Dickerson, Mary Dee and James W. Gentry (1983), "Characteristics of Adopters and Non-Adopters of Home Computers.," *Journal of Consumer Research*, 10 (September), 225-35.
- Donnelly, James H Jr and Michael J Etzel (1973), "Degrees of Product Newness and Early Trial," *Journal of Marketing Research*, 10, 295.
- Dumaine, Brian (1991), "Design That Sells and Sells And..." *Fortune* (March 11), 86-94.
- Elam, Kimberly (2001), *Geometry of Design: Studies in Proportion and Composition*, New York, Princeton Architectural Press.
- Eliashberg, Jehoshua and Thomas S. Robertson (1988), "New Production Preannouncing Behavior: A Market Signaling Study," *Journal of Marketing Research*, 25 (August), 282-92.
- Fenton, D. Mark (1985), "Dimensions of Meaning in the Perception of Natural Settings and Their Relationship to Aesthetic Response," *Australian Journal of Psychology*, 37, 325-39.
- Fishbein, Martin (1967), *Readings in Attitude Theory and Measurement*, New York,, Wiley.

- Francis, Alexander L. and Howard C. Nusbaum (2002), "Selective Attention and the Acquisition of New Phonetic Categories," *Journal of Experimental Psychology: Human Perception and Performance*, 28 (April), 349-66.
- Frijda, Nico H. (1986), *The Emotions*, Cambridge, Cambridge University Press.
- Frijda, Nico H., A. S. R. Manstead, and Sacha Bem (2000), *Emotions and Beliefs : How Feelings Influence Thoughts*, Cambridge, Cambridge University Press.
- Garcia, Rosanna and Roger Calantone (2002), "A Critical Look at Technological Innovation Typology and Innovativeness Terminology: A Literature Review," *The Journal of Product Innovation Management*, 19 (March), 110-32.
- Garner, W. R. and David E. Clement (1963), "Goodness of Pattern and Pattern Uncertainty," *Journal of Verbal Learning and Verbal Behavior*, 2, 446-52.
- Gatignon, Hubert and Jean-Marc Xuereb (1997), "Strategic Orientation of the Firm and New Product Performance," *Journal of Marketing Research*, 34 (February), 77-90.
- Girard, Xavier (2003), *Bauhaus* (English ed.), New York, Assouline.
- Gladwell, Malcolm (2005), *Blink : The Power of Thinking without Thinking* (1st ed.), New York, Little, Brown and Co.
- Goldsmith, Ronald E. and Charles F. Hofacker (1991), "Measuring Consumer Innovativeness," *Journal of the Academy of Marketing Science*, 19 (3), 209-21.
- Green, Paul E., Frank J. Carmone, and Marketing Science Institute (1970), *Multidimensional Scaling and Related Techniques in Marketing Analysis*, Boston, Allyn and Bacon.

- Green, Paul E., Yoram Wind, and Arun K. Jain (1973), "Analyzing Free-Response Data in Marketing Research," *Journal of Marketing Research*, 10 (February), 45-52.
- Green, Paul E. (1975), "On the Robustness of Multidimensional Scaling Techniques," *Journal of Marketing Research*, 12 (February), 73-81.
- Green, Paul E., Donald S. Tull, and Gerald S. Albaum (1988), *Research for Marketing Decisions* (5th ed.), Englewood Cliffs, N.J., Prentice Hall.
- Gregan-Paxton, Jennifer, Jonathan D. Hibbard, Frederic F. Brunel, and Pablo Azar (2002), ""So That's What That Is": Examining the Impact of Analogy on Consumers' Knowledge Development for Really New Products," *Psychology & Marketing*, 19 (June), 533-50.
- Grewal, Dhruv, R. Krishnan, Julie Baker, and Norm Borin (1998), "The Effect of Store Name, Brand Name and Price Discounts on Consumers' Evaluations and Purchase Intentions," *Journal of Retailing*, 74 (Fall), 331-52.
- Griffin, Abbie and Albert L. Page (1996), "Pdma Success Measurement Project: Recommended Measures for Product Development Success and Failure," *Journal of Product Innovation Management*, 13 (November), 478-96.
- Hair, Joseph F., Rolph E. Anderson, Ronald L. Tatham, and William C. Black (1998), *Multivariate Data Analysis* (5th ed.), Upper Saddle River, NJ, Prentice Hall.
- Handel, Stephen and W. R. Garner (1965), "The Structure of Visual Pattern Associates and Pattern Goodness," *Perception and Psychophysics*, 1, 33-38.
- Harte, Johanna M. and Pieter Koele (1995), "A Comparison of Different Methods for the Elicitation of Attribute Weights: Structural Modeling, Process Tracing, and Self-

Reports," *Organizational Behavior and Human Decision Processes*, 64 (October), 49-64.

Hirschman, Elizabeth C. (1980a), "Innovativeness, Novelty Seeking, and Consumer Creativity," *Journal of Consumer Research*, 7 (December), 283-95.

\_\_\_\_\_ (1980b), "Consumer Modernity, Cognitive Complexity, Creativity and Innovativeness," *Marketing in the 80s: 1980 Educator's Conference Proceedings*, Vol. 46, ed. Richard P. Bagozzi and Kenneth L. Bernhardt and Paul S. Busch and David W. Cravens and Joseph F. Hair, Jr. and Carol A. Scott. Chicago, IL: American Marketing Association, 135-39.

\_\_\_\_\_ (1984), "Experience Seeking: A Subjectivist Perspective for Consumption," *Journal of Business Research*, 12 (January), 115-36.

Hoch, Stephen J.; Ha, Young-Won (1986), "Consumer Learning: Advertising and the Ambiguity of Product Experience," *Journal of Consumer Research*, 13 (September), 221-33.

Hoeffler, Steve (2003), "Measuring Preferences for Really New Products," *Journal of Marketing Research*, 40 (November), 406-20.

Holbrook, Morris B. (1980), "Some Preliminary Notes on Research in Consumer Esthetics," *Advances in Consumer Research*, Vol. 7, ed. Jerry C. Olsen. Ann Arbor: Association for Consumer Research, 104-08.

\_\_\_\_\_ (1986), "Aims, Concepts, and Methods for the Representation of Individual Differences in Esthetic Responses to Design Features," *Journal of Consumer Research*, 13 (December), 337-47.

- Holbrook, Morris B. and Punam Anand (1992), "The Effects of Situation, Sequence, and Features on Perceptual and Affective Responses to Product Designs: The Case of Aesthetic Consumption," *Empirical Studies of the Arts*, 10 (January), 19-31.
- Hollins, Bill and Stuart Pugh (1990), *Successful Product Design : What to Do and When*, London, Butterworths.
- Hsiao, Kun-An and Lin-Lin Chen (2006), "Fundamental Dimensions of Affective Responses to Product Shapes," *International Journal of Industrial Ergonomics*, 26 (June), 553-64.
- Hultink, Erik Jan, Kwaku Atuahene-Gima, and Iris Lebbink (2000), "Determinants of New Product Selling Performance: An Empirical Examination in the Netherlands," *European Journal of Innovation Management*, 3, 27.
- Im, Subin, Barry L Bayus, and Charlotte H. Mason (2003), "An Empirical Study of Innate Consumer Innovativeness, Personal Characteristics, and New-Product Adoption Behavior," *Journal of the Academy of Marketing Science*, 31 (January), 61-73.
- Inkeles, Alex and David Horton Smith (1974), *Becoming Modern : Individual Change in Six Developing Countries*, Cambridge, Mass., Harvard University Press.
- Inkeles, Alex (1983), *Exploring Individual Modernity*, New York, Columbia University Press.
- Iyer, Easwar S. (1988), "The Influence of Verbal Content and Relative Newness on the Effectiveness of Comparative Advertising," *Journal of Advertising*, 17 (Fall), 15-21.

- Jindo, Tomido and Kiyomi Hirasago (1997), "Application Studies to Car Interior of Kansei Engineering," *International Journal of Industrial Ergonomics*, 19 (February), 105-114.
- Johannessen, Jon-Arild, Bjorn Olsen, and G.T. Lumpkin (2001), "Innovation as Newness: What Is New, How New, and New to Whom?," *European Journal of Innovation Management*, 4 (1), 20-31.
- Johnson, Jessica (2003), "Designing Man: Canadian-Born Ergonomics Expert Bryce Rutter Is on the Cusp of a New Trend: The Gourmet Approach to the Everyday," *The Globe and Mail*, Saturday, February 1, 2003, MetroL8
- Johnson, Michael D. and Claes Fornell (1987), "The Nature and Methodological Implications of the Cognitive Representation of Products," *Journal of Consumer Research*, 14 (September), 214-228.
- Jones, Gardner M. (1962), "Accounting Innovation and the Psychology of Change," *The Accounting Review*, 37 (April), 244-50.
- Joshi, Ashwin W. and Sanjay Sharma (2004), "Customer Knowledge Development: Antecedents and Impact on New Product Performance," *Journal of Marketing*, 68 (October), 47-59.
- Kant, Immanuel and J. H. Bernard (1951), *Critique of Judgment*, New York, Hafner Pub. Co.
- Kant, Immanuel and Werner S. Pluhar (1987), *Critique of Judgment*, Indianapolis, Ind., Hackett Pub. Co.

- Kanwar, Rajesh, Jerry C. Olsen, and Laura S. Sims (1981), "Toward Conceptualizing and Measuring Cognitive Structures," *Advances in Consumer Research*, Vol. 8, ed. Kent Monroe. Ann Arbor, MI: Association of Consumer Research, 122-27.
- Kaplan, Stephen (1987), "Aesthetics, Affect, and Cognition: Environmental Preference from an Evolutionary Perspective," *Environment and Behavior*, 19 (January), 3-32.
- Köhler, Wolfgang (1969), *The Task of Gestalt Psychology*, Princeton, N.J., Princeton University Press.
- Khilji, Shaista E., Tomasz Mroczkowski, and Boaz Bernstein (2006), "From Invention to Innovation: Toward Developing an Integrated Innovation Model for Biotech Firms," *Journal of Product Innovation Management*, 23 (November), 528-40.
- Kirton, Michael (1976), "Adaptors and Innovators: A Description and Measure," *Journal of Applied Psychology*, 61 (5), 622-29.
- Kleinschmidt, Elko J. and Robert G. Cooper (1991), "The Impact of Product Innovativeness on Performance," *Journal of Product Innovation Management*, 8 (December), 240-51.
- Kozinets, Robert V. (2002), "The Field Behind the Screen: Using Netnography for Marketing Research in Online Communities," *Journal of Marketing Research*, 39 (February), 61-72.
- Kunst-Wilson, William Raft and Robert B. Zajonc (1980), "Affective Discrimination of Stimuli That Cannot Be Recognized," *Science*, 207 (February), 557-58.
- Kupke, Valerie (2004), "Identifying the Dimensions to Retail Centre Image.," *Journal of Property Investment & Finance*, 22 (4), 298-306.

- Lafferty, Barbara A. and Ronald E. Goldsmith (2004), "How Influential Are Corporate Credibility and Endorser Attractiveness When Innovators React to Advertisements for a New High- Technology Product?," *Corporate Reputation Review*, 7 (Spring), 24-36.
- Lassar, Walfried M., Chris Manolis, and Sharon Lassar (2005), "The Relationship between Consumer Innovativeness, Personal Characteristics, and Online Banking Adoption," *The International Journal of Bank Marketing*, 23 (2), 176-99.
- Lawrence, A. W. and R. A. Tomlinson (1996), *Greek Architecture* (5th ed.), New Haven, Yale University Press.
- Leder, Helmut (2001), "Determinants of Preference: When Do We Like What We Know?," *Empirical Studies of the Arts*, 19 (2), 201-11.
- \_\_\_\_\_ (2003), "Familiar and Fluent! Style-Related Processing Hypothesis in Aesthetic Appreciation," *Empirical Studies of the Arts*, 21 (2), 165-75.
- Leder, Helmut, Benno Belke, Andries Oeberst, and Dorothee Augustin (2004), "A Model of Aesthetic Appreciation and Aesthetic Judgments," *British Journal of Psychology*, 95 (November), 489-508.
- Leder, Helmut and Claus-Christian Carbon (2005), "Dimensions in Appreciation of Car Interior Design," *Applied Cognitive Psychology*, 19 (July), 603-18.
- Lewicki, Pawel (1986), *Nonconscious Social Information Processing*, Orlando, Academic Press.
- Lidwell, William, Kritina Holden, and Jill Butler (2003), *Universal Principles of Design : 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make*

- Better Design Decisions, and Teach through Design*, Gloucester, Mass.,  
Rockport.
- Linn, Charles F. (1974), *The Golden Mean; Mathematics and the Fine Arts* (1st ed.),  
Garden City, N.Y., Doubleday.
- Loewenstein, George F. and Drazen Prelec (1993), "Preferences for Sequences of  
Outcomes," *Psychological Review*, 100, 91-108.
- Lollar, Fred P. (1981), "A Q-Methodology Study of News Reading Preferences,"  
*Thesis*, University of Missouri--Columbia, Columbia, MO.
- Luedicke, Marius K. (2005), "Brand Community under Fir: The Role of Social  
Environments for the Hummer Brand Community," *Association for Consumer  
Research*, ed. Cornelia Pechmann and Linda L. Price. San Antonio: Association  
for Consumer Research,
- Lynn, Michael and Judy Harris (1997), "The Desire for Unique Consumer Products: A  
New Individual Differences Scale," *Psychology & Marketing*, 14 (September),  
601-16.
- MacLean, Paul D. and V. A. Kral (1973), *A Triune Concept of the Brain and Behaviour*,  
Toronto, Published for the Ontario Mental Health Foundation by University of  
Toronto Press.
- MacLean, Paul D. (1990), *The Triune Brain in Evolution: Role in Paleocerebral  
Functions*, New York, Plenum Press.
- Marks, David F. (1973), "Visual Imagery Differences in the Recall of Pictures," *British  
Journal of Psychology*, 64 (February), 17-24.

- Martin, Mary C. and James W. Gentry (1997), "Stuck in the Model Trap: The Effects of Beautiful Models in Ads on Female Pre-Adolescents and Adolescents," *Journal of Advertising*, 26 (Summer), 19.
- Martindale, Colin and Kathleen Moore (1988), "Priming, Prototypicality, and Preference," *Journal of Experimental Psychology*, 14 (4), 661-70.
- Martindale, Colin, Kathleen Moore, and Alan West (1988), "Relationship of Preference Judgments to Typicality, Novelty, and Mere Exposure," *Empirical Studies of the Arts*, 6 (January), 79-96.
- McCormack, Jay P. and Jonathan Cagan (2004), "Speaking the Buick Language: Capturing, Understanding, and Exploring Brand Identity with Shape Grammars," *Design Studies*, 25 (January), 1-29.
- McCracken, Grant (1986), "Culture and Consumption: A Theoretical Account of the Structure and Movement of the Cultural Meaning of Consumer Goods," *Journal of Consumer Research*, 13 (June), 71-84.
- Mehrabian, Albert and James A. Russell (1974), *An Approach to Environmental Psychology*, M. I. T. Press.
- Meyers-Levy, Joan and Alice M. Tybout (1989), "Schema Congruity as a Basis for Product Evaluation," *Journal of Consumer Research*, 16, 39-54.
- Meyers-Levy, Joan and Brian Sternthal (1993), "A Two-Factor Explanation of Assimilation and Contrast Effects," *Journal of Marketing Research*, 30 (August), 359.
- Micheal, Kamel, Linda Rochford, and Thomas R. Wotruba (2003), "How New Product Introductions Affect Sales Management Strategy: The Impact of Type of

- "Newness" of the New Product," *Journal of Product Innovation Management*, 20 (July), 270-83.
- Midgley, David F. and Grahame R. Dowling (1978), "Innovativeness: The Concept and Its Measurement.," *Journal of Consumer Research*, 4 (March), 229-42.
- Miles, Matthew B. and A. M. Huberman (1984), *Qualitative Data Analysis: A Sourcebook of New Methods*, Beverly Hills, Sage Publications.
- Moll, Sebastien (2004), "Framing Carbon Fiber: The Material Gives Cyclists a Competitive Edge - So Why Are Bike Designers Spinning Their Wheels?," *International Design (I.D.)*.
- Monö, Rune (1997), *Design for Product Understanding : The Aesthetics of Design from a Semiotic Approach* (Michael Knight, Trans.), Stockholm, Liber.
- Moreau, C. Page, Arthur B. Markman, and Donald R. Lehmann (2001), "'What Is It?' Categorization Flexibility and Consumers' Responses to Really New Products," *Journal of Consumer Research*, 27 (March), 489-98.
- Mukherjee, Ashesh and Wayne D. Hoyer (2001), "The Effect of Novel Attributes on Product Evaluation," *Journal of Consumer Research*, 28 (December), 462.
- Muller, Wim (2001), *Order and Meaning in Design*, Utrecht, LEMMA Publishers.
- Murphy, Pat (1993), *By Nature's Design*, San Francisco, Chronicle Books.
- Murphy, Sheila T. and Robert B. Zajonc (1993), "Affect, Cognition, and Awareness: Affective Priming with Optimal and Suboptimal Stimulus Exposures," *Journal of Personality and Social Psychology*, 64 (5), 723-39.

- Nakada, Kuniaki (1997), "Kansei Engineering Research on the Design of Construction Machinery," *International Journal of Industrial Ergonomics*, 19 (February), 129-46.
- Neter, John, Michael H. Kutner, Christopher J. Nachtsheim, and William Wasserman (1996), *Applied Linear Statistical Models* (4th ed.), Homewood, IL, Irwin.
- Neuendorf, Kimberly A. (2002), *The Content Analysis Guidebook*, Thousand Oaks, Calif, Sage Publications.
- Nezlek, John B., Joy Austin-Lane, and Cynthia H. Null (2001), "Multidimensional Scaling Analyses of the Perceived Social Structure of Informal Groups," *Group Dynamics: Theory, Research, and Practice*, 5 (September), 200-07.
- Norman, Donald A. (1990), *The Design of Everyday Things*, New York, Doubleday.
- \_\_\_\_\_ (2004), *Emotional Design: Why We Love (or Hate) Everyday Things*, New York, Basic Books.
- Nowlis, Stephen M. and Itamar Simonson (1996), "The Effect of New Product Features on Brand Choice," *Journal of Marketing Research*, 33 (February), 36-46.
- Nussbaum, Bruce (1988), "Smart Design: Quality Is the New Style," *Business Week*, 3046 (April 11), 102-17.
- \_\_\_\_\_ (1993), "Hot Products," *Business Week*, 3322 (June 7), 54-57.
- Ogawa, Susumu and Frank T. Piller (2006), "Reducing the Risks of New Product Development," *MIT Sloan Management Review*, 47 (Winter), 65-71.
- Olshavsky, Richard W. and Richard A. Spreng (1996), "An Exploratory Study of the Innovation Evaluation Process," *Journal of Product Innovation Management*, 13 (November), 512-29.

- Olson, Eric M., Orville C. Walker, Jr., and Robert W. Ruekert (1995), "Organizing for Effective New Product Development: The Moderating Role of Product Innovativeness," *Journal of Marketing*, 59 (January), 48-62.
- Olson, Jerry C. and Aydin Muderrisoglu (1979), "The Stability of Responses Obtained by Free Elicitation: Implications for Measuring Attribute Salience and Memory Structure," *Advances in Consumer Research*, Vol. 6, ed. William L. Wilkie. Ann Arbor, MI: Association for Consumer Research, 269-75.
- Osborne, Harold (1986), "What Makes and Experience Aesthetic?," in *Possibility of the Aesthetic Experience*, ed. Michael H. Mitias. Boston: Kluwer Academic Publishers, 117-38.
- Oxman, Rivka (1997), "Design by Re-Representation: A Model of Visual Reasoning in Design," *Design Studies*, 18 (October), 329-47.
- Page, Christine and Paul M. Herr (2002), "An Investigation of the Processes by Which Product Design and Brand Strength Interact to Determine Initial Affect and Quality Judgments," *Journal of Consumer Psychology*, 12 (2), 133-47.
- Palmatier, Robert W., Srinath Gopalakrishna, and Mark B. Houston (2006), "Returns on Business-to-Business Relationship Marketing Investments: Strategies for Leveraging Profits," *Marketing Science*, 25 (September-October), 477-93.
- Perreault, William D. Jr and Laurence E. Leigh (1989), "Reliability of Nominal Data Based on Qualitative Judgments," *Journal of Marketing Research*, 36 (May), 135-48.
- Politis, Diamanto (2005), "The Process of Entrepreneurial Learning: A Conceptual Framework," *Entrepreneurship: Theory & Practice*, 29 (July), 399-424.

- Postrel, Virginia I. (2003), *The Substance of Style : How the Rise of Aesthetic Value Is Remaking Commerce, Culture, and Consciousness* (1st ed.), New York, NY, HarperCollins.
- Pye, David (1978), *The Nature and Aesthetics of Design*, New York, Van Nostrand Reinhold.
- Rapaille, Clotaire (2006), *The Culture Code : An Ingenious Way to Understand Why People around the World Buy and Live as They Do*, New York, Broadway Books.
- Rapaille, Gilbert C. (2001), *7 Secrets of Marketing in a Multi-Cultural World*, Provo, Utah, Executive Excellence Pub.
- Ratneshwar, S. and Shelly Chaiken (1991), "Comprehensions' Role in Persuasion: The Case of Its Moderating Effect on Persuasive Impact of Source Cues," *Journal of Consumer Research*, 18 (June), 52-62.
- Richardson, Alan (1977), "Verbalizer-Visualizer: A Cognitive Style Dimension," *Journal of Mental Imagery*, 1 (1), 109-26.
- Richins, Marsha L. (1994), "Valuing Things: The Public and Private Meanings of Possessions," *Journal of Consumer Research*, 21 (December), 503-21.
- Roberts, Edward B. (2007), "Managing Invention and Innovation," *Research Technology Management*, 50 (Jan/Feb), 35-54.
- Rogers, Everett M. (1962), *Diffusion of Innovations*, New York, Free Press of Glencoe.
- Rogers, Everett M. and F. Floyd Shoemaker (1971), *Communication of Innovations; a Cross-Cultural Approach* (2d ed.), New York, Free Press.
- Rogers, Everett M. (2003), *Diffusion of Innovations* (5th ed.), New York, Free Press.

- Rosch, Eleanor and Carolyn B. Mervis (1975), "Family Resemblances: Studies in the Internal Structure of Categories," *Cognitive Psychology*, 7, 573-605.
- Russell, James A. and S. Milne (1997), "Meaningfulness and Hedonic Value of Paintings: Effects of Titles.," *Empirical Studies of the Arts*, 15, 61-73.
- Russell, Phil A. (2003), "Effort after Meaning and the Hedonic Value of Paintings," *British Journal of Psychology*, 94 (1), 99-110.
- Sarin, Shikhar and Vijay Mahajan (2001), "The Effect of Reward Structures on the Performance of Cross-Functional Product Development Teams," *Journal of Marketing*, 65 (April), 35.
- Schank, Roger C. and Robert P. Abelson (1977), *Scripts, Plans, Goals, and Understanding : An Inquiry into Human Knowledge Structures*, Hillsdale, N.J., L. Erlbaum Associates.
- Schiffman, Leon G. and Leslie Lazar Kanuk (2004), *Consumer Behavior* (8th ed.), Upper Saddle River, N.J., Prentice Hall.
- Schmidt, Jeffrey B. and Roger J. Calantone (1998), "Are Really New Product Development Projects Harder to Shut Down?," *Journal of Product Innovation Management*, 15 (March), 111-23.
- Schonberger, Richard (1990), *Building a Chain of Customers : Linking Business Functions to Create the World Class Company*, New York, Free Press.
- Schroeder, Jonathan (Chair) (2006), "Roundtable Session: Researching Visual Consumption," *Association for Consumer Research*, Vol. 34, ed. Gavan J. Fitzsimons and Vicki G. Morowitz. Orlando: Association for Consumer Research,

- Scitovsky, Tibor (1992), *The Joyless Economy: The Psychology of Human Satisfaction*, New York, Oxford University Press.
- Shepard, Roger N. (1962), "The Analysis of Proximities: Multidimensional Scaling with an Unknown Distance Function," *Psychometrika*, 21, 125-39.
- Sigelman, Carol K., Lee Sigelman, Dan B. Thomas, and Frederick D. Ribich (1986), "Gender, Physical Attractiveness, and Electability: An Experimental Investigation of Voter Biases," *Journal of Applied Social Psychology*, 16 (3), 229–48.
- Simonson, Itamar and Stephen M Nowlis (2000), "The Role of Explanations and Need for Uniqueness in Consumer Decision Making: Unconventional Choices Based on Reasons," *Journal of Consumer Research*, 27 (June), 49.
- Singer, Judith D. (1998), "Using SAS PROC Mixed to Fit Multilevel Models, Hierarchical Models, and Individual Growth Models," *Journal of Educational and Behavioral Statistics*, 24 (4), 323-55.
- Sivadas, Eugene and F. Robert Dwyer (2000), "An Examination of Organizational Factors Influencing New Product Success in Internal and Alliance-Based Processes," *Journal of Marketing*, 64 (January), 31-49.
- Smets, G. J. F. and C.J. Overbeeke (1995), "Expressing Tastes in Packaging," *Design Studies*, 16 (July), 349-65.
- Smith, Kathryn L., Piers L. Cornelissen, and Martin J. Tovee (2007), "Color 3d Bodies and Judgments of Human Female Attractiveness," *Evolution and Human Behavior*, 28, 48-54.
- Snelders, Dirk and Paul Hekkert (1999), "Association Measures as Predictors of Product Originality," *Advances in Consumer Research*, 26, 588-92.

- Snyder, C. R. and Howard L. Fromkin (1980), *Uniqueness, the Human Pursuit of Difference*, New York, Plenum Press.
- Snyder, C. R. (1992), "Product Scarcity by Need for Uniqueness Interaction: A Consumer Catch-22 Carousel?," *Basic and Applied Social Psychology*, 13 (March), 9-24.
- Song, X. Michael and Mitzi M. Montoya-Weiss (1998), "Critical Development Activities for Really New Versus Incremental Products," *Journal of Product Innovation Management*, 15 (March), 124-35.
- Sorescu, Alina B, Rajesh K Chandy, and Jaideep C Prabhu (2003), "Sources and Financial Consequences of Radical Innovation: Insights from Pharmaceuticals," *Journal of Marketing*, 67 (October), 82.
- Spence, Ian and John C. Ogilvie (1973), "A Table of Expected Stress Values for Random Rankings in Nonmetric Multidimensional Scaling," *Multivariate Behavioral Research*, 8 (4), 511-17.
- Steenkamp, Jan-Benedict and Hans C. M. van Trijp (1997), "Attribute Elicitation in Marketing Research: A Comparison of Three Procedures," *Marketing Letters*, 8 (2), 153-65.
- Stephenson, William (1975), *The Study of Behavior : Q-Technique and Its Methodology*, Chicago, University of Chicago Press.
- \_\_\_\_\_ (1988), *The Play Theory of Mass Communication*, New Brunswick, Transaction Books.
- Stiny, G. (1980), "Introduction to Shape and Shape Grammars," *Environment and Planning B*, 7, 343-51.

- Strauss, Anselm L. and Juliet M. Corbin (1998), *Basics of Qualitative Research : Techniques and Procedures for Developing Grounded Theory* (2nd ed.), Thousand Oaks, Calif., Sage Publications.
- Sujan, Mita (1985), "Consumer Knowledge: Effects on Evaluation Strategies Mediating Consumer Judgments," *Journal of Consumer Research*, 12 (June), 31-46.
- Swami, Viren, Corina Greven, and Adrian Furnham (2007), "More Than Just Skin-Deep? A Pilot Study Integrating Physical and Non-Physical Factors in the Perception of Physical Attractiveness," *Personality and Individual Differences*, 42, 563-72.
- Swink, Morgan (2000), "Technological Innovativeness as a Moderator of New Product Design Integration and Top Management Support," *Journal of Product Innovation Management*, 17 (May), 208-20.
- Takane, Y., J. de Leeuw, and Forest W. Young (1977), "Nonmetric Individual Differences Multidimensional Scaling: An Alternating Least Squares Method with Optimal Scaling Features," *Psychometrika*, 42, 7-67.
- Tanoue, Chitoshi, Kenji Ishizaka, and Mitsuo Nagamachi (1997), "Kansei Engineering: A Study of Perception of Vehicle Interior Image," *International Journal of Industrial Ergonomics*, 19 (February), 115-28.
- Thompson, Craig J. and Diana L. Haytko (1997), "Speaking of Fashion: Consumers' Uses of Fashion Discourses and the Appropriation of Countervailing Cultural Meanings," *Journal of Consumer Research*, 24 (June), 15-42.
- Tian, Kelly Tepper, William O. Bearden, and Gary L. Hunter (2001), "Consumers' Need for Uniqueness: Scale Development and Validation," *Journal of Consumer Research*, 28 (June), 50-66.

- Tidd, Joe and Kirsten Bodley (2002), "The Influence of Project Novelty on the New Product Development Process," *R & D Management*, 32 (March), 127.
- Tovee, Martin J., Viren Swami, Adrian Furnham, and Roshila Mangalparsad (2006), "Changing Perceptions of Attractiveness as Observers Are Exposed to a Different Culture," *Evolution and Human Behavior*, 27, 443-56.
- Treat, Teresa A., Richard M. McFall, Richard J. Viken, Robert M. Nosofsky, David B. MacKay, and John K. Kruschke (2002), "Assessing Clinically Relevant Perceptual Organization with Multidimensional Scaling Techniques," *Psychological Assessment*, 14 (September), 239-52.
- Van Wezel, M. C. and W. A. Kusters (2004), "Nonmetric Multidimensional Scaling: Neural Networks Versus Traditional Techniques.," *Intelligent Data Analysis*, 8 (6), 601-13.
- Venkatraman, Meera P. and Linda L. Price (1990), "Differentiating between Cognitive and Sensory Innovativeness: Concepts, Measurement, and Implications," *Journal of Business Research*, 20 (June), 193-315.
- Veryzer, Robert W, Jr. and J Wesley Hutchinson (1998), "The Influence of Unity and Prototypicality on Aesthetic Responses to New Product Designs," *Journal of Consumer Research*, 24 (March), 374-94.
- Veryzer, Robert W. (1999), "A Nonconscious Processing Explanation of Consumer Response to Product Design," *Psychology & Marketing*, 16 (September), 497-522.

- Veryzer, Robert W. Jr (1998a), "Key Factors Affecting Customer Evaluation of Discontinuous New Products," *The Journal of Product Innovation Management*, 15 (March), 136-50.
- \_\_\_\_\_ (1998b), "Discontinuous Innovation and the New Product Development Process," *The Journal of Product Innovation Management*, 15 (July), 304-21.
- Viken, Richard J., Teresa A. Treat, Robert M. Nosofsky, Richard M. McFall, and Thomas J. Palmeri (2002), "Modeling Individual Differences in Perceptual and Attentional Processes Related to Bulimic Symptoms," *Journal of Abnormal Psychology*, 111 (November), 598-609.
- Vitruvius, Pollio and Thomas Gordon Smith (2003), *Vitruvius on Architecture*, New York, Monacelli Press.
- Vriens, Marco, Gerard H. Loosschilder, Edward Rosbergen, and Dick R. Wittink (1998), "Verbal Versus Realistic Pictorial Representation in Conjoint Analysis with Design Attributes.," *Journal of Product Innovation Management*, 15, 455-67.
- Walker, Beth A, Richard Celsi, and Jerry C. Olson (1987), "Exploring the Structural Characteristics of Consumers' Knowledge," *Advances in Consumer Research*, Vol. 14, ed. Melanie Wallendorf and Paul Anderson. Provo, UT: Association for Consumer Research, 17-21.
- Weber, Jèurgen (2002), *The Judgement of the Eye : The Metamorphoses of Geometry-- One of the Sources of Visual Perception and Consciousness: A Further Development of Gestalt Psychology*, Wien ; New York, Springer.
- Weber, Max and Stephen Kalberg (2005), *Max Weber : Readings and Commentary on Modernity*, Malden, MA, Blackwell Pub.

- Webster (2002), *Webster's New World College Dictionary* (Fourth ed.), Cleveland, Wiley Publishing.
- Wertime, Kent (2003), *Building Brands and Believers*, Singapore, John Wiley and Sons Pte Ltd.
- Whitfield, T. W. Allan and P.E. Slatter (1979), "The Effects of Categorization and Prototypicality on Aesthetic Choice in a Furniture Selection Task," *British Journal of Psychology*, 70 (February), 65-75.
- Whitfield, T. W. Allan (1983), "Predicting Preference for Familiar, Everyday Objects: An Experimental Confrontation between Two Theories of Aesthetic Behavior," *Journal of Environmental Psychology*, 3, 221-37.
- \_\_\_\_\_ (2000), "Beyond Prototypicality: Toward a Categorical-Motivation Model of Aesthetics," *Empirical Studies of the Arts*, 18 (1), 1-11.
- Williamson, Judith (1978), *Decoding Advertisements*, London, Marion Boyars Publishers Ltd.
- Wilson, Nancy Lynn Fraser (2002), "Russian Consumer Attitudes toward American Advertising," *Dissertation*, Journalism: University of Missouri - Columbia, United States -- Missouri.
- Wohlwill, Joachim F. (1976), "Environmental Aesthetics: The Environment as a Source of Affect," *Human Behavior and Environment*, 1, 37-86.
- Wolverton, Troy (2000), "Pets.Com Latest High-Profile Dot-Com Disaster," <http://news.com.com/2100-1017-248230.html>.

- Wu, Yuhong, Sridhar Balasubramanian, and Vijay Mahajan (2004), "When Is a Preannounced New Product Likely to Be Delayed," *Journal of Marketing*, 68 (April), 101-13.
- Wuyts, Stefan, Shantanu Dutta, and Stefan Stremersch (2004), "Portfolios of Interfirm Agreements in Technology-Intensive Markets: Consequences for Innovation and Profitability," *Journal of Marketing*, 68 (April), 88-100.
- Yamamoto, Mel and David R Lambert (1994), "The Impact of Product Aesthetics on the Evaluation of Industrial Products," *The Journal of Product Innovation Management*, 11 (September), 309-24.
- Yi, Youjae and Kenneth C. Gray (1996), "Revisiting Attribute Diagnosticity in the Context of Product Typicality," *Psychology & Marketing*, 13 (September), 605-32.
- Yoon, Eunsang and Gary L. Lilien (1985), "New Industrial Product Performance: The Effects of Market Characteristics and Strategy," *Journal of Product Innovation Management*, 2 (September), 134-44.
- Young, Forest W. and David F. Harris (2004), "Multidimensional Scaling," in *Spss 13.0 Advanced Statistical Procedures Companion*, ed. Marija J. Norusis. Upper Saddle River, N.J.: Prentice Hall, 287-355.
- Zaichkowsky, Judith Lynne (1985), "Measuring the Involvement Construct," *Journal of Consumer Research*, 12 (December), 341-52.
- Zajonc, Robert B. (1968), "Attitudinal Effects of Mere Exposure," *Journal of Personality and Social Psychology*, 9 (June), 1-27.

Ziamou, Paschalina (2002), "Commercializing New Technologies: Consumers' Response to a New Interface," *The Journal of Product Innovation Management*, 19 (September), 365-74.

Ziamou, Paschalina and S. Ratneshwar (2003), "Innovations in Product Functionality: When and Why Are Explicit Comparisons Effective?," *Journal of Marketing*, 67 (April), 49-61.

## VITA

Scott Radford was born in Winnipeg, Manitoba, on the chilly plains of the Great White North, June 1<sup>st</sup>, 1973. He received a Bachelor of Environmental Design Studies from the Technical University of Nova Scotia; a Bachelor of Arts with honours in Philosophy and minors in Art History and Fine Arts, from the University of New Brunswick; and a Masters of Business Administration from the University of New Brunswick. He worked for a number of years in Montreal, Quebec for R. Nicholls Distributor Inc as Director of Advertising and for Collins Safety Inc as Director of Marketing before heeding the call to return to academia. He has accepted a position as Assistant Professor in the marketing department at the Haskayne School of Business, University of Calgary.

## APPENDICES

Appendix A: Operationalization of Newness and Innovation Constructs .....	190
Appendix B: Study 1 Instrument .....	202
Appendix C: Study 2 Instrument .....	207
Appendix D: Study 2 Coding Instructions.....	212
Appendix E: Study 3 Instrument.....	216

**APPENDIX A: OPERATIONALIZATION OF NEWNESS AND INNOVATION  
CONSTRUCTS**

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Ali 2000)	Product Innovativeness	Firm and Consumer	Researcher Evaluated	Functional	Moderates relationship between development time and market performance	Modified from Booz, Allen and Hamilton	5 categories
(Amason, Shrader, and Tompson 2006)	Novelty of joint venture	Firm	Researcher Evaluated	Functional	Moderator of characteristics of top management on new venture performance	Novelty subjectively evaluated by researchers from prospectus - placed in three categories	(1) "offering products or services which were materially the same as products or services previously offered by other firms" (2) "represented advances in existing technologies, so called 'next generation' products or services or (3) had never before been sold and that might spawn a new industry or change the nature of an existing industry"
(Atuahene-Gima 1995)	Degree of Product Newness	Consumer and firm	Firm	Functional	Moderator of Market orientation on new product performance	Customers - To what extent does each of the following statements describe the new product It required major learning effort or experience by customers The product/service concept was difficult for customers to evaluate or understand  Type of new products	6 item scale  6 item scale  Categorical - (1) product or service improvements, (2) line extensions, (3) product or service lines to the firm, (4) real new-to-the-world innovation
(Atuahene-Gima and Evangelista 2000)	Product Innovativeness	Firm	Firm	Functional	IV on marketing influence and R&D influence	Assign selected new product to one of four categories	4 categories - new to the world, new to the company, line extension, and product modification/improvement

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Blake, Perloff, and Heslin 1970)	Product newness (Novel and recently place on market)	Consumer	Consumers	Functional	Independent on willing to buy	Discrepancy between subject's idea of typical product in the class and the characteristics of the product described Utility - scale of usefulness Recency - # of months product has on the market	5 point scale 7 point scale number of months
(Bonner and Walker Jr. 2004)	Newness	Firm	Firm	Functional	Moderator of relationship between relational embeddedness and knowledge heterogeneity on new product performance	Uses five item measure from Olson et al 1995 (not specified)	
(Brentani 2001)	Degree of Innovativeness	Firm	Firm	Functional	Independent variable on success	Technological newness - the new service exploited technology that was totally new to the firm newness to the market - service is highly innovative; nothing like it on the market; replaces vastly inferior service Several variables measured the degree of innovativeness of the new service projects (e.g. technological newness, service newness to the market, etc.)” –	7 point scale 7 point scale
(Blythe 1999)	Degree of Innovativeness (newness)	Consumer	Consumers	Functional and Visual	Dependent variable from innovativeness	Shown three pieces of hi-fi equipment asked to judge which was most innovative (essentially newness) Assign score out of 10 factors led to judgment of innovativeness - practicality, brochure, appearance, technical aspects, size	Ranking 0-10

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Callahan and Lasry 2004)	Newness-to-the-firm	Firm	Firm	Functional	IV on importance of customer input and method intensity	How new (to your company) were the customers targeted by the new product?	7 point scale
						How new (to your company) were the user needs addresses by the new product?	7 point scale
(Carbonell, Escudero, and Aleman 2004)	Technological Newness	Firm	Firm	Functional	Technological newness as a moderating variable of 5 go/no go criteria	Newness of technology on single item scale	7 point scale from technology sufficiently implemented to new or emerging technologies
(Chandy and Tellis 1998)	Radical Product Innovation	Firm	Firm	Functional	Willingness to cannibalize as driver of radical product innovation	This SBU rarely introduces products that are radically different from existing products (R)	7 point scale
						This SBU lags behind in introducing radical product innovations	7 point scale
						Please indicate the number of radical product innovations introduced by your SBU in the last three years.	Number
(Cooper 1979)	Newness to the firm	Firm and Consumer	Firm	Functional	Factor in factor analysis of dimensions of new product success	Newness to the firm - a project which takes the firm into new markets, new technologies, etc. Product Uniqueness - a product which is truly unique; firm is first into the market with the type of product Product Uniqueness/ superiority - a product which has significant improvements over previous products making it unique and superior	No scale sizes specified

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Cooper and Kleinschmidt 1993)	Product Innovativeness	Firm	Researcher Evaluated	Functional	IV on product success rate	Modified Booz, Allen, Hamilton	7 categories - true innovations, totally new to the world product with existing market, totally new to firm with new features over competitors in existing market, new product line to firm, new item in existing product line with existing market, significant modification of an existing product, fairly minor modification of an existing company product
(Cox and Cox 2002)	Novelty	Consumer	Consumers	Visual	Impact of repeated exposure on liking with complex stimuli	Perceived Novelty	new-old, original - unoriginal, unusual - common, familiar - novel, and typical - atypical (9 point scale)
(Cox and Locander 1987)	Product Novelty	Consumer	Consumers	Functional	Independent variable on affective reaction to ad	Standard Cola and cola with vitamins	Two IV conditions
(Dahl, Chattopadhyay, and Gorn 1999)	Originality	Consumer	Consumers	Functional	Independent variable on customer appeal	Respondents asked to rate originality of product.	3 item semantic differential scales (7 point) - Unique to ordinary, original to commonplace, fresh to routine

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Danneels and Kleinschmidt 2001)	Product Innovativeness	Firm	Firm	Functional	Factor Analysis to determine components of innovation  Fit and familiarity independent variables to performance	Market Familiarity - To what extent (TWE) did this product cater to new customer needs - customer needs that you had not served before Technology Familiarity – TWE did the technology involved in the development of this product represent new or different technology for your firm? Marketing Fit – TWE was your existing company's sales force more than adequate to handle the selling of this product Technological Fit - TWE were your firm's Engineering resources, people, and skills more than adequate for the engineering and design work involved in this project? New Marketing Activities - TWE did this product require a new sales force or distributor sales force system - different from your existing sales force distributor sales force system?	Had served Before - Totally new needs served  our existing technology - totally new technology for us  Totally inadequate - far more than adequate  Totally inadequate - far more than adequate  Used our existing sales force - required a totally new sales force
(De Kluyver 1977)	Product Newness	Consumer	Firm	Functional	Correlation between product life cycle shape and product newness	3 elements of product newness  Generation of engineering to which product belongs The degree of newness of the application of the product  The elasticity of substitution of the product	Rating scale correspond to chronological age Subjectively rated by firm managers Count of number of feasible alternative in market

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Donnelly and Etzel 1973)	Degree of Product Newness	Consumer	Researcher Evaluated	Functional and Visual	independent on actual purchase	Authors judged products on packaging, physical appearance, use behavior, and technological processing	Categorized as Artificially new, marginally new and genuinely new
(Eliashberg and Robertson 1988)	Customer Switching Costs	Consumer	Firm	Functional	IV on Preannouncing behavior	Same as Atuahene Gima but with different name	
(Gatignon and Xuereb 1997)	Radicalness of innovation	Firm	Experts	Functional	Moderates the relationship between strategic orientation and new product performance	This new product is a minor improvement on current technology This new product incorporated a large new body of technological knowledge	Labeled as Radical or incremental by experts
(Gegan-Paxton et al. 2002)	Really new products	Consumer	Consumers	Functional and visual	Stimuli used to examine the impact of analogy on product feature memory	PDA is provided as new product	Developed by researcher
(Griffin and Page 1996)	New product	Firm	Firm	Functional	IV on product success factors	Booz, Allen, and Hamilton categories	categorize past innovations
(Hoeffler 2003)	Newness Rating	Consumer	Consumers	Functional	Independent Variable	Enter a number between 0 and 99 that reflects the relative newness of the product concept described above	Categorical - RNP and INP
(Hultink, Atuahene-Gima, and Lebbink 2000)	Product newness to the firm	Firm	Firm	Functional	IV on new product selling performance	Newness to the firm 4 items. How much experience does the firm have in (1) manufacturing, (2) selling, (3) marketing, and (4) designing similar products	5 point scale
(Iyer 1988)	Relative newness of brand	Consumer	Consumers	Functional	Mediator of effectiveness of comparative advertising	Authors manipulated conditions - evaluating an ad for a new brand of antacid	Two IV conditions

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Johannessen, Olsen, and Lumpkin 2001)	Innovation as Newness	Firm	Firm	Functional	Factor analysis to determine components of innovation	Indicate the degree to which the company made changes within the last three years that were of such a nature that they were perceived to be new to the company Incremental Innovation - Has your company made changes during the last three years that were perceived to be new for the company, but which have previously been used by other firms. Radical Innovation - Has your company made changes during the last three years that were perceived to be new to the industry in which the company operates?	5 point scale  Y/N  Y/N
(Joshi and Sharma 2004)	Innovation Range	Consumer	Firm	Functional	Independent	Please Evaluate the "newness" of the product on the following scale  Please Evaluate the "distinctiveness" of the value proposition on the following scale  Please Evaluate the newness of the product features on the following scale	a = line extension, b=new to the company, c= new to the world a = me-too value proposition, b = somewhat distinct from the competition, c = significantly different from the main competitor a=minor modifications to existing features, b = new features to this company, c = new features to this industry
(Kleinschmidt and Cooper 1991)	Product innovativeness	Firm	Researcher classified	Functional	IV on Product financial performance	3 cat. of innovativeness developed for study- Booz Allen and Hamilton classification, collapsed into three to improve distribution	Highly innovative, Moderately innovative, low innovative

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Lafferty and Goldsmith 2004)	Perceived Product Newness	Consumer	Consumers	Functional and Visual	IV on attitude toward brand and purchase intention	How do you feel about this particular cell phone	3 bipolar adjective scales (1) Like all the other - unlike all the others, (2) innovative - ordinary, (3) new - old
(Leder and Carbon 2005)	Innovation in design	Consumer	Consumers	Visual	IV as related to attractiveness	Researchers created visual stimuli of car interiors that demonstrate high medium and low innovation	High, medium, low
(Meyers-Levy and Tybout 1989)	New Product Introduction	Consumer	Consumers	Functional	Stimuli to test categorization hypotheses	Authors created stimuli to present matching between new product label and description Soft drink is consistent (soft drink features) or inconsistent (juice features) with category label	
(Micheal, Rochford, and Wotruba 2003)	Product newness	Firm and market	Firm	Functional	IV on changes in sales management strategy	Most recent new product introduction categorized by managers	Categorized into (1) new-to-market and new-to-firm, (2) not-new-to-market and new-to-firm, and (3) not-new-to-market and revisions-to-firm
(Moreau, Markman, and Lehmann 2001)	Really new products	Consumer	Consumers	Functional and aesthetic	Stimuli to test categorization hypotheses	Author created stimuli - Digital camera provided as stimuli for really new product b/c of lack of familiarity by pretest subjects	
(Mukherjee and Hoyer 2001)	Novel Attributes	Consumer	Consumers	Functional	IV on product evaluation or sales	Author created stimuli - Add a fictitious new feature	Y/N feature appears with product
(Nowlis and Simonson 1996)	New Feature	Consumer	Consumers	Functional	New feature as IV	Author created stimuli - New Feature introduced on product	Y/N feature is new

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Olshavsky and Spreng 1996)	Innovation	Consumer	Consumers	Functional	Consumer steps used for categorization and evaluation of new products	Do you perceive this product to be an innovation  How innovative is it?  How much impact would use of this product have on your daily life	yes/no  1 = minor variation of existing products, 7=completely new product  1 = little or no impact, 7 = very great impact
(Olson, Walker, and Ruckert 1995)	Degree of innovativeness or newness	Firm	Firm	Functional	Impact of newness on coordinating structures as a moderator and IV	Categorizes newness using Booz, Allen, and Hamilton taxonomy. Derives a five item scale (not provided)	
(Schmidt and Calantone 1998)	Product innovativeness	Firm	Researcher evaluated	Functional	IV on managers reluctance to shut down project	Two experimental conditions described by researchers	Low product innovativeness and high product innovativeness
(Sorescu, Chandy, and Prabhu 2003)	Radicalness of Innovations	Firm	Firm	Functional	DV from dominance and IV to value	Use Chandy and Tellis Taxonomy three categories - Radical innovations, market breakthroughs, technology breakthrough	Count of number of drug introduction in each category
(Sarin and Mahajan 2001)	Degree of Innovation	Firm	Firm	Functional	Outcome variable of development process (reward structure)	Categorize the product - develop categorization from Booz, Allen and Hamilton, Ancona and Cladwell and Olson et al	(a) the product is entirely new to both our firm as well as the customers, (b) the product is new to the customers but not very new to our firm, (c) the product is new to our firm but not very new to our customers, (d) the product is neither new to our firm nor new to the customer, (e) our product is an imitation of an existing product.

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Sivadas and Dwyer 2000)	Innovation type	Firm	Researcher Evaluated	Functional	Innovation type as IV on cooperative competencies	All innovations lie on a continuum of newness. Adopt a dichotomous classification and classify all identified new products	Dichotomous classification - Incremental or Radical
(Snelders and Hekkert 1999)	Novelty and Originality	Consumer	Consumers	Visual	Appearance is used as an IV on associations	Originality Novelty Typicality	Not original - original old model telephone - new model telephone bad example of the category - good example of the category
200 (Song and Montoya-Weiss 1998)	Degree of Product Innovativeness	Consumer	Firm	Functional	Moderates the relative effect of NPD activities on new product performance	Dichotomous categorization between really new and incremental	Really new - entirely new product category or production and delivery system or Incremental - adaptation , refinement, and enhancement of existing products and/or production delivery systems
(Swink 2000)	Technological Innovativeness	Firm	Firm	Functional	Moderator of design integration and top management support on NPD success	Estimate the percentage of the product's features and functions involving technology that are new to the firm. Estimate the percentage of processing technology used to manufacture the product that was new to the firm Rate the aggressiveness of the product innovation goals	5 point scale 5 point scale 5 point scale
(Tidd and Bodley 2002)	Project Novelty	Firm	Firm	Functional	Factors that affect NPD process	use simplified Booz, Allen and Hamilton taxonomy	Categorization

Authors (Date)	Construct Name	Whose Perspective?	Respondent	Functional / Visual	Causal Role of Product innovativeness	Sample Items	Scale Type
(Veryzer 1998a)	Innovativeness	Firm	Firm	Functional	Case study of 8 discontinuous product development activities	Author identified discontinuous products classified on two dimensional matrix	Matrix of Technological Capability (Same / Advanced) vs. Product Capability (Same / Enhanced)
(Wu, Balasubramanian, and Mahajan 2004)	Product Innovativeness	Consumer and technology	Firm	Functional	IV on delay in introducing preannounced products	The preannounced product included innovative product features  Compared to similar products developed by our competitors, the preannounced product offered unique features/attributes/benefits to customers In terms of the embedded technology, the preannounced product was substantially more innovative compared to existing products available in the market	7 point scale  7 point scale  7 point scale
(Wuyts, Dutta, and Stremersch 2004)	Innovation	Firm	Firm	Functional	Moderator on various relationships with profitability	Count of cumulative number of innovations between 1991 and year t	Count
(Yoon and Lilien 1985)	Product innovation type	Firm	Researcher evaluated	Functional	Moderator on market share	Researcher assigned dichotomy	Original new products and reformulated new products
(Ziamou 2002)	Functionality Newness	Consumers	Consumers	Functional	Interaction of functional and interface on intention to buy new product	Pre-test - "how would you rate the functionality provided by this product?"	9 point scale - not at all novel to very novel
(Ziamou and Ratneshwar 2003)	Innovations in Functionality	Consumer	Consumers	Functional	Stimuli to test categorization hypotheses	Typical and Atypical product descriptions of product functionality	High low tested with 9 point pretest for atypicality

**APPENDIX B: STUDY 1 INSTRUMENT**

## RESEARCH ON PRODUCT NEWNESS

The following information is provided to you so that you may decide whether you wish to participate in this study. You should be aware that you are free to decide to participate, not participate, or withdraw from participation at any stage and this will not affect your relationship with the researcher, the Department of Marketing at MU, or the University of Missouri-Columbia.

The purpose of this study is to understand how people evaluate new products. To do this we will be using a product sorting procedure. You will be shown a number of pictures and a number of products. You will be asked to organize these pictures based on specific instructions. There are a total of 6 product types that you will be asked to sort. After you sort the products we will ask you to fill out a short screening survey that will provide us with some more information about you. The total time for this study is between 30 and 40 minutes.

There are no known discomforts associated with this study. Your participation is strictly voluntary. Your responses and comments will not be linked to you and all responses remain anonymous and confidential.

If you have any questions about your rights as a research participant that have not been answered by the investigator, you may contact the University of Missouri-Columbia Institutional Review Board at 573-882-9585. Do not hesitate to ask any questions about the study either before participating or during the time that you are participating. A hard copy of this consent form will be made available at your request.

Thank you for your participation.

Please sign your consent with full knowledge of the nature and purpose of the procedures as outlined above.

---

Signature of Participant

---

Date

*Scott K. Radford, Department of Marketing, MU, Principal Investigator, 573-882-6244*  
*Peter H. Bloch, Department of Marketing, MU, Co-investigator, 573-884-1808*

## Sorting Instructions

One critical component of innovation is the design of the product. Firms want their product to break out from the clutter and appear as the “**newest**” product. This study is interested in understanding which product designs are most successful in communicating the “**newness**” of the product.

You will be presented with pictures of product prototypes and real products from 6 different product categories. For each product category you will sort the products into 5 groups. As you look at the product imagine that you must position the product between the following two adjective pairs.

This product looks...

Not at all new     +1     +2     +3     +4     +5    Extremely new

In front of you are sheets that show the five groups and indicate, with a rectangle, the number of products required in each group. Place the photographs, one on each rectangle, until each photo has been assigned. Feel free to move the cards around until you are satisfied with the way that you have grouped them.

Once you have finished assigning all of the cards, place the cards in a pile with +1 on the bottom, up to +5 on top. Place them to one side to be collected and begin on the next product category.

Once you have finished sorting all 6 categories turn to the next page.



Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
Owning products that have superior design makes me feel good about myself	<input type="checkbox"/>				
I enjoy seeing displays of products that have superior designs	<input type="checkbox"/>				
A product's design is a source of pleasure for me	<input type="checkbox"/>				
Beautiful products make our world a better place to live	<input type="checkbox"/>				
Being able to see subtle differences in product design is one skill that I have developed over time	<input type="checkbox"/>				
I see things in a product's design that other people tend to pass over	<input type="checkbox"/>				
I have the ability to imagine how a product will fit in with designs of other things I already own	<input type="checkbox"/>				
I have a pretty good idea of what makes one product look better than its competitors	<input type="checkbox"/>				
Sometimes the way a product looks seems to reach out and grab me	<input type="checkbox"/>				
If a product's design really "speaks" to me, I feel that I must buy it	<input type="checkbox"/>				

Are you      Male \_\_\_\_\_      Female \_\_\_\_\_

How old are you? \_\_\_\_\_

What is your major area of study? \_\_\_\_\_

Thank you for participating in this study.

**APPENDIX C: STUDY 2 INSTRUMENT**

Surveys - MU College of Business - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/asp/survey/takeSurvey.asp?surveyID=298

### Product Design Survey Template

The following information is provided to you so that you may decide whether you wish to participate in this study. You should be aware that you are free to decide to participate, not participate, or withdraw from participation at any stage and this will not affect your relationship with the researcher, the Department of Marketing at MU, or the University of Missouri-Columbia.

The purpose of this study is to understand how people evaluate new products. We ask that you complete a web based survey on the computer provided. You will be shown several photographs of consumer products and asked to provide your opinion of these products. After you evaluate the products we will ask you to fill out a short screening survey that will provide us with some more information about you. The survey should take you about 35 minutes.

There are no known discomforts associated with this study. Your participation is strictly voluntary. Your survey answers and comments will not be linked to you and all responses remain anonymous and confidential.

If you have any questions about your rights as a research participant that have not been answered by the investigator, you may contact the University of Missouri-Columbia Institutional Review Board at 573-882-9585. Do not hesitate to ask any questions about the study either before participating or during the time that you are participating. A hard copy of this consent form will be made available at your request.

Thank you for your participation.

By clicking on the "CONTINUE" button, I affirm that I am at least 18 years of age and understand the parameters of the study and desire to participate.

*Scott K. Radford, Department of Marketing, MU, Principal Investigator, 573-882-6244*  
*Peter H. Bloch, Department of Marketing, MU, Co-investigator, 573-884-1808*

Continue

Done Internet 90%

Surveys - MU College of Business - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/asp/survey/takeSurvey.asp?surveyID=298&pageNumber=28&lastQuestionNumber=0&adminEdi

### Product Design Survey Template



When you look at this espresso maker what are the most distinctive design elements or characteristics that come to mind?  
Please list between 3 and 5 attributes.

Continue

Done Internet 90%

Surveys - MU College of Business - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/asp/survey/takeSurvey.asp?surveyID=298&pageNumber=8&lastQuestionNumber=6&adminEdi

Surveys - MU College of Business

### Product Design Survey Template



When you look at this bicycle what are the most distinctive design elements or characteristics that come to mind?  
Please list between 3 and 5 attributes.

Continue

Internet 90%

Surveys - MU College of Business - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/asp/survey/takeSurvey.asp?surveyID=298&pageNumber=16&lastQuestionNumber=14&admin

Surveys - MU College of Business

### Product Design Survey Template



When you look at this hand vacuum what are the most distinctive design elements or characteristics that come to mind?  
Please list between 3 and 5 attributes.

Continue

processResponse.asp?surveyID=298

Internet 90%

Surveys - MU College of Business - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/asp/survey/takeSurvey.asp?surveyID=298&pageNumber=21&lastQuestionNumber=19&admini

Surveys - MU College of Business

### Product Design Survey Template



When you look at this toaster what are the most distinctive design elements or characteristics that come to mind?

Please list between 3 and 5 attributes.

Continue

processResponse.asp?surveyID=298

Internet 90%

Surveys - MU College of Business - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/asp/survey/takeSurvey.asp?surveyID=298&pageNumber=26&lastQuestionNumber=24&admini

Surveys - MU College of Business

### Product Design Survey Template

## Toothbrush #7

To answer this question please look at the toothbrush marked with a #7.

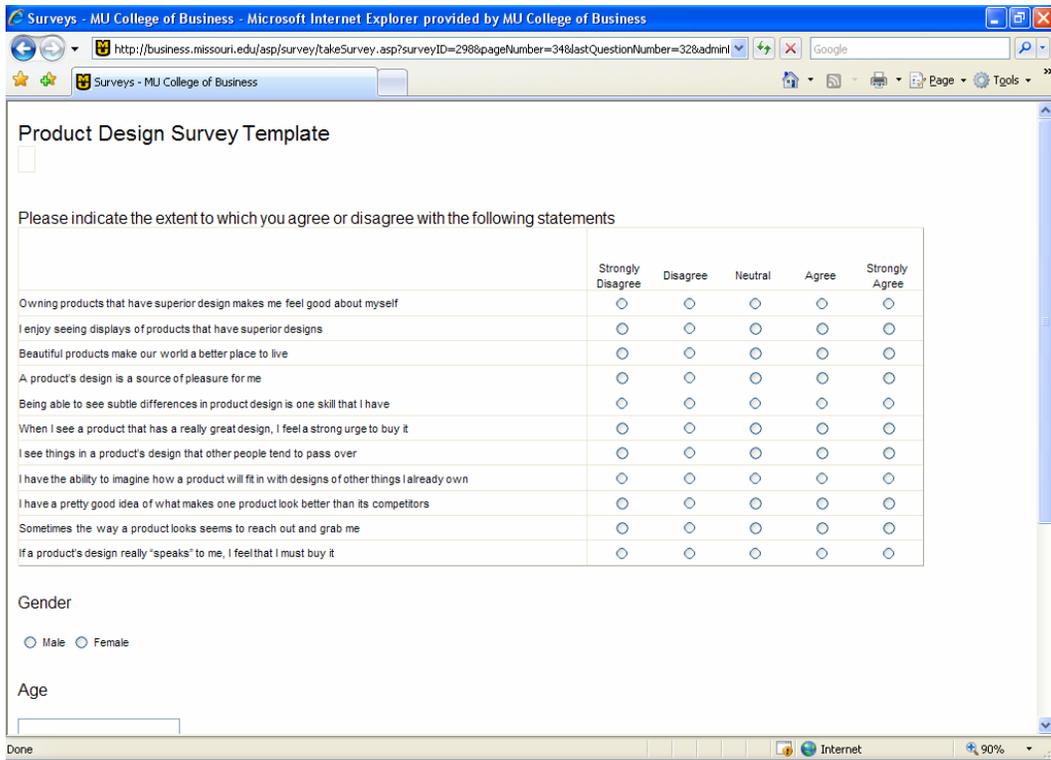
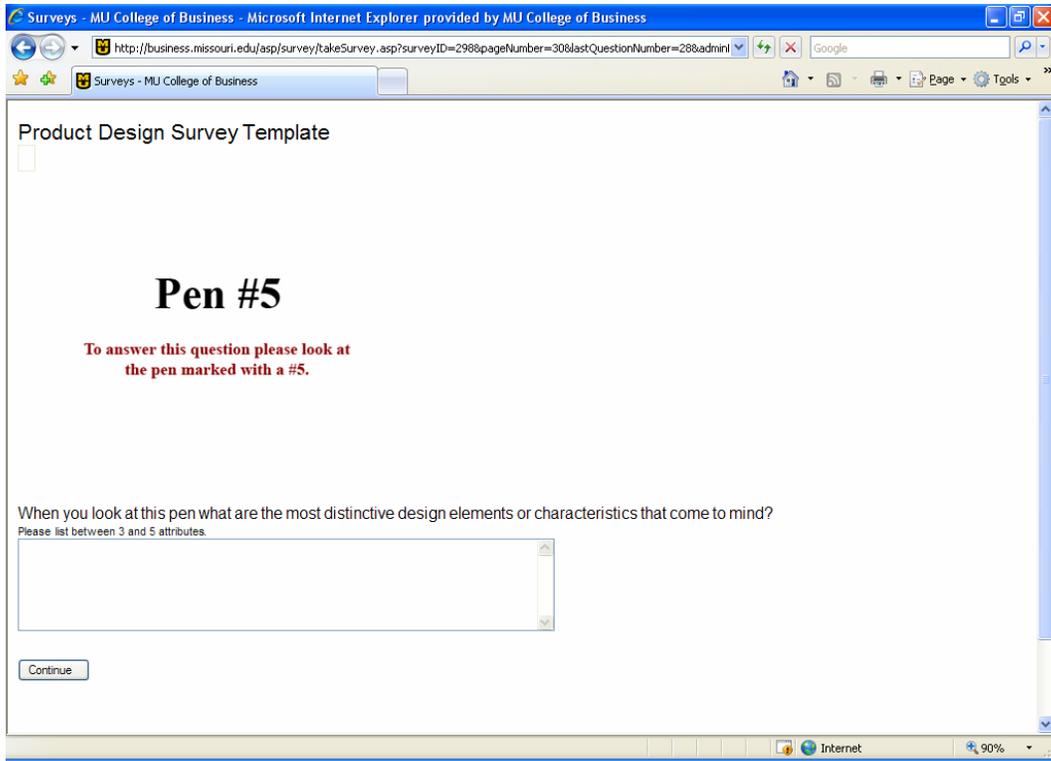
When you look at this toothbrush what are the most distinctive design elements or characteristics that come to mind?

Please list between 3 and 5 attributes.

Continue

processResponse.asp?surveyID=298

Internet 90%



**APPENDIX D: STUDY 2 CODING INSTRUCTIONS**

## Coding Instructions

Each respondent was shown 32 different pictures of new products in 6 different product categories. An attribute elicitation task was performed by each subject where they were asked to indicate the features or characteristics of the product that were most salient to them. This data is the compilation of these responses. The data is sorted first by product, then by respondent number. There are 60 respondents.

Each respondent was shown a picture and asked the following question.

**When you look at this {product category} what are the most distinctive design elements or characteristics that come to mind?**

Please list between 3 and 5 attributes.

This data is really in short sentences, fragments, or words the level of analysis will be at the level of the clause. That is, each statement whether it be a fragment or word should be treated as a separate entity. There should be between 3 and 5 clauses for each participant. A new line in the data set indicates that the subject hit return and so is setting a new clause. Some subjects did not hit return between clauses so commas, periods, hyphens, etc... should also be considered as separators.

The general framework comes from Crilly, Moultrie, and Clarkson (2004) "Seeing things: consumer response to the visual domain in product design." This is a conceptual piece that outlines a set of four responses to visual design. These responses may be *emotional*, *aesthetic*, *semantic*, or *symbolic*. The goal here is to identify how each statement falls into these categories. On the attached coding sheet, indicate the category that you think is most representative of the clause. Enter a '1' if it is clause 1 for that respondent, '2' if it is clause 2, etc...

On the next pages are descriptions of each of the four categories.

### **Emotional/Affective**

This is the affect or feelings that the consumer exhibits toward to the product and can encompass a variety of emotions such as admiration, disappointment, amusement, and disgust. These feeling will likely be fairly mild. Five categories of emotional response offer a way of identifying and categorizing consumers' responses.

In this category will be any case where the response concerns like/dislike, attraction, or personal evaluations of the product. So this category will include things such as

“love the color”

“doesn't look like it writes very nice”

“Switch looks dull”

“Boring”

“Weird”

“Ugly”

### **Aesthetic Impression (Design)**

In this category are the cases where subjects are referencing specific design elements.

They may be speaking about the overall design of the product as a sort of Gestalt evaluation of order and meaning, they may be referencing the uniqueness or novelty of the design, or they may simply be refereeing to specific design elements.

So in here you would put statements like

“Same design as other vacuums so the color may be differentiating factor”

“The storage on top is innovative”

“Sleek”

“Smooth”

“Rounded corners”

### **Semantic Interpretation**

A significant portion of the value assigned to a product may be attributed to their utility – this can comprise practical qualities such as function, performance, efficiency, and ergonomics. These aspects of utility can be conveyed by the visual form of the product. So semantic interpretation is about the evaluation of the design's ‘apparent utility’ and ‘perceived qualities.’ When the participant refers to the operation of the device – the function of the product, durability, and physical characteristics like fragility are in this category.

In this category you would put statements such as

“Looks like you would have to bend over a lot to ride this bike”

“the dial allows you to set the darkness of the toast”

“lightweight”, “the wheels look flimsy”, “sturdy”

“only one knob to figure out”

### **Symbolic**

All product hold some socially determined symbolic meaning. Products may evoke thoughts, feelings, and associations which one links to the commodity or one assumes others must associate with it. These are the culturally agreed meaning of objects.

In this area are references to a product as ‘retro’ or ‘futuristic’, or ‘modern’.

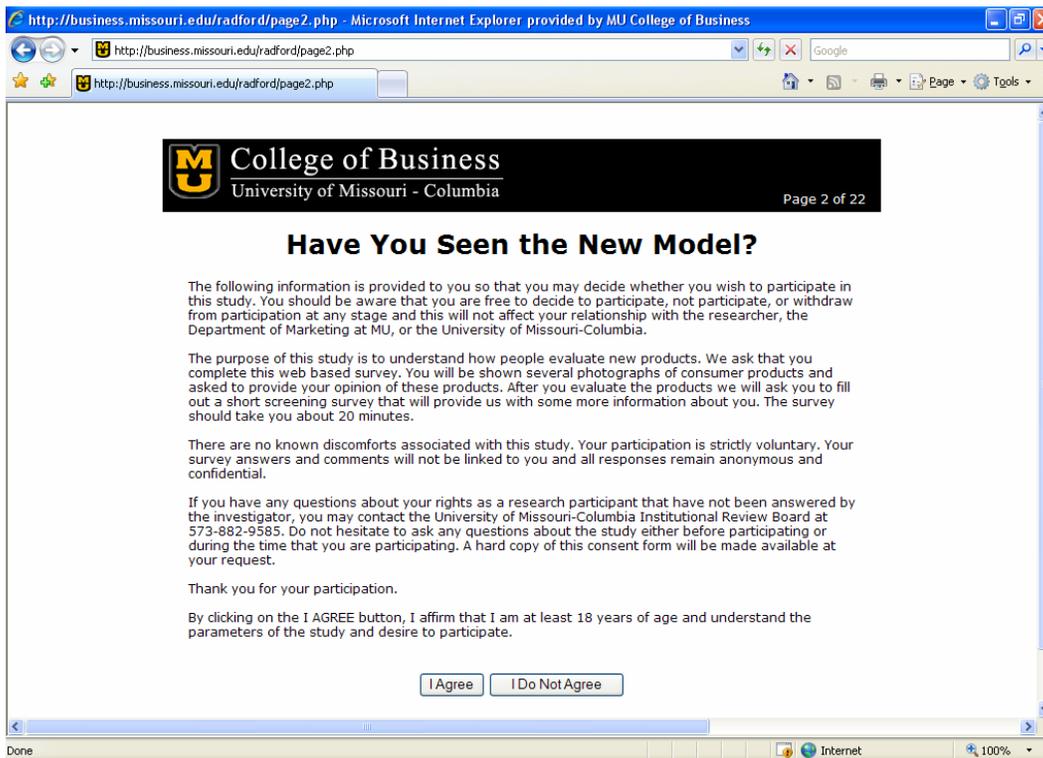
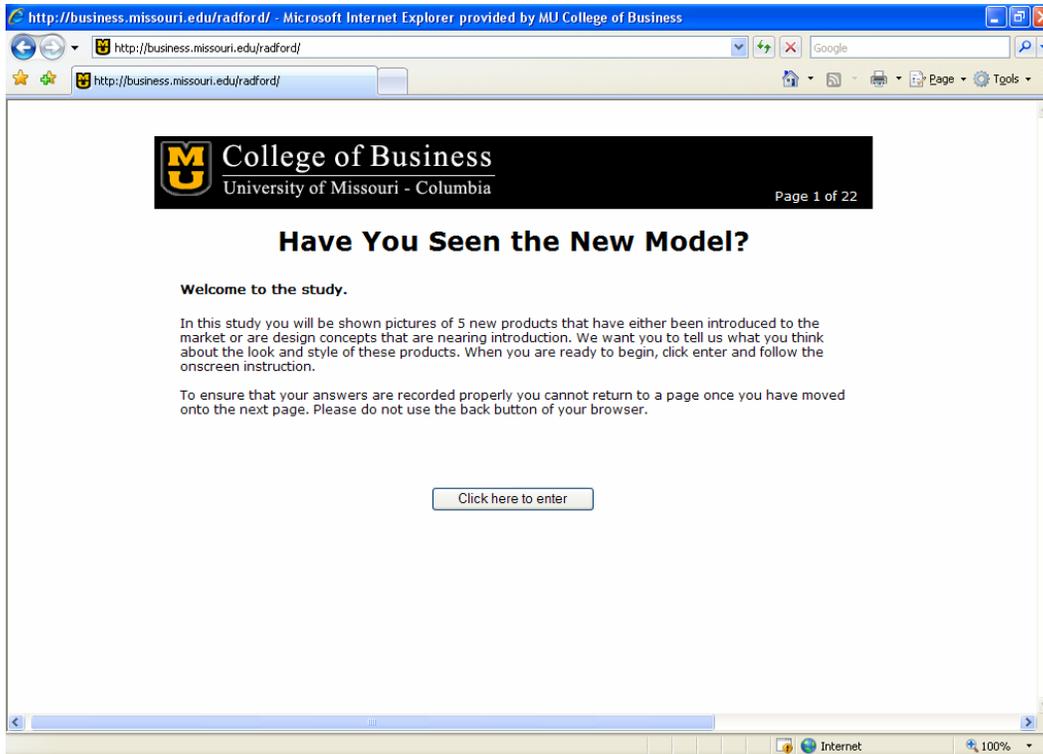
“Looks like something that I had when I grew up”

## Examples

Here are a number of text examples that are similar to what you may encounter. In this case respondents looking at a bicycle have all commented on the pedals on the bicycle. These comments are then assigned to one of the four groups. Each of these statements is about the pedals, but they are referring to the pedals in different ways.

<b>Emotional/Affective</b>	<b>Aesthetic Impression (Design)</b>	<b>Semantic Interpretation (Usage)</b>	<b>Symbolic</b>
I like these pedals	Pedals are long and skinny	Pedals look like you need	Pedals look like those
These pedals look cool	Pedals are blue	special shoes	Lance Armstrong uses
The color is dull	Shiny metallic finish	Pedals do not look	Look futuristic
These pedals are boring	Sleek	comfortable	Look modern
These pedals are	Metallic finish	Pedals look like they might	Look like something
interesting	Stripe down one side	break	from the Jetsons
Weird	Unusual pedals	Pedals look heavy (light)	Look like the pedals I had
Ugly	New looking pedals	These pedals look very	on my bike when I was a
	Innovative pedal design	efficient	kid

**APPENDIX E: STUDY 3 INSTRUMENT**



Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page3.php

College of Business  
University of Missouri - Columbia

Page 3 of 22

Please evaluate this Espresso Machine on the following criteria. Please select a position between these two adjectives that you feel best describes the product.



I think that this Espresso Machine is ..

Futuristic	<input type="radio"/>	Nostalgic					
Attractive	<input type="radio"/>	Unattractive					
Conservative	<input type="radio"/>	Avant-garde					
Pleasant	<input type="radio"/>	Unpleasant					
Dazzling	<input type="radio"/>	Ordinary					
Appealing	<input type="radio"/>	Unappealing					
Interesting	<input type="radio"/>	Boring					
Unlikable	<input type="radio"/>	Likeable					
Contemporary	<input type="radio"/>	Traditional					
Beautiful	<input type="radio"/>	Ugly					
Unimpressive	<input type="radio"/>	Impressive					
Innovative	<input type="radio"/>	Imitative					
Good	<input type="radio"/>	Bad					

Next

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page3b.php

College of Business  
University of Missouri - Columbia

Page 4 of 22



If you were in the market for an Espresso Machine do you think that:

You would definitely not consider buying this Espresso Machine         You would definitely consider buying this Espresso Machine

Would you say that your overall opinion of this Espresso Machine is:

Very unfavorable        Very favorable

Would you say that this Espresso Machine is:

Very bad        Very good

Please indicate the extent to which you agree or disagree with the following statements:

Strongly Disagree         Strongly Agree

This Espresso Machine is visually attractive

Next

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page12.php

College of Business  
University of Missouri - Columbia

Page 17 of 22

Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. Owning products that have superior design makes me feel good about myself	<input type="radio"/>				
2. I enjoy seeing displays of products that have superior designs	<input type="radio"/>				
3. A product's design is a source of pleasure for me	<input type="radio"/>				
4. Beautiful products make our world a better place to live	<input type="radio"/>				
5. Being able to see subtle differences in product design is one skill that I have developed over time	<input type="radio"/>				
6. I see things in a product's design that other people tend to pass over	<input type="radio"/>				
7. I have the ability to imagine how a product will fit in with designs of other things I already own	<input type="radio"/>				
8. I have a pretty good idea of what makes one product look better than its competitors	<input type="radio"/>				
9. Sometimes the way a product looks seems to reach out and grab me	<input type="radio"/>				
10. If a product's design really "speaks" to me, I feel that I must buy it	<input type="radio"/>				
11. When I see a product that has a really great design, I feel a strong urge to buy it	<input type="radio"/>				

Next

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page13.php

College of Business  
University of Missouri - Columbia

Page 18 of 22

Please indicate the extent to which you like or dislike the activities described in the following statements.

	Strongly Dislike	Dislike Somewhat	Neutral	Like Somewhat	Strongly Like
1. Finding out the meaning of words I don't know	<input type="radio"/>				
2. Trying to figure out the meaning of unusual statements	<input type="radio"/>				
3. Thinking about different ways to explain the same thing	<input type="radio"/>				
4. Figuring out the shortest distance from one city to another	<input type="radio"/>				
5. Analyzing my own feelings and reactions	<input type="radio"/>				
6. Discussing unusual ideas	<input type="radio"/>				
7. Thinking about why the world is in the shape that it is in	<input type="radio"/>				
8. Figuring out how many bricks it would take to build a fireplace	<input type="radio"/>				
9. Being on a raft in the middle of the Colorado River	<input type="radio"/>				
10. Having a vivid dream with strange colors and sounds	<input type="radio"/>				
11. Riding the rapids in a swift moving stream	<input type="radio"/>				
12. Having a strange new feeling as I awake in the morning	<input type="radio"/>				
13. Steering a sled down a steep hill covered with trees	<input type="radio"/>				
14. Dreaming that I was lying on the beach with the waves running all over me	<input type="radio"/>				
15. Walking across a swinging bridge over a deep canyon	<input type="radio"/>				
16. Having vivid and unusual daydreams	<input type="radio"/>				

Next

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page14.php

College of Business  
University of Missouri - Columbia

Page 19 of 22

Please indicate the extent to which you agree or disagree with the following statements

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. I often risk doing things differently from others	<input type="radio"/>				
2. I frequently have original ideas	<input type="radio"/>				
3. I am able to cope with several new ideas at the same time	<input type="radio"/>				
4. I tend to actively share ideas with others	<input type="radio"/>				
5. I am able to provide fresh perspectives on old problems	<input type="radio"/>				
6. Others find my conversation stimulating	<input type="radio"/>				
7. I can nearly always think of something when stuck on a problem	<input type="radio"/>				
8. I am willing to stand out in disagreement against a group	<input type="radio"/>				
9. I would sooner create something new than improve on something that already exists	<input type="radio"/>				
10. I am willing to vary set routines at a moment's notice	<input type="radio"/>				
11. I need frequent change to keep me interested	<input type="radio"/>				

Next

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page15.php

College of Business  
University of Missouri - Columbia

Page 20 of 22

Please indicate the extent to which you agree or disagree with the following statements

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1. I am very attracted to rare objects	<input type="radio"/>				
2. I tend to be a fashion leader rather than a fashion follower	<input type="radio"/>				
3. I am more likely to buy a product if it is scarce	<input type="radio"/>				
4. I would prefer to have things custom made than to have them ready-made	<input type="radio"/>				
5. I enjoy having things that others do not	<input type="radio"/>				
6. I rarely pass up the opportunity to order custom features on the product I buy	<input type="radio"/>				
7. I like to try new products and services before others do	<input type="radio"/>				
8. I enjoy shopping at stores that carry merchandise which is different and unusual	<input type="radio"/>				

Next

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page16.php

College of Business  
University of Missouri - Columbia

Page 21 of 22

Please answer the following questions.

Age:

Gender:

Major:

Thank you for participating in the study. To receive bonus credit in Marketing 3000 please enter your student number

Student Number:

If you would also like to be entered to win one of two \$100 Mastercard gift cards please enter your Missouri email address

Missouri email Address:

Marketing Study - Microsoft Internet Explorer provided by MU College of Business

http://business.missouri.edu/radford/page17.php

College of Business  
University of Missouri - Columbia

Page 22 of 22

Thank you for participating  
Please close the browser.