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PERSUASIVE PACKAGING: AN EYE-TRACKING APPROACH TO DESIGN

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PERSUASIVE PACKAGING: AN EYE-TRACKING APPROACH TO DESIGN

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ABSTRACT

This dissertation details the development of a consensus-centered strategy for managing packaging design projects that enables designers from various fields to participate (seriously play) in the development process. The Work/Flow developed was quantified though a series of empirical eye-tracking experiments to determine if objects produced through the system resulted in longer fixation durations than the control. It was determined that packages developed through the Work/Flow were significantly more persuasive than the control ($P < 0.0005$).

The second experiment observed the effectiveness of designs produced through the Work/Flow in respect to the competitive retail array. Out of three product categories tested, one package was developed which garnered significantly different total fixation duration than the competition ($P < 0.0005$). The remaining two packages failed to significantly attract attention more than the competitive array. However, the results showed that the designs developed did not differ, and thus all designs produced through the Work/Flow were as equally as persuasive against the competition.

The dissertation details an intensive review of literature on three areas of study: serious design and play, participatory strategies, and rhetorical persuasion and seduction. The last chapter provides a detailed analysis and description of implementing the teaching and communicating the Work/Flow to professional packaging engineers, designers from various backgrounds, and academia.

DEDICATION

       This project is dedicated to my wife, Bianca, who has tolerated me throughout this project for the past four years.

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CHAPTER ONE

INTRODUCTION

As stated in the 2010 ERA keynote presentation, the packaging industry is a 600-billion dollar global market, making it the third largest industry in the world. Packaging is also the largest industrial employer, with an annual growth rate of 5% (ERA, 2010). With millions of people working within the industry, there are only five schools in the United States that issue bachelors degrees within the field as of 2011. Therefore, with such little output of academically trained packaging engineers, it is not feasible for the majority of professionals working in this industry to have a packaging-specific degree. Furthermore, the faculties within current academic programs, for the most part, either originated in food science, human nutrition, or polymeric sciences. Thus, within the area of packaging design, the majority of professionals (including academics) are not formally educated in the specifics and requirements of the industry. These claims were derived from a survey delivered to 1200 packaging designers throughout the United States [1]. Out of the 433 responses, the following results were observed:

· 93% did not have a degree in packaging

· 81% "greatly needed" further professional development in packaging

· 66% noted that packaging design projects took over four months on average

· 81% outsource deliverables on the average packaging design project

· 52% considered their project workflow "antiquated"

The survey conducted in 2010 sets the stage for the proposed topics of this research, which are divided into **two** parts. The initial section aims to develop a holistic and accessible packaging design Work/Flow. It is apparent that due to the lack of formal training within the field of packaging design and the majority dissatisfied with the existing workflows, a *participatory strategy* needs to be developed which is accessible, affordable, comprehensive, efficient, and state-of-the-art. The second section is the development and quantification of an empirical methodology to determine the effectiveness of the design manifested within its proper context.

Three primary areas of scholarship will be reviewed to ground the research: serious design and play, participatory strategies, and rhetorical persuasion and seduction. The concept of design within packaging is rarely taken *seriously*. The notion of *serious design* attempts to switch the perception of design from being frivolous to *serious*, where the procedures and decision-making within packaging design are quantitative, scientific, and useful to the user and producer. *Serious* designers take many aspects of human factors, ethics, and information disclosure into consideration when designing (or playing with) packaging. These topics, however, are not currently taken seriously enough within the field.

Serious design, within the context of this research project, will be paired directly with the concept of *play*. It is the intent to create a Work/Flow that enables designers from various backgrounds to create *(play)* within the packaging development process. The research will complicate the notion of "work then play," remixing traditional developmental procedures. The current packaging design workflow justifies itself with

"unnecessary science" which is preventative to designers in other fields. For instance, in order to create a simple paperboard carton, the designer must be knowledgeable with various substrates, folding allowances, printing processes, structural stability, dynamic distributive forces, die-making and design standards. Yet, none of this is actually necessary. By automatizing and constructing simple algorithms, anyone should be able to design successful packaging without requiring a specialized education within the packaging field. If such a system were to exist, designers could invest time in *seriously playing* in the developmental Work/Flow – creating and analyzing the persuasive and seductive qualities of their artifacts.

Furthermore, *serious play* should not be limited by technology and resources. Currently, the majority of packaging specific technology is owned and licensed by only a handful of small companies. In order to be properly equipped to design packaging efficiently, a designer is required to invest over $150,000 per computing station. For the majority of designers, this cost is prohibitive, restricting quality design to only large corporations. Thus, the participatory strategy and Work/Flow described in this research will develop a space wherein this technology can be democratized and collaboratively developed for any designer to utilize.

Development and implementation of such a Work/Flow would result in a paradigm shift in the packaging industry. And paradigm shifts are rarely seamless. Thus, the research will make sharp turns and hard transitions from topic to topic. The ultimate goal is not only to develop a Work/Flow, but also to propose how it can be managed

(*participatory strategies*), and how specific elements of the design process can be made more persuasive and seductive.

It is important to now define the two items that have been used in the introduction. The terms persuasion and seduction are rhetorical, and both will be discussed at great length throughout the research. Yet, for the purposes of the empirical aspects of the study, the 'persuasive' attributes of a packaging design will be quantified in terms of the consumer's time to visually notice and then fixate on the package. The 'seductive' attributes of a package design will be quantified in terms of the consumer's pupil dilation (both frequency and change in diameter). Pupil dilation will be shown to have a direct effect on the 'cognitive arousal' of the consumer, and defined more clearly within dissertation research. This system of tracking a prospective consumer's eye within a specified retail context will qualify the proposed Work/Flow.

Once established and tested, the second part of the research will focus on an empirical study to qualify *and* quantify the Work/Flow. From a qualitative perspective, three developmental projects will be conducted from concept to commercialization through the proposed Work/Flow. The initial product, Georgia Olive Farm's Extra Virgin Olive Oil, is the first extra-virgin product to meet the 2011 USDA regulations (USDA, 2010). The second project involves Shaw Farm's branded Gayla's Grits, an established wholesale product, where a retail packaging system is required. The third project is a packaging redesign for a large cooking appliance company. These projects will have actual client interactions, focus groups, and forums. Secondly, these projects will be

developed through an eye-tracking procedure that will automate the creative process and act as a decision-maker for selecting packaging attributes.

After setting up the experiment and discussing the findings, the last section of this dissertation will focus on communicating, teaching, and implementing the technology in both academia and industry. Specifically, a significant outgrowth of this research aims to recommend pedagogical methodologies for how best to teach the model within a packaging science program as well as a more generic design curriculum. Secondly, training modules and online course management systems will be shown to complement current industry standards and assist in production workflows.

It should also be noted that ethics is and will remain the essence of this research. Though it may seem slightly ironic that a research project that aims to manifest idealized designs may contradict or cross ethical boundaries, it is the intention of the author to construct a transparent operating system where the persuasive and seductive qualities of packaging designs are clearly indicated to the designers. If a designer chooses to make unethical decisions within the design process, then the effects of those decisions on prospective consumers will be identified within the Work/Flow. The research also uncovers the rhetorical strengths and weaknesses of a respective design, quantifying the package's *ethos*.

The Dissertation

The dissertation itself is an argument for a consensus-based, participatory strategy for managing packaging projects, which enables designers from various fields to create

(play) within the development workflow. The primary area of literary focus is within Serious Design and Play, which provides a foundation for how to work and design (play) within the packaging industry. This topic positions the major aspects of the Work/Flow, or development process, and then segues into the secondary topic, *participatory strategies*.

Participatory strategies is a unique entity, combining the fields of Design Strategies, Visual Design, and Development Collaboration. In essence, this field grounds the development of a Work/Flow, an operating system, in which members of a packaging design project can work, design, and play together. The Work/Flow bridges the integral people and aspects into one complete system. The Work/Flow manages communication, ideation, development, and file management between the *egents* (Ulmer, 2006) working within the development of a design. Once a Work/Flow has been created and implemented, an empirical methodology is developed and quantified to determine the effectiveness of three packaging design projects managed and developed through the Work/Flow. The effectiveness of designs manifested through the Work/Flow are then qualified through the object's persuasive and seductive qualities.

Experimental Design

The empirical study of the dissertation is an experiment to confirm whether or not the Work/Flow has a significant impact on the persuasive and seductive qualities of a package design over the control designs. A team of designers was assembled to follow the Work/Flow for three different packaging design projects (a new product offering, a

package redesign, and a line extension) that encapsulates all possible design scenarios. Initially, the design team created packaging designs for each scenario as the team would normally do without the proposed Work/Flow; thus, creating the control group. In addition, the designs created within the Work/Flow were observed for contextual improvement as well as differentiation within the competitive array. Therefore, the experimental design not only validates the Work/Flow as a significant design aid, but also illustrates the quality of the designs produced in respect to other competing products.

For each project, three iterations were designed. It is the hypothesis of the Work/Flow that iterations clarify unique, real life issues that would be difficult if not impossible to detect before investment in production. The first iteration is a natural design, which involves the talent and experience of the design team. The design was eye-tracked, and the results analyzed to determine any major issues (i.e., design was not selected, apparent differentiation issues, branding/color concerns, shape/size concerns, and packaging style conflicts). The design team then eliminated these issues. In the second eye-tracking round, the same environmental variables were utilized to determine if the next group of subjects shops the design differently. After analyzing and eliminating the second iteration design issues, a third round of eye-tracking was conducted. From the perspective of the Work/Flow, each iteration showed a greater number of subjects considering the design project than before. From the perspective of the dissertation, data from all nine eye-tracking experiments (135 subjects) was analyzed to determine if utilizing the Work/Flow had significant improvement over not only the control, but within the three iterations produced through the Work/Flow.

Chapter Discussion

This dissertation includes six chapters, in addition to an introduction, conclusion and bibliography, where I frame the project. The project will be subdivided into three parts: *knowing* (theory), *doing* (eye tracking studies), and *making* (building an online model and the physical environment: CUshop™). It should be noted that the methodology and experience lab setup is groundbreaking research – this has never been done before. The chapters are briefly outlined below.

Chapter One details a comprehensive and theoretical packaging design Work/Flow, leveraging the theory within serious play (and design) and *participatory strategies*. This chapter defines, in explicit detail, how a collaborative environment should exist to aid in the development and design of a package. The chapter concludes with the development of the Ouroboros, an RCID-owned technology that was developed, invested in by Clemson University, and created under the Work/Flow.

Chapter Two defines the Work/Flow and required technologies, grounds the Work/Flow rhetorically, and details the benefits of the system to prospective users.

Chapter Three chronicles the development of CUshop™, a physical grocery store used to conduct the eye tracking and consumer experiments for this research.

Chapter Four shows the inter-relationships among rhetorical persuasion, seduction, and eye-tracking methods. A unique eye-tracking methodology is theorized that illustrates the differences between the persuasiveness of a package (defined in terms of scan paths and fixation times) and the seductiveness of a package (the percent of pupil dilation a package causes to the observer). These methods are utilized to illustrate how a

package can be theoretically designed to be more marketable than its competition in the existing retail array.

Chapter Five details the experimental design of the eye-tracking studies, as well as the statistical analysis coding. The primary focus is on the algorithms utilized to determine the subjects' pupil dilations after viewing packaging. This section also details the programming code.

Chapter Six illustrates the results of the study along with the statistical analysis.

Chapter Seven not only links the results of the study to the impact of serious play, *participatory strategies*, and rhetorical persuasion/seduction, but provides an in-depth discussion of the data and how the proposed Work/Flow provided a major competitive advantage when designs are placed in the retail array. To conclude the discussion of the data, a section on the pedagogical approaches to communicating and implementing the proposed Work/Flow to organizations and academia is provided.

Conclusion

The dissertation aims to benefit both industry and academia in several ways: it provides a space in which to participate with others in the development of designs, as well as a method to conduct design projects and qualify one over another. The process can be taught and will be greatly beneficial to students who embrace the Work/Flow, as well as entrepreneurs and designers who are not familiar with the industry, but are fully capable of participating within it.

Yet, the dissertation provides a greater value in shifting the paradigm of current thinking on packaging design. In essence, the dissertation is a manifesto, a statement that grounds research in a humanistic focus on ethics, people, and the democratization of technology within the field. A Work/Flow, grounded in serious design and participatory strategies, not only increases productivity and efficiency, but aids in collaborative development, sharing of knowledge and open resources. Findings and data may also be shared throughout the Work/Flow to increase designer effectiveness. Furthermore, as more designers embrace the Work/Flow, a natural flow towards utilizing compatible technologies and open-source software emerges: freeing designers from the economic constraints that currently exist in the industry. Thus, a discussion of how designers make, play and work together is necessary both for increased productivity and efficiency as well as for improvements in the effects of packaging design on social conditions and the environment.

CHAPTER TWO

SERIOUS DESIGN, PLAY AND PARTICIPATORY STRATEGIES

Introduction

The fields of serious design/play and participatory strategies ground the Work/Flow of the research project. Because the major issues of the packaging industry have been identified as methodological as described by the survey conducted at the Sonoco Institute of Packaging Design and Graphics in 2010, these fields were chosen to best define an environment where packaging design and development can most efficiently be conducted. This chapter seeks to understand how play (serious design) as well as a collaborative, participatory strategy can improve productivity and creativity.

Serious Design and Play

Whether he was credited with the discovery or not, Mihaly Csikszentmihalyi described the seriousness within play during the mid-1970s when he began experimenting with the concept of flow (Csikszentmihaly, 1990). Flow is a state of complete immersion, where the user is unconcerned with reality (time, physical requirements, ego, etc.) and may perform the task at hand at an "ultimate emotional state" (p. 6). Flow is difficult to achieve, and requires careful attention to a user's stimulation, environmental reward, and perceived difficultly. Since release, Csikszentmihalyi has been heavily cited in publications centering on serious play, where the notion of flow has become a strategic educational model. One such author, Matzko Rieber (University of Georgia), has leveraged many of Csiksentmihalyi's works to develop an array of

educational games in the field of physics. In his paper, "Serious Design for Serious Play,"

Rieber brings fourth a clear definition of serious play as "an intensive and voluntary

learning interaction consisting of both cognitive and physical elements…[and] is

satisfying and rewarding in and of itself" (Rieber, 2002). Learning is the direct outcome

of serious play, and is a medium that allows for flow to occur. Rieber critiques

contemporary educational models, as they are contrary to serious play; "we seem

satisfied to have students demonstrate mastery on tests of short-term performance and

place little emphasis on the application of what has been learned in long-term pursuits"

(Rieber, 2002). When engaged in serious play, a state of flow may occur, which is

described to be the pinnacle of learning and attention. Within his work, Rieber details

how simple, yet effective games enable instances of serious play among students.

Leveraging Csikszentmihalyi's work in cognitive psychology and play, Rieber

empirically illustrates that events of serious play will have a long-term cognitive impact

on users, due to the immersive and emotional make-up of a state of flow.

Flow is ubiquitous when in serious play (Ryu, et al, 2011). It is a "state of being"

where the subject is "one with the experience." Ryu (Massey University) leverages

Csikszentmihalyi's work in his experimentation of "social flow." Ryu shows how

collaborative learning environments increase "ambitious behavior" when states of flow

are observed. Interestingly, Ryu links how the use of contemporary mobile devices, smart

phones, and tablet computers have created an expectation to "work, learn and study

whenever and wherever we want to" (Ryu, 2011). However, these on-demand

characteristics are not new; they are child-like attributes, where flow and social flow are found in young children as well.

Moments of serious play are commonly noticed in young children. They seem mesmerized by their environment at times, investing the greatest amount of attention into the simplest things. During these moments, children are unaware of their surroundings and even their physical limitations; these are instances where children are cognitively developing, learning, and flowing. The study of flow in the education of children is a core competency of the Montessori school system. Fernando Chulanganee noted in his article, "Integrating Csikszentmihalyi and Montessori," that an embracement of flow allows Montessori educators to "include universality, [build a] foundation on practical experience, reference to subconscious activity, call for challenge to spark interest, and use…freedom in self-discipline as incentives to self motivation" (Chulanganee, 1997). Best said by Kristina Loring in the context of technology and education, "children are never more serious than when they play" (Loring, 2010).

It is not uncommon for adults to have vivid memories of times of serious play, for the state of flow is deeply emotional and euphoric (Csikszentmihalyi, 1990). And it is important to illustrate how play is the medium in which flow occurs. Csikszentmihalyi, in an interview with *Wired Magazine*, compares jazz to the state of flow, as "being completely involved in an activity for its own sake. The ego falls away. Time flies. Every action, movement, and thought follows inevitably from the previous one, like playing jazz. Your whole being is involved, and you're using your skills to the utmost" (Geirland,

1996). Flow is the 'ah-ha!' moment when one is able to seriously play and enter a state of flow.

According to Rieber, design is a form of play, and serious design is serious play (Rieber, 2002). The Oxford Dictionary defines design as, "intention; purpose; end," where this does not differ from serious play. Serious play and design have a single answer to intention, purpose and end: learning from flowing.

The term "serious play" has been used throughout this text so far, and its seriousness must be discussed. The only technical difference between serious play and design is the word "serious," which only exists to legitimize the use of the word "play." It would just be silly to ask a professional to play with their work, or a student to play with their assignments, for it would be like playing with one's food. And playing with food is just not acceptable. But, when one seriously plays, then all is well in the world, and it is accepted as serious, because it says it is. One could argue how one "works then plays," indicating the latter may be of more importance, but this is another topic altogether.

But seriously, the idea of serious play is an important aspect to achieve a state of flow in design. Paula Scher, a highly respected designer, delivered a TED talk in 2008 on the topic of serious play in design (Scher, 2008). In her captivating discussion, Scher begins with, "my work is play and I play when I design." Intermixing the two terms throughout her speech, Scher develops a taxonomy of play (design) where the action of design (play) is differentiated into two subcategories: serious design and solemn design. Solemn design occurs when creativity and uniqueness become appropriated; it is when seriousness is lost. Serious design is inherently experimental, where solemn design has

proven to be successful. Serious design brings about imperfection, invention and change. In similar words to Csikszentmihalyi and Rieber, serious play (design) is a moment when one "gets it," when a concept is "embraced," when reality is displaced, and the state of flow is achieved. Scher delivers personal experiences of serious play, and notes that when these moments occurred (which were few, but very memorable), she was unqualified, ignorant, and most importantly, child-like in her work. Scher discusses moments when she remixed typography and architecture, something that seemed as foolish as playing with one's food, which quickly became appropriated by major organizations. Once it became trendy, it became solemn, and the seriousness was lost. But, throughout this experience, Scher became aware of flow and its importance when designing and learning.

Vilém Flusser describes serious design as "both a political and an aesthetic question and forms the central concern when it comes to creating things" (Flusser 1999, 59). Flusser argues how the future depends on serious design, for it is the emulsifying agent between art, science, philosophy, theology and technology. Specifically, Flusser defines serious design as epistemic, and articulates his argument through a description of a pot and water. In essence, a pot is designed to be grasped, and a user naturally desires to fill it with amorphous objects (i.e. water). The pot not only grants a function, but also delivers form to the substances that fill it. Thus, objects can present a state of flow onto a user, if seriously designed. Few entities are able to demand such actions from its users; take for instance the Apple iPhone, the Google search engine, and even Wal-Mart. These objects (and spaces) leverage the attributes of flow (immersive, removal of reality, etc.) that guides the user to decision. These entities are epistemic in nature.

Contrary to Csikszentmihalyi, who illustrates that flow is best achieved individually, within a solitary state of study, Flusser shows how external objects can trigger the state. Flusser is not alone in this analysis. As previously discussed, Ryu discovered that flow, through a series of empirical studies, was found to be easier to achieve when individuals were not alone (Ryu, et al., 2011). Thus, design is serious not only because the future depends on it, but also due to the fact that designs themselves can provide a state of epistemic flow, where it has a major immersive affect on users.

The notion that serious design (rather objects) is epistemic denotes that objects are not real. In his illustration of the pot, Flusser desires to show how objects are only byproducts of serious design. This epistemology stems from Platonic concepts where "knowledge and perception are the same" (Plato, 1992). In the *Republic*, Plato argued through his dialogue with Socrates that knowledge is innate and that objects are mere reflections of reality. In his allegory of The Cave, Plato describes the prescribed attributes man grants objects, even though they are only 'shadows' of reality (Plato, 1992). Plato indirectly described a state of flow when an individual, who was bound to the cave walls, decided to turn around (seriously play) and see how the prior reality was only a mere reflection of the new reality (flow). Plato described how when one enters this state, they become a "philosopher" (Plato, 1992).

Flusser activates design in various ways through definition, as serious design "forms" concerns and "projects" itself into one's path (Flusser 1999, 58). It is as if design is the portal to one's innate knowledge, in respect to Plato. This is the reality of flow – it directs decision making at a hyper state. This is no different to the findings and

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experiences of Csikszentmihalyi, Rieber, and Scher's discussions, except that flow is described as epistemic; it is the state during which one learns.

One could argue that Flusser and Plato would agree that when in serious play, realities are constructed. This notion is illustrated by Marshall McLuhan's focus on the medium rather than the message of a design. In his 1964 work, *Understanding Media: The Extensions of Man*, McLuhan uses the analogy of a light bulb to describe how an object, or a medium, projects space. Light bulbs are void of content, as they are only byproducts of design. If the medium is really the message, then content is of minimal value. McLuhan illustrates his argument entertainingly by using the term, "massage." The term has endless possibilities – did McLuhan mean the medium is the 'message' (a typo), or is it a deep-tissue 'massage,' or is it the 'mass(-)age'? Regardless of the intent, the 'message' is quite simple…it is irrelevant. It communicates how messages do not matter; only mediums provide epistemic value. Mediums communicate, they immerse, and regardless of the message, users seriously play with them. If a medium has been seriously designed, then a state of epistemic flow is possible.

There are adversaries to Csikszentmihalyi's notion of Flow, but the arguments against concern only the long-term effects. No one in the field is debating the power and legitimacy of the state of flow. Jeff Brewer, author of *The Parable of the Four Stones*, states that "the flow experience can take people close enough to the shore of their dreams that they can almost touch it, but it can't take people all the way across. It can provide them with a certain kind of happiness for a season, but it can never provide lasting satisfaction." (Brewer, 2008: 152). Brewer is specifically arguing against using the aspect

of flow to replace the notion of God in the design and learning process, but he does not reduce flow's effectiveness.

We have taken the concept of serious play and better defined it as a context in which a state of flow is possible. Next, it was shown how objects designed within a state of flow (called serious design) have the ability to be epistemic (where users naturally react to and learn from them). It was shown how objects do not exist and that mediums are what communicate to a user. One may counter this argument by noting that designers think in terms of the object they are designing, and if the object does not exist, how would design be possible? Yet, this is simply not accurate. A designer is a designer of a medium. If the object already existed (in form or thought), then design would be unnecessary. If an idea can be expressed or communicated, it has already been 'designed.' Design is ideally a state of flow where a designer is learning and emotionally constructing mediums in unique ways. The process becomes ubiquitous, and creativity flows through the manipulation of mediums, not pre-defined objects. Design initiates with a blank slate (or medium) to be twisted and tangled by the flow of the designer.

Serious play is a state of being, a reality (or anti-reality), where learning is taking place. When we are seriously designing, we are in a state of serious play. When in a state of serious play, the message becomes meaningless; we are truly focused on the medium. In her TED talk, Scher discussed how in order to reinvent herself she had to enter a state of flow. After a stressful year, Scher removed herself from the city and moved to the mountains, where she began to paint pictures of the entire world. The experience was completely self-reflective; she drew continents, countries, states and cities in her own

perceived reality. Things were out of scale, countries were illustrated that did not exist, but it made sense. When Scher was asked to show the art, they sold quickly, and she began to paint more. As she became aware that a style had been established (where she was able to create many other similar objects), the play become solemn and the seriousness was lost. Scher became aware of reality (reproducing objects for the purpose of sale) and exited flow. This is the current state of the design world. Designers are forced into solemn design because it sells. Serious design is worthless to investors, for it has yet to be established.

Kalle Lasn, founder of Adbusters and author of *Design Anarchy*, provides a meaningful insight to the seriousness of serious design and play. Similar to "The First Things First 2000: A Design Manifesto," both texts call for a reversal of the role of the contemporary designer. The idea is to focus less on content, and calls for designer's skills "to be put to worthwhile use" (Garland, 1964). Focusing less on content aligns with the arguments of McLuhan, and it makes sense—allow designers to be serious and embrace flow. When designers embrace a state of serious play, then flow may be achieved. It is important that working environments and systems of design are developed to promote serious play—so that flow may occur.

In conclusion, serious play allows for serious design, which creates objects (mediums) that permit learning. It is the act of Flusser's "creating," and Csikszentmihaly's "flow," that enables designers to seriously design and users to benefit. Though it may appear that we learn from objects, this is simply not the case – we learn from mediums, which were designed from a state of serious play. Sherry Turkle states in

her text, *Evocative Objects: Things We Think With*, that "objects are naturally evocative because they remind us of the blurry childhood line between self and other" (Turkle 2007, 8). Similar to Plato and Flusser, objects are only reflections of moments in serious play. When we interact with an evocative object, we are reminded of times when we were in instances of immersive learning and serious play. When designers (as well as users) embrace serious play, change will occur and learning will be achieved. This is possible because of flow. Serious play enables anyone, from any background, to legitimize designing in an unfamiliar field. And when designers step up and out: the more serious playing and the less solemn designing will result.

In 2010 I began rethinking how the packaging industry functions. The workflows are constrictive, and design is not possible. 'Designers' select from 'stock' choices and focus on surface treatments, which are also constrictive and limiting. Yet, I experienced a state of flow when I began to reconsider how packaging could be made. I thought about the end of a package—ideally recycled into another system, yet inevitably disposed of in a landfill. Once I began seriously playing with concepts—learning, Google-ing, researching, and investing in the subject, my mind began to run at hyper speeds in an intensive moment. I lost track of reality, and it concluded with the Ouroboros bottled water packaging design, which my employer invested tens of thousand of dollars protecting. This would have not been achieved without a state of flow, and it has been shown this is not a random or spontaneous process.

Flow can be integrated into design workflows, and has a proven corporate track record. One example is the concept of "Bootlegging" (3M, 2011), an organizational

practice where a percentage of time may be spent on personal projects or self-directed research and development. Companies such as 3M, Hewlett-Packard, and Google encourage employees to spend up to 20% of their time seriously playing at work. Other than the development of Google's Gmail and their multi-billion dollar AdSense campaign, the most influential Bootlegging product on the market is 3M's Post-it Note. Developed by Art Fry, who seriously played with Dr. Spencer Silver's pressure sensitive adhesive, the product quickly became an international success (3M, 2011). It is well documented that the development of the Post-it Note would not have been possible without 3M's Bootlegging policy. Fry was a designer, not an organic chemist. He was unqualified, ignorant, and child-like, like Scher and many others, including myself.

Flow is a state that can be highly productive and motivational when integrated into a workflow. Flow allows for many employees to design in a system, regardless of background. Flow presents a space where boundaries are crossed and innovations are inspired. Most importantly, designs manifested under a state of flow are epistemic, and the Post-it Note is no exception. In the context of packaging, if designers embraced the concept of flow and designed objects (mediums of paper, plastic, metal and wood), then users of these products would be more informed and immersed into the product/packaging system. From a designer standpoint, if the concept of flow is integrated into the development workflow, constraints can be reduced, more individuals can participate in the system, and better products can be created. Within a state of serious play, our industry would have more Schers and Frys developing and creating. But most importantly, when serious play is permitted and a state of flow is achieved, the industry

providing such an environment to their designers may await many great achievements to come.

The value of the proposed Work/Flow within this dissertation, *Seductive Packaging: An Eye-Tracking Approach to Design*, provides not only scholarly significance, but also a trans-disciplinary importance that extends outward to the packaging industry, academic, and design communities. The adhesive elements that cement the Work/Flow are the concepts of serious play and flow, which bind designers to unique and creative productivity. The research into Serious Design and Play provides a justification for ensuring that a space or Work/Flow encourages serious play, and thus creativity. The next step is to determine how people will use such a space and the participatory strategies that enable its many users to embrace flow.

Participatory Strategies

The notion of serious play and flow, according to Czikszentmihalyi, is best practiced independently. Yet, recent research shows that flow can be actualized in groups, where it "raise[s] the [level] of challenge to do further learning activities" (Ryu, et al., 2011). Though it is apparent in academic research that flow inherently reduces the chance of "taking [on] further challenges" the purpose of participatory strategies is to involve rather large groups of people in an environment where flow may be achieved (Ryu, et al., 2011). In respect to the packaging industry, where 95% of new product introductions fail (Hart, 2007), the issue at hand is imperative: a participatory strategy

must be developed where industry stakeholders can work together and design within a state of flow; ensuring designs are unique, creative, functional, and sustainable.

Participatory strategies combine the philosophies of two major fields: consensus development and design strategy to provide a space where multiple 'stakeholders' may enter, work together, and play within a consensus decision-making arena to resolve an issue. It should be noted that the particular space that will be constructed within this research would rely upon a consensus-based design rather than credential-based design. For instance, large organizations such as NSF, NIH, ASTM, and ISO enlist professionals, or those with credentials, to arrive at a conclusion (Kosecoff, Chassin, Brook 1984). This research, however, will leverage literature that illustrates how individuals without credentials arrive at resolutions faster, act more efficiently, provide a more creative answer, and are more likely to experience flow within the collaborative process.

As noted previously, flow is a possible outcome of a state of serious play; it is best achieved when someone is sincerely attempting to manifest a resolution to an issue, while being unqualified, ignorant and child-like in his or her approach (Scher, 2008). Gregory Ulmer, in his book *Electronic Monuments*, describes the anatomy of a self-formed, consensus-based, collaborative, online group, which is described as an EmerAgency, "a distributed, virtual, online consulting agency" (Ulmer 2006, xiii). Ulmer names the individuals who work under the umbrella of the EmerAgency, or Egents, as "self-declared consultants without portfolio" (Ulmer 2006, xiii). The notion of 'without portfolio' is a critical attribute of these individuals—they are not credentialed professionals, only passionate and sincere 'netizens' (Ulmer 2006, xiii).

Ulmer deconstructs conventional, credential-based consultants within *Electronic Monuments*. Specifically, in the case of a social worker and a child abuse scenario, Ulmer states that the "conventional [consultant] [tries] to isolate the aberration as exception, unaware of the logic of bare life. They are unable to conceive of America as we-who-abuse-children" (Ulmer 2006, 157). Ulmer rightfully notes that as long as "abuse is acknowledged as the symptom of a value […] there is no hope in altering the behavior" (Ulmer 2006, 140). In response, Ulmer's concept of a MEmorial is "collective self-knowledge" (Ulmer 2006, 140). Very similar to Czikszentmihalyi's work in flow, MEmorials are instances where intensive internal deliberation and self-study will aid in resolving an external issue within a group of like-minded individuals. Like flow, MEmorials are instances built upon emotion and passion by its Egents to collaborate within a participatory strategy to resolve an issue about which many are passionate. In essence, a MEmorial described by Ulmer is a space, or participatory strategy, that has developed from a group of passionate, unqualified, professionally ignorant, and child-like netizens that have engaged in serious play and entered flow.

Ulmer explains that because the Internet has become ubiquitous, then "in an electrate consultancy, art is as important as math and science" (Ulmer 2006, 161). This is evident in the creation of various (and similar) spaces that utilize Internet invention. The computer, which is the host to Internet invention, is founded on mathematical code, yet is masked by art. The graphic user interface (GUI), commonly referred to as the 'graphic interface' or 'windows interface,' is "just as important" as the code that drives the application. The same logic applies to an Internet website; in essence the content is

binary code, a series of ones and zeroes. But, art (visual content) and the GUI are what allow the math and science to be useful. In Participatory strategies, this respect to math, science and art is important as well: spaces must be designed accordingly if serious play is to be achieved. For instance, imagine raster-imaging software, such as Adobe Photoshop, functioning without a GUI. Technically, this is completely possible – insert the appropriate string of 1s and 0s, and the same effects can be achieved. But, the relationship between art, science and math has been carefully balanced within the software to allow for any individual, regardless of background, to utilize the technology and seriously play. This is the purpose of leveraging a participatory strategy.

The software industry is not the only unit embracing participatory strategies; the field of architecture has many case studies that involve consensus decision-making. Christopher Day embraces the context of objects by involving spaces, environments, users, producers and designers into one holistic workflow. Within his text, *Consensus Design*, a detailed, step-by-step workflow is described showing how all elements that interact with a design need to be involved in the development of the object. Day argues how 'consensus design' is a highly productive method to involve people in creating the spaces and places where they work, play and live (Day 2003).

Other industries are embracing Day's notion of consensus design, and are enabling other non-credentialed individuals an impact on the issues at hand. In *The Consensus Building Handbook: a comprehensive guide to reaching agreement*, a case study of Levi Strauss & Co. was developed. Within the world's largest producer of brand name clothing, it was possible to develop a consensus building effort, which not only

25

included stakeholders, but was consistently responsive to their concerns (Susskind, McKearnan, Tomas-Larmer 1999). Though the issue was not digital or in any way a MEmorial, a major conflict resolution program was developed by hundreds of volunteer employees and agreed upon in a systematic manner. The case study of Levi Strauss & Co. shows how a participatory strategy is possible within a large organization.

When a participatory strategy is developed, where groups of individuals have begun to seriously play in respect to solving an issue at hand, multi-modal mediums and collaborative learning techniques must be incorporated. Richard Mayer notes in his article, "The Promise of Multimedia Learning: Using the Same Instruction Design Methods Across Different Media," that "students can learn more deeply from well-designed multimedia messages consisting of words and pictures than from more traditional modes of communicating involving words alone" (Mayer 2002, p.125). Mayer's research illustrates four major effects from his study: the multimedia effect, coherence effect, spatial contiguity effect, and the personalization effect. Research indicates that students learn better from multi-modal communication (images, words, animation, film, etc.) than from words alone in both print and digital mediums. The coherence effect illustrates how students "learn more deeply when extraneous material is excluded rather than included" in both print and digital mediums (Mayer 2002, p 125). Mayer's "spatial contiguity effect" shows how images and words need to be spatially close together in order to maximize learning comprehension. Lastly, the "personalization effect" shows how students have improved comprehension and learning when words are "presented in conversational rather than formal style" (Mayer 2002, p.125). Mayer also

concludes that an online space, where students come together to learn, can be just as effective as a physical space if his four major effects are taken into consideration (Mayer 2002).

As of 2011, the most popular online participatory strategy-based places are Google, YouTube, and Wikipedia (as ranked by Alexa.com on February 24, 2011). Interestingly, each of these sites works within a continuum in which non-credentialed people compose the largest group of users. Google.com delivers results based on the average consensus of their users. For instance, websites accessed via Google.com are recorded on a continuum where their respective ranking on the search engine improves as it is accessed more frequently. Similarly, YouTube.com ranks on a continuum as well, featuring most popular (or influential) media based on the frequency of views. Wikipedia.com is an ideal participatory strategy space for this research and is literally based on a large group of non-credentialed users who passionately built the world's largest, and most utilized encyclopedia in the world (Alexia, 2011). The methodology behind Wikipedia.com would be an appropriate model on which to base a participatory strategy design for the packaging community.

The article, "Power of the few vs. wisdom of the crowd: Wikipedia and the rise of the bourgeoisie," provides an analysis of Wikipedia's log archive to determine what user group category was posting and editing the majority of articles. The findings of the research illustrate that in the beginning, a few "elite users" wrote and managed the majority of the articles, yet after 10,000 articles were published within a given language, the majority of the articles published and edited were from a large multitude of

individuals (Kittur, et al 2007). It was noted that after the establishment of 10,000 articles, the majority of contributors commented on only a few articles, supposedly within their expertise, rather than editing many articles within a broad field spectrum. Similar to the anatomy of Ulmer's MEmorials, Egents manage their agencies, which are made up of many, like-minded individuals building within a niche area.

To continue weaving in Ulmerian logic into the concept of participatory strategies, the aspect of art, as an equal to science and math, is prevalent in Wikipeida as well. In the article, "The Visual Side of Wikipedia," Fernanda Viegas describes how Wikipedia became a successful user-oriented website (Viegas 2007). Similar to Mayer's work in multi-modal learning tactics, Viegas describes how different learners assisted in developing Wikipedia in the most accessible way possible. Specifically interested in visual media, Viegas conducted research via surveys to seek why people (netizens) post content and visual media to Wikipedia. Viegas concluded with five major reasons (listed in order of predominance) why people contribute to Wikipedia:

1. The majority of people edit Wikipedia because "existing media inspires them to upload their own images and thoughts"

2. Wikipedia presents an "opportunity to improve upon a person's own content"

3. Wikipedia enables an individual to "set the bar on improvements"

4. People edit Wikipedia to "cover additional areas not currently discussed or imaged"

5. Lastly, people edit and upload to Wikipedia to compete with the content of

   others

To compare with Ulmer, playing begins considering an issue, rather a perspective. To experience a MEmorial, one must "[demolish] the perspectivist window and all its extensions as a metaphor for thought" (Ulmer 2006, 7). The same holds true for Wikipedia; perspectives are removed unless found as fact, cited and sourced. Cognitive Potential (www.Cognitive Potential.com), in their article, "What makes Wikipedia Successful," noted six attributes of the site that makes it the highest ranked wiki in the world. First is Wikipedia's "shared vision" on the notion of its purpose - an encyclopedia. All who use the application know this fact and frame things accordingly. Another unique principle is the "5 pillars" of Wikipedia. There are clear rules that must be obeyed. The site's "emphasis on wiki adoption" ensures virtually unlimited methods of starting to edit a wiki, and within a few minutes, a new user is ready to go with the knowledge they need. Cognitive Potential comments on the "compelling reasons to contribute," as the topics themselves are compelling enough, because they are broad and deep. Anyone can find his or her particular passion within the application. Furthermore, Wikipedia is based on "objective criteria," everything written is based on facts which must be cited and sourced. There exists no room for "personal opinions, experiences or arguments." Lastly, "policies [have] consequences," contributors are watching and accounts are easily banned (Cognitive, 2009). Maybe the most important fact is that developer anonymity in the

Wikipedia system does not exist—contributors are clearly identified. This attribute, among many others, will be leveraged in the design of a Work/Flow.

Yet, all are not advocates for the comprehensiveness of the participatory strategy of Wikipedia. Chris Anderson, editor-in-chief of *Wired Magazine*, wrote the "wisdom of the crowds approach of Wikipedia will not displace top scientific journals with their rigorous peer-review process" (Wikipedia, 2011). Thus, there are places where credentialed consensus will never be replaced, but for the purposes of this research, this is irrelevant. Yet, within the opposition articles of Wikipedia, no author could be found who was arguing against the success of Wikipedia as a consensus-based site. Wikipedia brings many together to create MEmorials and join netizens in serious play.

In conclusion, as Electracy provides the full potential of literacy of electronic discourses, participatory strategies provide the full potential of the spaces of serious play, in which media may be developed. Utilizing the principles of participatory strategies, a group of like-minded individuals can successfully be engaged to seriously play, flow, and develop MEmorials together. Research from many sources show how consensus and collaborative efforts can be implemented effectively in large corporate units as well as in online and volunteer roles. For the purposes of this research, participatory strategies will be developed to allow groups of people to come together and collaboratively design packaging, involving the many stakeholders required within an online system. Leveraging Wikipedia as a model apparatus, change can occur, designing can become better, and significantly more than 5% of packaging can sustain the rigors of the retail industry if an effective participatory strategy is properly developed and implemented.

Sam Meier, author of "Is Wikipedia a Credible Source for Undergraduate Economics Students," concluded that Wikipedia was not only in fact credible within the scope of economics, but "has the potential to share information and stimulate creativity better than any resources the world has known" (Mier, 2008). If a similar mechanism could be developed for the packaging industry, possibly the same could be achieved in terms of success of design.

<div align="center">Conclusion</div>

It is apparent that an environment which allows one to be immersed within a project and seriously play in a development project, has a higher likelihood of producing more creative designs than when not in a such a space. When flow is embraced, a designer's creative potentiality is accessible, and this will benefit the Work/Flow. Because packaging design projects involve large groups of people, theory illustrates that even groups can leverage flow to be more productive on projects.

Overall, research, theory, and common sense reveal that if a space is created that organizes people, clearly identifies roles, is accessible, and organizes all communication in a coherent and friendly GUI (graphic user interface) {serious play}, then the prerequisites of flow can be achieved. The next chapter details the design of a theoretical space (Work/Flow) as well as an immediate solution that meets the majority of the industry's needs to conduct packaging design projects.

CHAPTER THREE

THE WORK/FLOW

<u>Introduction</u>

The Work/Flow is the core of the dissertation; not only is it the medium in which

the experimenter will develop packaging designs, but it is also the subject of the

experiment, which aims to determine the effectiveness of the Work/Flow as a means of

developing packaging. This chapter describes the Work/Flow, which is a virtual space

(serious game) that leverages a procedural rhetoric and participatory strategy to operate.

The Work/Flow presented in the dissertation is a starting point in which the participants

of the structure will begin to re-shape and customize its functionality. Lastly, the chapter

will discuss the necessity of a controlled, physical grocery store used to conduct eye

tracking and consumer research.
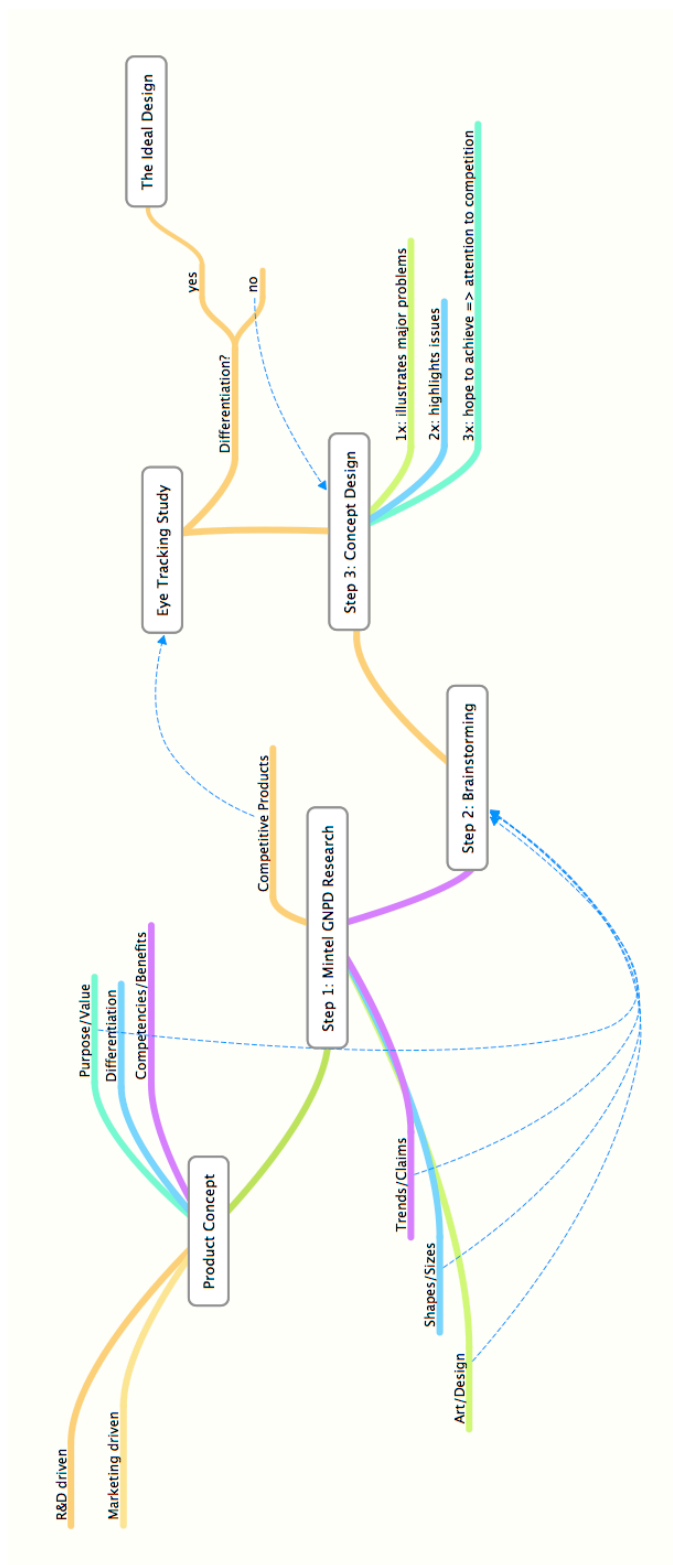
Figure 3.1: Visual Mindmap of the *Work/Flow*

The Work/Flow

The *Work/Flow* is a theoretical concept used to enable a designer to participate effectively throughout a packaging design project. The major benefits of the *Work/Flow* are as follows:

1. Organizes communication throughout the entire supply chain

2. Provides a space to develop the product and package concurrently

3. Leverages eye-tracking methodology to solidify design decisions

4. Enables anyone to participate within the design project

5. Democratizes the technology required to design packaging

6. Unveils traditional decision-making in a transparent development space

The backbone of the *Work/Flow,* for the purposes of this dissertation, is the BaseCamp® project management software. Basecamp® is a customizable online space that provides the following benefits:

- *manages communication*: email composed directly on Basecamp® or on a local email client are tracked and posted to the all project participant's dashboards. The software collects and tags project-related discourse and communication lines to files, milestones and deliverables.

- *organizes timelines and milestone deliverables*: participants can post transparent milestones, comprised of defined deliverables, which sync with each user's dashboard. As files are generated and deliverables are completed, the group must arrive at a consensus to mark a deliverable as complete.

- *supports multiple languages*: Basecamp® supports multiple languages and works with the majority of automatic page translators to encourage global project participation.

- *cross-platform and mobile ready*: Basecamp® is a web-based software and is not limited to any specific operating system. A great advantage to a browser-based system is that anyone who has access to the Internet can utilize the technology, including mobile devices. Furthermore, the system is compatible on all modern web browsers.

- *provides automatic image previews*: a key feature to the *flow of* Basecamp® is the ability of users to preview many different file types on the browser. This important attribute allows users to stay immersed in the project dashboard without leaving the area to open or access another program. Not only does this keep participants engaged in the project, it saves time and does not require users to have proprietary software installed on their computing devices to view and critique raw files.

- *file versioning*: possibly the most important aspect of Basecamp® is mandatory file versioning. Gone are the days of developers mislabeling or mismanaging files. The *Work/Flow* is designed with a customized Basecamp® dashboard which has pre-labeled subcategories for files to be stored and arranged by the most current version. For instance, each structural design for every stage of the package development process is organized. As changes and/or modifications are made to files, original files remain unaltered and modified files are automatically labeled and saved as a newer version, with the modifier's handle attached.

The *Work/Flow* functions in that no matter the corporate method of product development (market-driven or research-driven), the attributes of the product concept and design brief can be linked directly to the Basecamp® dashboard where marketing, development, and design can come to a consensus on the definition of the product and development of the packaging. This instance of the *Work/Flow* is necessary as it provides the designer with critical marketing information and defined constraints illustrating how the participants want to feature the product. From a system of designing within constraints, development becomes transparent. When a participant uploads a file and alters a design, the original file is always available for viewing. This removes anonymity from development, and is a part of the intended *participatory strategy.* Unethical actions and framing are not prevented, but are visible as all development is tagged to a specific author.

The *Work/Flow* is a form of procedural rhetoric, and should be utilized in a linear and logical way. The three unique phases of the *Work/Flow's* procedure are detailed below:

Phase 1

The first phase of the *Work/Flow* is to conduct a global product database query. Where traditional packaging design projects leverage retail audits—findings are commonly localized and not representative of a target audience (Taylor, 2009). However, the *Work/Flow* calls for a comprehensive understanding of similar products. There are various resources online that provide trend and global reporting of product packaging, yet Mintel Global New Product Database (Mintel) has been proven to be a valuable resource to packaging professionals (Doherty, Tranchell, 2005). From Mintel, the design team can determine the following valuable information prior to brainstorming product/packaging designs:

1. *Trends and Claims.* Most product databases forecast trending based on the number of new product launches. Within this data are claims reporting that provides a wealth of information on product/packaging information.

2. *Structural Specification.* Mintel can quickly provide participants hundreds of similar products, along with the respective packaging type, material, and

volumetric conditions. This allows a development team to create design

constraints in just a matter of moments.

3. *Design Inspiration.* Because Mintel provides high-resolution imagery, a design

    team can quickly borrow cues from similar packaging available worldwide.

    Because these images can be tagged to Basecamp® discussions, this aids in

    stimulating *flow* and creative development.

4. *Competitive Advantage*. Having all the details, and in some cases manufacturing

    information, of the competition in quick reach allows for better decision-making.

    This encourages developers to invest more time on the Basecamp® dashboard, as

    other team members are locating valuable information that is being tagged in real-

    time to the dashboard.

It only requires 15 seconds to perform a customized search on Mintel to observe

the global offerings of packaged apple juice (Figure 3.2). In a matter of seconds, Mintel

provided detailed and descriptive access to over 24,000 apple juice packages launched

from 1996 to 2011. Due to large quantities of information, Mintel has a useful in-

application filtering and graph function. The participants within the *Work/Flow* can

generate data and trend reporting by selecting one of hundreds of package attributes and

plot this over just as many other options. Figure 3.3 shows a simple delineation of the

number of apple juice products launched each year. Mintel can be an extremely beneficial

tool for not only marketing, but also packaging design and development. Figure 3.4

illustrates the same packaging as in Figure 3.3, but organized via closure type.
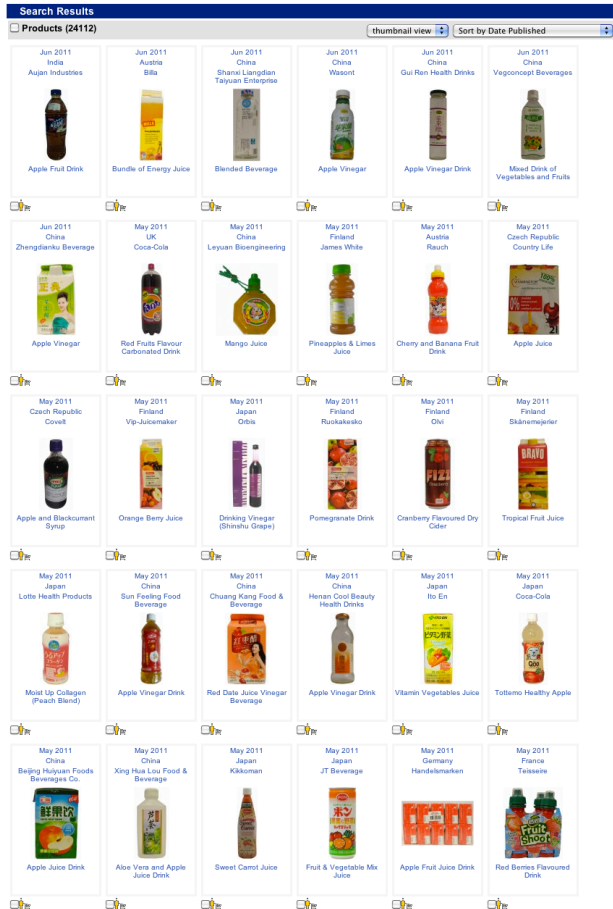
Figure 3.2: Advanced Search Query, "Apple Juice" under the "Drink" Category (Mintel,

2011)
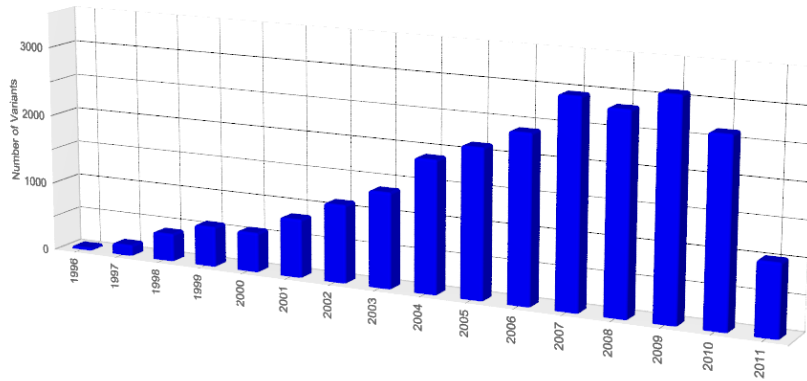
Figure 3.3: Number of Apple Juice Products launched from 1996-2011 (Mintel, 2011)
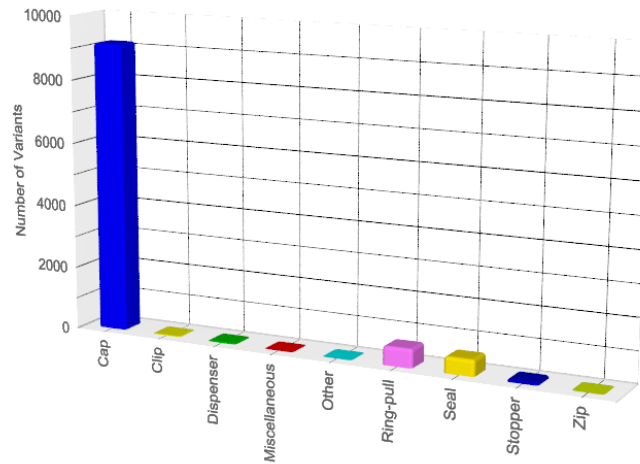
Figure 3.4: Apple Juice Launched 1996-2011 and Organized by Closure Type (Mintel, 2011)

Phase 2

The second phase of the *Work/Flow* is brainstorming, which is constrained by the framework of *participatory strategy* (the Mintel reporting and Basecamp®). This *flow*-inspired phase of the process is not as radically free as most brainstorming sessions are (Sutton, Hargadon 1996), but productively restrained by the marketing bloodline (values and core competencies) as well as the results from Mintel. The goal of brainstorming within the *Work/Flow* is not to develop an artifact that represents itself, but to fairly and accurately represent the product being packaged. This is a paradigm shift from traditional market-driven brainstorming. Because the design team has a clear and comprehensive understanding of the market place, trend reporting, the target audience briefing, and product data, a solid design can be drafted from within these constraints. The benefit the *Work/Flow* has on the brainstorming of the initial package concept is through transparency. Because the *Work/Flow* is a *participatory strategy*, the development is transparent. When packaging sizes and shapes are presented that may result in a challenge to shipping and receiving, the individuals who manage this area have the ability to influence the design. Likewise, when procurement participates in the *Work/Flow*, the likelihood of designs being developed out of budget will be reduced.

Phase 3

The third phase of the *Work/Flow* is the concept design, which originates from the final brainstorming concept. Instead of using traditional focus groups or market studies to qualify the design, the *Work/Flow* calls for a series of eye-tracking experiments that aim

to provide designers key insights from the target audience. The *Work/Flow* utilizes CUshop(TM), a consumer experience laboratory, to stage a realistic retail environment for the packaging concept to be tested amongst its competition. After the first concept is prototyped, an eye-tracking study is conducted, where the amount of consumer time invested on the design in question is compared to other similar products. The goal of the third phase is to provide the team with design direction. The hypothesis of the *Work/Flow* is that designs developed within this procedure will increase consumer perception of the product, as eye-tracking experiments are preformed, observed, and the design is altered based on the feedback of qualitative results. As more iterations are completed based on the results of eye-tracking experiments, consumers will perceive the package more than the competition.

BaseCamp® Customization

BaseCamp® provides a running start for corporations, freelancers and academic institutions to begin embracing the *Work/Flow* and encouraging *flow* within their participants. The web-based software is easy to use and is customizable to any project. Figure 3.5 shows the participant component to the Work/Flow.
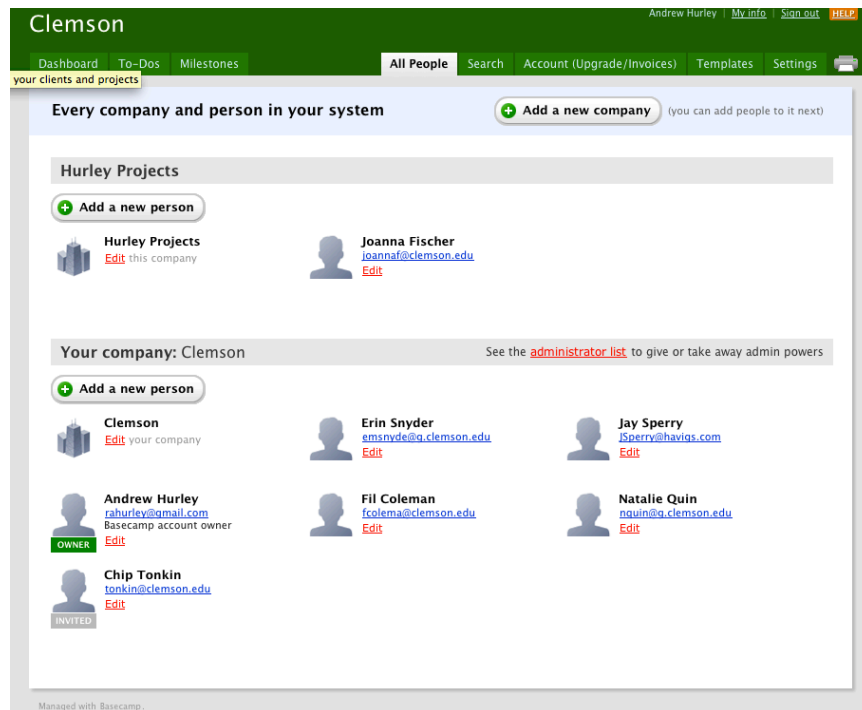
Figure 3.5: View of Project Participants (BaseCamp®, 2011)

Files are organized coherently and versioned to keep track of all progress towards project deliverables. Everything can be easily searched, tracked, and filtered. Figure 3.6 illustrates one of the experiment's projects that include over 20 deliverable sub-categories containing more than 25 files each. Note how the author's name as well as the date and time of upload is available. At the bottom of each file description, there is an option to upload a new version.
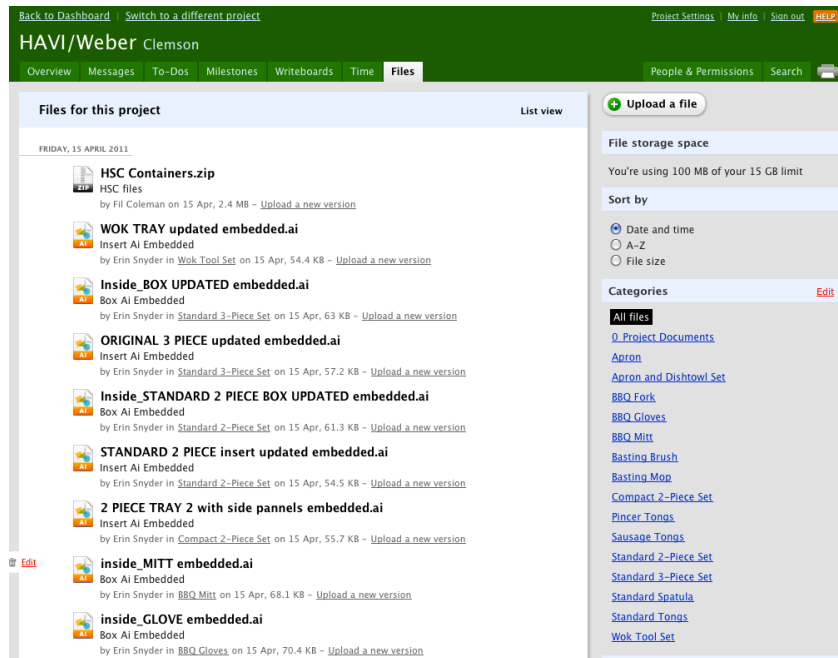
Figure 3.6: View of Project Files (BaseCamp®, 2011)

BaseCamp® provides the necessary foundation for the Work/Flow to operate successfully. Though the use of BaseCamp® will be unnecessary after enough participants customize and develop a more suitable piece of customizable software, BaseCamp® is currently the best choice for managing the development of packaging as described by the *Work/Flow*.

The Ideal Work/Flow

The Work/Flow, in concept, is more than just a project management technology, it is literally a *participatory strategy* that is intended to be developed and improved upon by its users. As said best by Eric Raymond, author of *The Cathedral and the Bazaar,* "given enough eyeballs, all bugs are shallow" (Raymond, 1999). Raymond's essay

clearly illustrates the effectiveness of open-source, democratized and participatory

development of software over corporate and proprietary means (Raymond, 1999). At the

moment, the incentive for a design team to use the *Work/Flow* is tied to improving

communication, creativity, and *flow*. However, the intention of the *Work/Flow* is to

enable anyone to participate within the design process. As more designers, freelancers,

and engineers utilize the *Work/Flow*, they have the full ability to edit and develop custom

application programming interfaces (APIs). It is expected that Basecamp® will be

replaced by a similar design and provided free of charge. Soon, the software will be

developed to run on a localized server, and as public programs are developed, they will

be integrated into the design process. The *Work/Flow* is flexible and only acts as a

roadmap toward improving the functionality and creativity within a team of participants

working toward developing packaging. At the same time, the *Work/Flow* provides a

much needed transparency in design, linking decision making (whether ethical or

unethical) to their owners and an open forum for decision-making and brainstorming.

Regardless of the results of the experimental design, it is hypothesized that the

Work/Flow will greatly increase communication between design team members and

stakeholders.

Grounding the *Work/Flow* Rhetorically

The root of the Work/Flow is a series of procedural arguments that influence

creativity, communication and decision-making of a group. However, it is a system of

environmental and algorithmic limitations, which is known as procedural rhetoric. As

described by Ian Bogost in his text, *Persuasive Games*, the notion of procedural rhetoric is depicted as the ability of games to craft arguments and influence human behavior (Bogost, 2007). Videogames are tied to the processing limitations of computers, and the *Work/Flow* described is no different. The *Work/Flow* is a system tied to a specific set of limitations and is a *serious game* in which a designer *plays* to creatively express him or herself. This, among many other attributes of the *Work/Flow*, contributes to its ability to encourage *flow* among its users.

In a brief discussion, the *Work/Flow* will be situated in a rhetorical context, leveraging aspects of serious play, serious design, *flow* and procedural rhetoric. Secondly, the many value-added benefits of the Work/Flow to the industry, academic, and design communities will be articulated.

Discussion

Within his text, *A Grammar of Motives*, Kenneth Burke notes that life is a *play*, where humans are actors (agents) and *participate* within a drama (Burke, 2000). Agents work within 'acts,' in 'scenes,' leveraging various agencies. In essence, Burke defines the efforts of humanity as a theatrical play, in what he describes as *dramatism*. The purpose of introducing this concept is not only to show that life can be considered *play*, but that the different agencies utilized by people on a daily basis are symbolic and regulated by the social context created by the 'scene' or environment. Within the *scene* of life, we (agents) interact with one another, and emotions are developed and expressed through an interaction of symbols. Because actors are in a state of constant *play*, *flow*ing in a false

(unnatural) immersive environment, reality is lost. The *act* of *dramatism*, as articulated by Burke, should be seen as an immersive game in which people act in defined roles, within a predefined set of symbolic limitations. Life, according to Burke, is no different than a (*serious*) game.

Burke's *dramatism* is similar to Baudrillard's notion of *hyper-reality.* Both *dramatism* and *hyper-reality* describe the methods in which symbols affect human behavior. Whereas Burke defines human understanding as only a system of prior artifacts that shape the understanding of the present, Baudrillard declares that humans perceive value through the negation of objects (Baudrillard, 1994). In essence, humans define objects through a larger network of objects that they are not. For instance, a chair is a chair because it is not a door, not a house, not a cat, and not a toilet. Thus, in the quest to determine and understand the world around us, we are led into a more complex world of additional objects that must be defined in terms of what they are not. Burke stated that we enter into a guilt-redemption cycle to counter this issue (Kawaguchi-Ailetcher, 2006), whereas Baudrillard suggests we become unable to differentiate reality from fantasy. Both Burke and Baudrillard define the systems (procedures) in which people operate. The laws of truth (knowledge and understanding) have limits and algorithms in which they are acquired. Burke describes one mechanism of procedural limitation via the notion of the *terministic screen*, which is a mesh of symbols that guide our understanding of the world (Burke, 1966, p. 45). The *terministic screen* is similar to a computer processor that guides our actions and re/actions. The *terministic screen* has limits, and should be considered a form of procedural rhetoric within the drama of life (Burke, 2000).

The work of Baudrillard and Burke delves into the roles of material objects, and are considered by both to be mere symbols, only having definition by their perceived social context (the reality or game in which agents are *play*ing within). Burke and Baudrillard describe how objects (symbols) influence social behavior: Burke notes how man is a "symbol using animal," where Baudrillard focuses on the 'consumption' rather production of symbols (Burke, 1966, p.3). However, both of these theorists describe the scene of life to be a series of symbols within a state of *serious play*, much like a videogame.

It is important to note that Marxism had a heavy influence on both Burke and Baudrillard. Marxists view society not as a structure of individuals, but as series of social networks and interrelationships. This network forms the core-values of a group of people, which are the signs and signifiers that direct the actions of the group. Taking Marxism outside of a political sphere and placing it into an organizational methodology works well, for when a group of like-minded individuals work toward the successful completion of a project, the symbolic interactions will complement one another. And forcing a Marxist theme within an organizational Work/Flow should theoretically ease the way in which people work together.

Roland Barthes, a member of Baudrillard's Ph.D. committee, had a heavy influence on Baudrillard's *System of Objects* (Baudrillard, 2006). Barthes, who also had an interest in Marxism, noted that once an object is created, the creator relinquishes control of the object upon public disclosure. In essence, Barthes notes an inevitability of social Marxism, where authors and inventors cannot be owners – their products enter a

web of social understanding and become the property of the public. This rationale justifies the inclusion of *participatory strategies* within the dissertation, for the public will define and appropriate the reality of any object produced within the *Work/Flow*.

Barthes encapsulates the essence of the *Work/Flow* by bridging theory to actuality. With his notion of the *punctum*, where internalized and reflective knowledge acquired from objects actually *pierces* the observer, Barthes illustrates the potentiality of object-oriented and procedural rhetoric (Barthes, Dyer, 2010). Baudrillard, Burke, and McLuhan all discuss the effects that objects have on human behavior, yet Barthes demonstrates the true impact of objects, for they are able to enter the subconscious and create new realities. Within this new immersion, reality and simulation are confused. Thus, *dramatism*, *hyper-reality*, and *punctum* are all states of serious play. They all parallel a *second life* where subjects enter, experience, and learn.

The proposed Work/Flow leverages Mihaly Csikszentmihalyi's notion of *flow* as a synonym for *dramatism, hyper-reality and punctum*. *Flow* is a highly researched topic, primarily extending into *participatory* and consensus *strategies* as well as serious games. Csikszentmihalyi's notion of *flow* was influenced by Maria Montessori (Rathunde, Csikszentnmihalyi, 2005, pp. 341-371), and has been appropriated by many international faculty. Simply put, *flow* is a mental space achieved by immersing oneself within a state of serious play. Within *flow*, one's creative and learning potentiality can be actualized.

One could argue that Csikszentmihalyi's notion of *flow* is a polar opposite of *hyper-reality, dramatism, and punctum*. Being that *flow* is a state of actualized learning, where truth and knowledge are acquired at a hastened rate, *hyper-reality* could be

considered the rapid loss of reality. However, both *flow* and *hyper-reality* are forms of serious play that lead an individual (or a group of people) outside the material world and into a new state of understanding. I am not arguing that one is more productive than another, but that both allow one to leave the material world and enter into a new space. In both cases, *flow* and *hyper-reality* attempt to achieve an understanding through a state of serious play. This is the theoretical intention of the *Work/Flow*.

The many philosophers who have uncovered the effective learning outcomes of serious design and play justify the development of a packaging design *Work/Flow*. Serious play has a dramatic impact on reality and the comprehension of the material world. For instance, within a state of *flow*, a writer can be consumed within the act of writing. Inside this state, time is lost as well as reality and the material world. The same goes for an artist immersed within their studio work. And this same experience is observed when seriously gaming. A well-designed game can immerse its participants in a similar fashion (loss of time, sense and reality). From a Burkean perspective, the 'man using symbols' turns to a state where symbols use man. Serious play, from a symbolic perspective, has an impact on the environment and perceived reality of its participants. Someone engaged in an act of serious play has left the material world and entered into a new reality.

Plato discussed the notion of two worlds: the apparent world (which is in a state of constant flux) and the world of forms (ideals and truths) (Ross, 1976). Though I am not arguing that Plato suggested we could leverage immersive forms of play to travel

between worlds, I am only stating that Plato argued that the world we live within is only a reflection (or simulation) of truth.

Within the design world, creativity is commonly defined as the ability to create something new. But, from the prospective of Plato, 'new' is not possible. Therefore, removing oneself from the material world and extracting knowledge from the world of forms may enable creativity. When a designer embraces serious play, he or she is attempting to solve a problem through a Work/Flow. At this point, they may enter a state of *flow* or *hyper-reality*. Again, discussing the differences between these states is not the issue—the issue is the ability to remove oneself from the material world in attempt to acquire a new knowledge.

The idea of 'leaving the world' to learn and become one with nature is the basis of romanticism. This is not a theoretical ideal, but an actual state that produces creative results. Designers Paula Scher (SP) and Art Fry (3M) are leaders within their fields who define design as *play.* To both Fry and Scher, *play* is a state away from the material world: no different than any of the rhetoricians discussed. Scher discusses at length within her TED Talk (Scher, 2008) on Serious Design and Play, that when designs are appropriated, the author exits the state of play. This is similar to Barthes' notion that the *author is dead*, and that design is at the mercy of the public.

In conclusion, Plato's allegory of the Cave represents the ideal designer (Plato, 1992). The individual who escapes the constraints of the cave may exit the material world and enter into the next. Whether this is another immersive reality or the world of forms is irrelevant, because the designer is now able view a new reality and/or reflect on the prior

reality. The designer may now return to the cave with creative ideas. In other words, a self-actualized designer is a sophist.

Therefore, suggesting that a Work/Flow with predefined limits be utilized to assist designers working within the field of packaging is not too distant from the concepts presented by significant rhetorical theorists. The proposed *Work/Flow* should be considered a valid rhetorical device that can be used to bring audiences together to resolve design issues. The notion of serious design and play should be considered a pivotal mechanism that allows the development of a *Work/Flow* to engage a creative audience in attempt to exit the material world and enter into a new state of immersive reality, where knowledge can be acquired.

The Value of the *Work/Flow*

To further the legitimacy of the project, the value of the *Work/Flow* will be described in the context of its users: the packaging industry, academia, and the design community. Each of these represents a unique part of the *participatory strategies* involved in conducting the Work/Flow successfully. The three major groups are defined, along with their associated value to the proposed Work/Flow, and discussed below.

Value to the Packaging Industry

The packaging industry is not only the single largest employer in the world, but also the most valuable, at an estimated $600 billion (ERA, 2010). The industry is primarily composed of the following areas: food, healthcare, cosmetics, material converters and

material suppliers. The benefits of the proposed *Work/Flow* to the industry are substantial in that if the procedure is followed, then better products and packaging will be provided to the public. The current issue is that only large organizations can afford to hire academically trained packaging engineers. This leaves small businesses and entrepreneurs at the mercy of material suppliers to design and develop functional packaging systems. The tragedy of the current process is that the material suppliers retain the rights to the developed property, forcing the client to a particular material developed by the supplier (which may not be the best choice) and their pricing scheme. The issues here are vast, as material suppliers are designing, rather than supplying, which increases material cost. Secondly, inventors and entrepreneurs are forced to work with one supplier, which will limit creativity and detach any property rights from the client. This prevents producers from shopping for better rates and technology. Yet, within the Work/flow, inventors, brand owners and entrepreneurs are able to design, develop and qualify intellectual property internally, which will materialize as a major cost-savings throughout the entire industry. This, in turn, will drive material prices down, as material suppliers will no longer be required to focus on design, thereby bettering the supplying of materials. Firms will be more productive and efficient by designing in a streamlined fashion, focusing specifically on the medium when delivering a message. With better-designed products and reduced prices, the industry will see a shift in the quality and satisfaction of their consumers and producers. Thus, the industry will be perceived as more sustainable and efficient.

To counter, the industry will resist the Work/Flow because it represents change. The industry has a substantial investment in the current procedures and organizational structures that must be modified in order to integrate the Work/Flow. For instance, major brand owners and 'big box' organizations will stop the *flow* by mandating that procedures and developments be charted through content management programs and specification databases, not within the *Work/Flow*. Yet, with smaller businesses that embrace the Work/Flow launching to shelf faster, larger corporations will be forced to compete and change their practices.

From an organizational perspective, the *Work/Flow* provides a model for increased proficiency. A streamlined, state-of-the-art procedure will be outlined and feature optimized tools for completing tasks. The *Work/Flow* will also mandate cross-functional cooperation, which will not only hasten product development, but also ensure supportive relationships and a common knowledge base among stakeholders. Lastly, the proposed *Work/Flow* requires designers to critically think about product offerings, ethical considerations, and improving the authenticity of what is being proposed.

Value to Academia

The benefits of the Work/Flow are large, as it is a procedure that can be taught. Students will gain a practical understanding of the industry by working on projects that involve many critical aspects of packaging design, as well as working under the guidance and demands of an actual client. The Work/Flow also embraces critical thinking, where designers are required to understand and visually articulate the representation of a

product through a package. If a product is to be differentiated among its competitors, the students must first understand the competitive array, decipher current trends, as well as be intimate with the product itself. Because the Work/Flow is theory driven, then supplemental readings can reinforce the learning process. Lastly, the Work/Flow leverages a historical context of the packaging system. Students will be required to improve upon current design and learn from prior attempts. If the teacher chooses, a student group can reverse engineer a packaging system through the Work/Flow to better understand why it flourished or failed.

The underlying criticism academia will present against the Work/Flow will be how it infringes on their current monopoly on developing packaging professionals. The major academic institutions have crafted their own certification programs and IOPP (International Organization of Packaging Professionals)-sponsored platforms, which have directly influenced human resource requirements of positions. For instance, jobs are listed as demanding a "package engineer" or requiring a "packaging science degree." This is limiting to the many others who could participate within the Work/Flow and design just as well.

The rebuttal to academia's argument is that the Work/Flow does not develop professionals, it only aids in streamlining decision-making, providing a space for collaboration and simplifying tasks with technology. Packaging engineers will quicken the process and reduce costs when compared to a designer without prior experience in the field. With academia primarily targeting the Dow 30 to place students, the Work/Flow

caters to the remaining 90% of the industry. The purpose of the Work/Flow is not to disrupt academia, but only to improve it.

<div style="text-align:center">Value to the Design Community</div>

Because a society is made up of social networks and interrelationships, it is important to consider the many others that participate in the development of objects. The ultimate goal of the Work/Flow is to enable other creative people to engage in the packaging industry. The rationale is simply to improve the overall effectiveness, quality, and ethical consideration of packaging. If more creative people participated within the development process, then the overall quality would improve. As *participatory strategies* will illustrate, the wisdom of the crowds is much more effective than the wisdom of a few experts. Including the masses in the development process is important and a required aspect of the Work/Flow.

It also cannot hurt to open up the largest industry to the broad availability of designers. This will not only improve the global economy, but differentiate packaging substantially. The Work/Flow will enable the design community to participate within the packaging development process in a three-step methodology. First, designers will leverage the Work/Flow to gain the knowledge required to design within the logistical, managerial, material, geometrical, structural, visual and legal constraints of the project. Next, a designer will be equipped with the ability to customize a Work/Flow template for their specific product and process. Lastly, a designer will be informed on how to make, test and confirm designs produced appropriate to the competitive array.

From a communal aspect, products and packaging developed from the Work/Flow will provide more rewarding experiences for consumers. Packaging geometry and materials will better reflect the intended functions of the product, and thus will be more rewarding and easy to use. When the end of life of a package is properly considered, the user will be able to dispose of it safely and properly. Similarly, packaging will illustrate a more efficient disclosure of contents and legal requirements.

<div align="center">Conclusion</div>

It should be clear that the proposed Work/Flow is an extension of the procedural rhetoric described by Ian Bogost. It requires participants to take on roles similar to the playful environment described by Burke, and to experience instances of play as discussed by Baudrillard and Csikszentmihalyi. Furthermore, the Work/Flow embraces a positive notion of Marxist organization, where the social networks and interrelationships of stakeholders are identified and leveraged to complete a project as a group. The end product developed by the Work/Flow should *pierce* the observer as Barthes describes as an inherent attribute of objects and visuals. From a designer-perspective, the notion of seriously playing to achieve a new state of consciousness is not only ideal, but also mandatory when striving to be creative, unique and different.

By participating within the proposed Work/Flow, a designer can achieve productive creativity within the packaging industry without requiring an advanced and/or uncommon degree. The rules, regulations, and requirements will be provided for the

designer to *seriously play* and construct a new reality for a product. The BaseCamp®

project management software provides the necessary functions to link the three major

phases of the Work/Flow together.

The system also presents tangible benefits to industry, academia and community.

From an industrial perspective, better products and packaging can be produced, which

increases the satisfaction of users and producers. The Work/Flow impacts organizations

on the level of efficiency, optimization, authenticity and cross-functional cooperation.

Academically, the Work/Flow presents an encapsulation of packaging theory that can be

taught, practiced and applied. It relies on critical thinking and is grounded in rhetorical

theory. From the perspective of the design community, the Work/Flow provides users and

consumers more rewarding experiences when interacting with packaging.

The Work/Flow is a procedural system, and when tied to a controlled retail

environment, i.e. CUshop™, the qualitative data collected will enable participants to

'know,' 'do,' and 'make' packaging.

CHAPTER FOUR

DEVELOPMENT OF CUshop™

Background

The ideal fit for a controlled retail environment to test the validity of packaging designs is at Clemson University's Harris A. Smith Building, at the Sonoco Institute of Packaging Design and Graphics. Since October 2008, the Sonoco Institute has been fostering advanced research and academic programs in the field of packaging design. The Harris A. Smith facility is a 28,000 square-foot, LEED (Leadership in Energy and Environmental Design) Gold certified building and is unlike any other amenity for students pursuing a specialized degree in packaging science. The space is not just limited to packaging and graphics majors, but bridges programs such as engineering, material science, architecture, computer science and the fine arts. While providing opportunity for multidisciplinary education, this relationship among the departments benefits all involved, optimizing creative thinking and design.

Not only does this seven million dollar space provide students with a focused area for research and design, it houses state-of–the–art prototyping and production machinery. Also contained in this area is a design studio with the majority of contemporary packaging design software. Designs generated can be specified and built with the machinery within the facility, and tested in the consumer experience lab. In essence, the Sonoco Institute acts as a perfect complement to the *Work/Flow*.

With the many components of the *Work/Flow* already in operation, the facility was prepped to house its most unique attribute to-date, the *Consumer Experience Lab*, and branded as CUshop™. CUshop™ completes the theoretical *Work/Flow* model, where packaging designs are observed and analyzed in real-time by their respective target audience. Most importantly, no other public facility in the world can boast a similar space.

CUshop™ is located adjacent to the lobby on Fernow Street in Clemson, SC. The space has both an interior and exterior presence. This chapter will detail the specific build of the space, from a bare room to a fully dynamic, controlled retail environment. This project is the result of a Clemson University Creative Inquiry initiative in the spring of 2011. A group of eight, senior architecture students assisted in the design and development of CUshop™.

Design Methodology

The first stage of the project initiated with a brainstorming session, combining many elements of product design, packaging, graphics and architecture. The course, PKGSC 399, met once a week with the instructor; and students met outside of class to work in small groups. Coursework was recorded in a Wordpress® Blog, found at http://pkgsc399.wordpress.com/.

While gathering ideas and imagery, the students simultaneously researched neighboring grocery stores to gain an appreciation of retail environment design and the ultimate goal of the task. Although beginning with a blank canvas, the goal of the project

was to create a realistic space that would complement the *Work/Flow* and provide an immersive, yet realistic shopping experience. Visiting grocery stores such as Whole Foods®, Trader Joe's®, and Bloom® provided necessary information about the expectations of a retail grocery space. Finding the similarities and differences in each store proved to establish certain design cues that were implemented into the project as early as brainstorming. After an intensive review of established retail venues, the following preliminary sketches of the environment were created in respect to the Harris A. Smith Building:
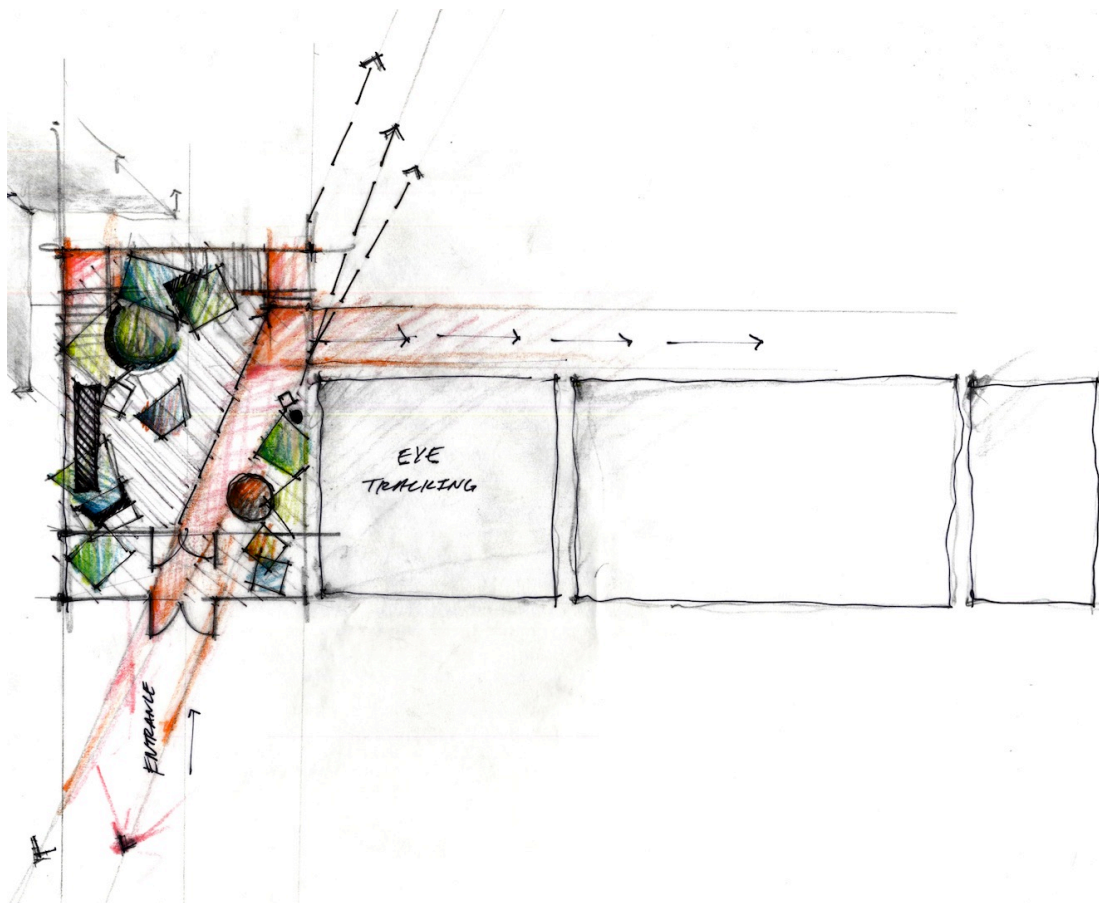
Figure 4.1: Preliminary entrance sketch plan of CUshop™. *Sketch by D. Hutcherson*
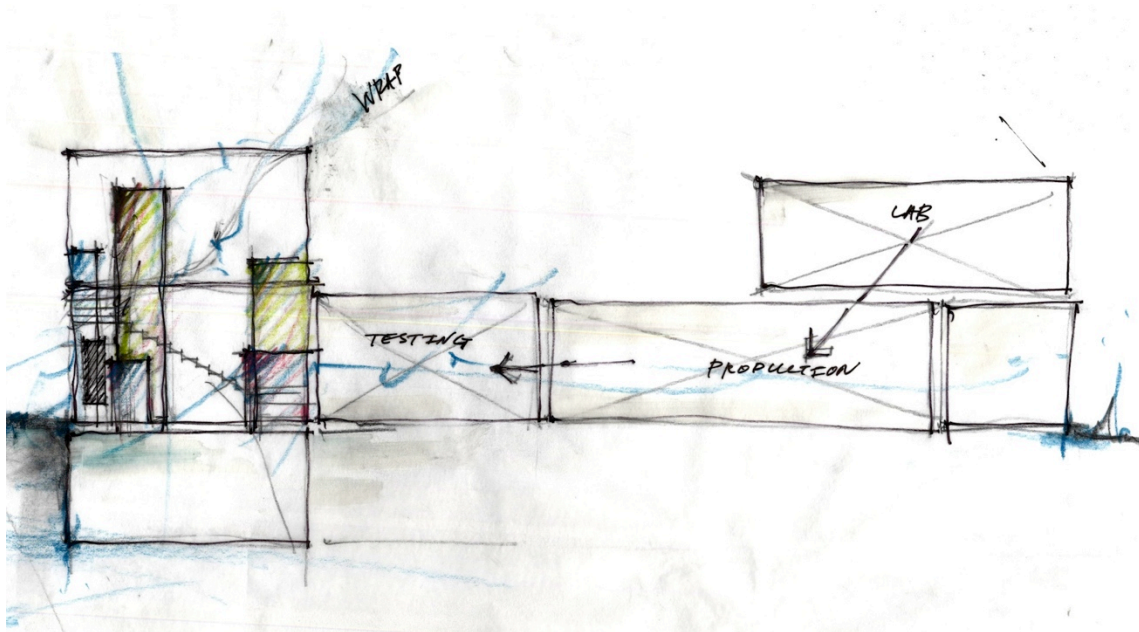
Figure 4.2. Preliminary entrance sketch elevation of CUshop™. *Sketch by D. Hutcherson*

Figure 4.3. Preliminary entrance sketch perspective of CUshop™. *Sketch by D.*

Hutcherson

Furthermore, the students began to draft out different experience points of the shop. It was requested that the students leverage design attributes recorded in their retail audits into the design of CUshop™. This included not only structural and informative areas, but also aesthetic and environmental qualities. Lindsay Shelton designed three posters, which showcase consumer mapping, unique shelving and the sustainability perception of CUshop™ (Figure 4.4).
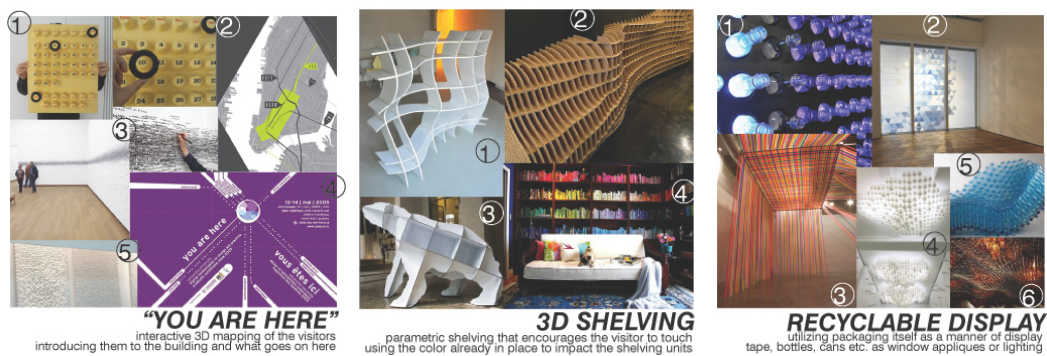
Figure 4.4: Experience Design Options for CUshop™. *Designed by L. Shelton*

Once the preliminary brainstorming and sketching was completed, a group of students focused on the branding and visual identity of the store. Here, out of fifteen branding schemes, CUshop™, which combined the spirit of Clemson University and eye tracking with a shopping atmosphere, was voted into place. With a color palette, logo and an identity at hand, the design process for the store could be constructed properly.

<u>Preliminary Research</u>

The Creative Inquiry team was tasked to visit and take inspiration from various retail stores in the surrounding areas. Looking towards more retail market typologies, the three chosen to audit were Bloom® (Clemson, SC), Trader Joe's® (Greenville, SC) and Whole Foods® (Greeville, SC). Students reported similar attributes within all of the stores visited, which greatly aided in the preliminary design concepts for the space in the Sonoco Institute. These similarities were not ignored during the design phase and played an important role in the program of the space. Below are the main findings that were essential to incorporate into the design phase:

- **Automatic sliding doors** set the tone for the entrance to the store. In all stores visited, there existed a set of sliding doors that opened into a large vestibule area. A second set of automatic sliding doors initiating the shopping experience.

- **End caps** were found in all stores visited and notably faced the entrance area. All of the students reported that the first areas viewed were commonly end caps. In only one instance did the aisle end caps run parallel to the front of the store. Here, specials and new items are displayed.

- **Specialty areas** were prevalent in each store audited. These areas were typically located in the store corners and delineated by unique materiality, special lighting,

and/or another type of treatment. Usually contained in this area were produce, breads, wine, or specialty items such as cosmetic or hygienic products.

- **Logos** were found in all locations audited. Certain color schemes or logos were repeated throughout each store, creating a *flow* and continuity throughout the space. From large signage on the outside of the building, to very small logos on price tags, these features fostered a cohesive atmosphere for consumers.

- **Aisle and shelf width** differed in ratio among all the stores visited. It was found that depending on the area, 18-inch or 24-inch shelves were utilized, with 5 to 6-feet of aisle space between. The students reported that in combination with color and lighting, each store kept an aisle width that was comfortable enough for a shopper to have ample room to browse. It is important that each shopper should be able to compare products while in the aisles as well. Shelf widths were found to be 18-inchs in less turnover areas.

- **Ceiling and floor treatment** differed among the stores audited. The students all reported that a consumer must be deliberately cognitive of these areas, as they fade into the peripheral. The floors in all stores audited were simple in construction, either linoleum tile or brushed concrete. Both are smooth and had a minimal finish. The most notable aspect of the ceilings was the height. Because of the high ceilings, signage and other objects could be hung with minimal

interruption, where electrical, plumbing, HVAC, lighting, and ceiling prep could be observed.

Although each retail environment audited contained similarities of a typical store, each also had a striking way of becoming its own through graphics, logos, color, and materiality (Figure 4.5).

Figure 4.5. Observed Design Attributes of Retail Locations. *Photographs by R Randall*.

Branding

Due to the necessity of a brand name, common theme and color palette, a store named needed to be determined. The team spent a week brainstorming a creative, fun and informative title of the space. Specifically, the design team wanted to integrate the following themes:

1. Clemson University
2. Eye-Tracking

3. Grocery Store

4. Environmentally Conscious (due to the location in a LEED certified building)

The themes combined led to the development of CUshop™ (Figure 4.6). CU having a double meaning: CU for Clemson University and literally CU ('see you') inspired by the eye tracking technology. Figure 4.7 outlines the primary branding development and brainstorming of the CUshop™ iconography.

Figure 4.6: CUshop™ Logo

Figure 4.7: CUshop™ Primary Braining Strategy

The green color, Pantone 376C, found in the logo was chosen as an element that

conveys nature, sustainability and responsibility. The grey color, Pantone 8C, was

utilized as a neutral complement to the design, and allows the logo to fit in most

environments without an unappealing contrast. The custom-designed fruit cross-section

communicates freshness and complicates the logo without adding unnecessary noise.

This simple iconography became the basis of all of the graphics and colors for

CUshop™, creating continuity and rhythm throughout. The branding extended to

secondary graphics (Figure 4.8) and tertiary supplies (Figure 4.9).

Figure 4.8: CUshop™ Secondary Branding Strategy

Figure 4.9: CUshop™ Tertiary Branding Strategy

Existing conditions and design

Figure 4.10: Shop Specification in Existing Room

After the completion of the branding schemes, complementary color palettes and retail audits, the team tackled the design of the consumer experience lab at the Sonoco Institute. Since the room was designed with two entrances: one from the main hallway and another from the prototyping lab, it was important that a primary entrance was designated. Through the retail audits, it was found that most stores contain one entrance and exit vestibule space, usually located in the front of the store and parallel to the end caps. Knowing this, CUshop™ was designed to enter and exit from area 1 (Figure 4.10).

With the shelving (area 3), aligned perpendicular to the windows (area 4), a maximum shelving area was achieved (Figure 4.10). Area 5 represents an existing brick wall that was ideal for produce shelving and created a specialty area that was found within the retail audits. It is important to note that each set of metal shelving, area 3, contains end caps. This is one of the most marketable and realistic parts of a grocery store, and was essential to the development of the space.

<center>Program</center>

Within CUshop™, many decisions had to be made about the preliminary specifications. Once the director of the Sonoco Institute and major stakeholders approved the final design, the materiality and production of the projects was established. Each of the following elements all became vital attributes of CUshop™:

- **Automatic Sliding Doors.** The inspiration for the sliding doors came from the large entrance designed into the lab. This became a vestibule space, which is common in most grocery stores and establishes a new context for a consumer entering into the space. A custom produced set of clear glass doors were installed and covered with vinyl CUshop™ branded icons (Figure 4.11).

<center>71</center>

Figure 4.11. Automatic Sliding Doors to CUshop™

- **Grocery Store Shelving.** In order to stay consistent with what was observed in the retail audits, CUshop™ utilized 18-inch standard store shelving to optimize space, yet maintain a realistic presence. All shelving was ordered in 4-foot intervals, where the first row is a total of 12-feet long and the second at 8-feet long. This difference in length allows a consumer to view the far right produce shelving upon entering CUshop™. In order to disguise the eye-tracking IR markers, the shelving units were sent to APEX Powdercoating in Simpsonville,

SC to be chemically stripped and powder coated black. A rendering of the store shelving can be viewed in Figure 4.12.
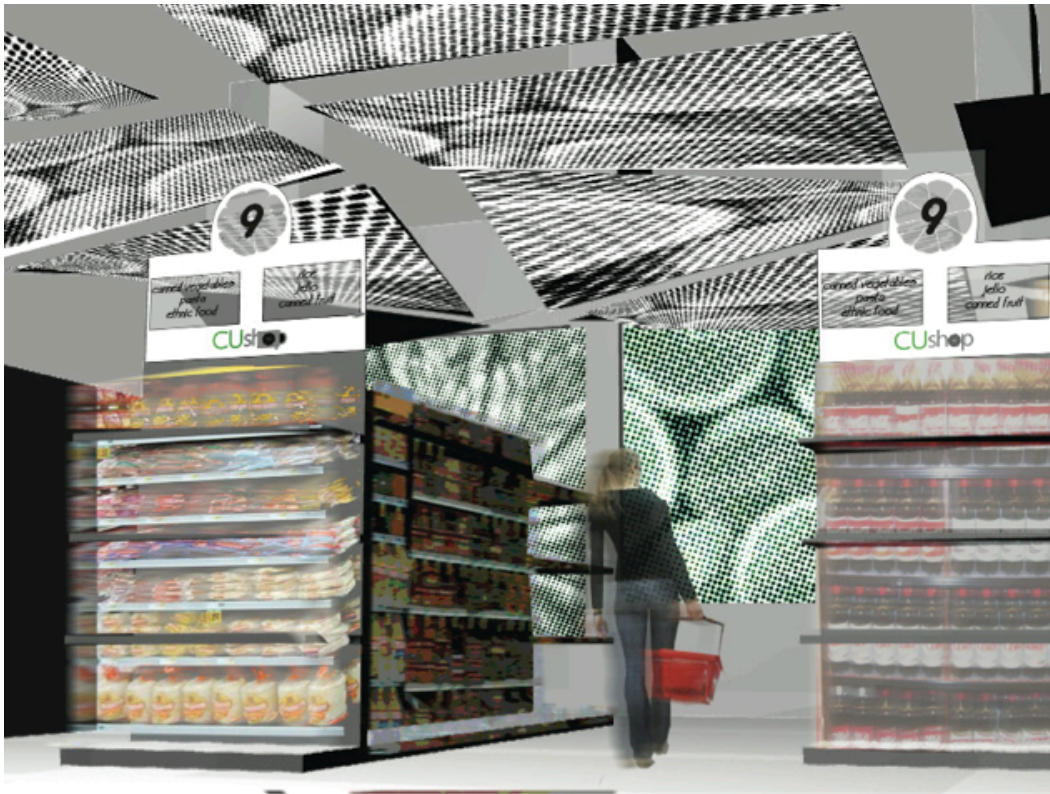
Figure 4.12: Rendering of Store Shelving

- **Produce Shelving.** It was determined in the preliminary brainstorming that in order to appear similar to contemporary retail environments specialty areas are required. The creative inquiry team deliberated between healthcare, produce and alcoholic beverages. Because this section would be aesthetic (non-functional), and requires unique shelving (where alcoholic beverages and healthcare products utilize standard shelving), produce was agreed upon. A custom and raised wood

shelf was designed by the team and manufactured by Twin Builders, LLC. in Seneca, SC. The manufacturer specification and build diagrams are shown in Figure 4.13. The produce stand is made from Grade 1 Maple hardwood, is 15-feet long, 2-feet 10-inches high, 3-feet in depth and presents produce at a 20-degree angle. For usability purposes, the front panels were designed to be removable to access the hollow space under the shelves. Figure 4.14 shows a rendering of the produce shelves.
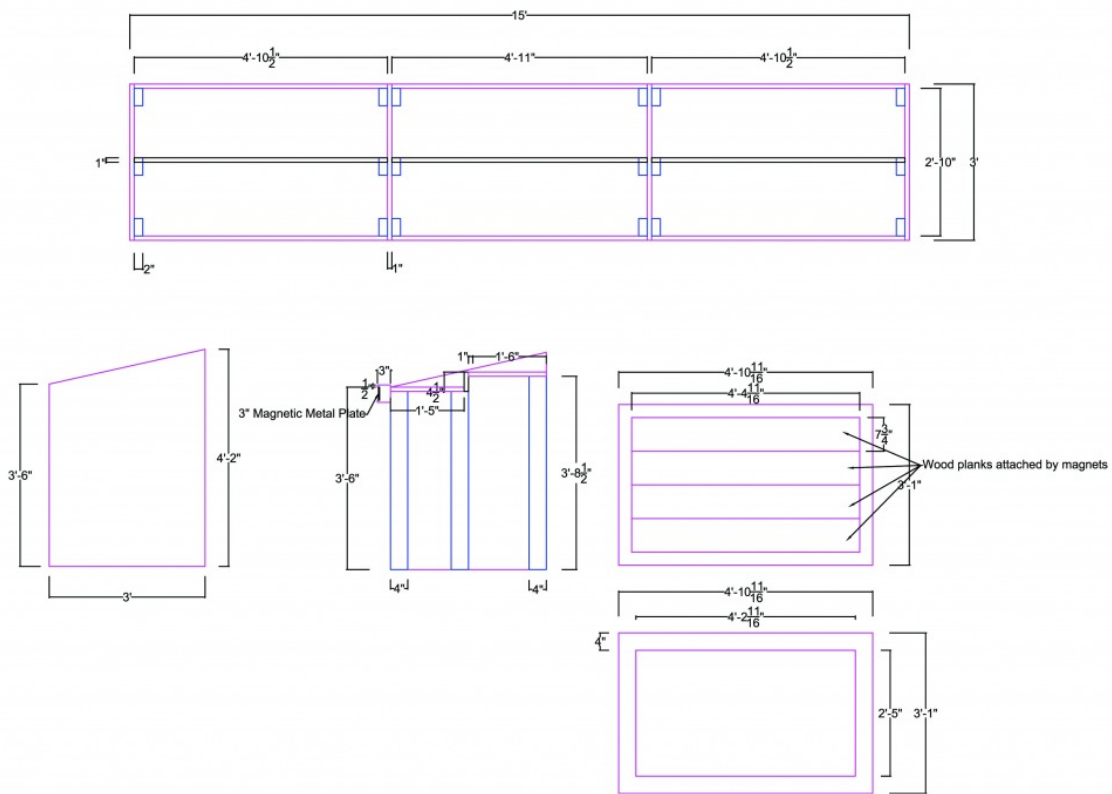
Figure 4.13: Produce Shelf Manufacturer Build Sheet

Figure 4.14: Rendering of Produce Shelf

- **Cold Storage Area.** To be a complete retail shopping experience, and allow
  testing all possibilities within a grocery store, it was important to have cold
  storage areas. Much deliberation concerned the cold storage areas, where it was
  concluded that utilizing functioning cold storage devices would not be sustainable
  and customized commercial refrigerators were expensive. Because the layout
  called for a short corner freezer, a wall-mount (peg-hook) cold area, and an
  aesthetic linking together of two traditional pull-door freezers, it was decided to
  build cabinetry instead. Figures 4.15, 4.16 and 4.17 detail the specifications of the

cold storage units. Figure 4.18 depicts the graphic rendering of the designed cold

storage area. Twin Builders of Seneca, SC built the cold storage units out of grade

A maple finished with clear polyurethane and utilized stainless steel hardware

with tempered glass doors. The results were a practical, yet customized solution

for CUshop(TM).
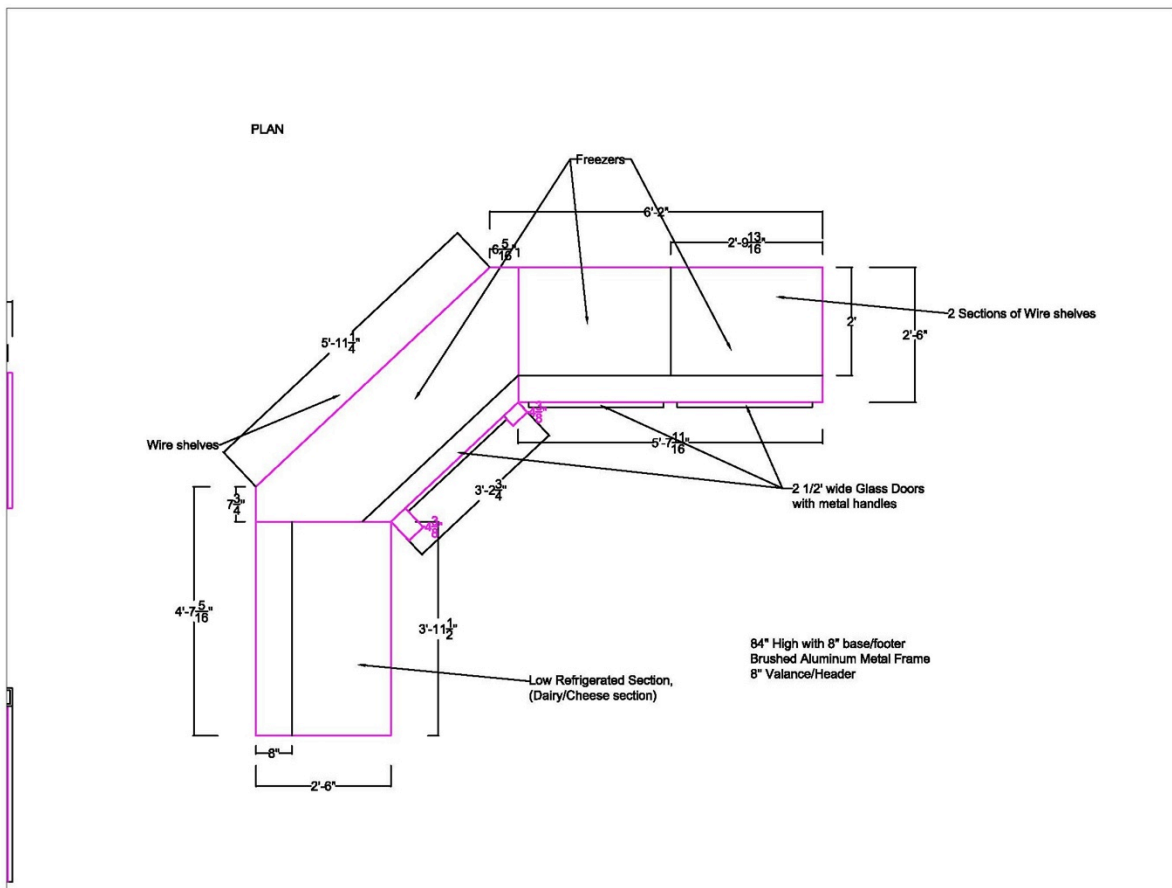
Figure 4.15: Cold storage top view
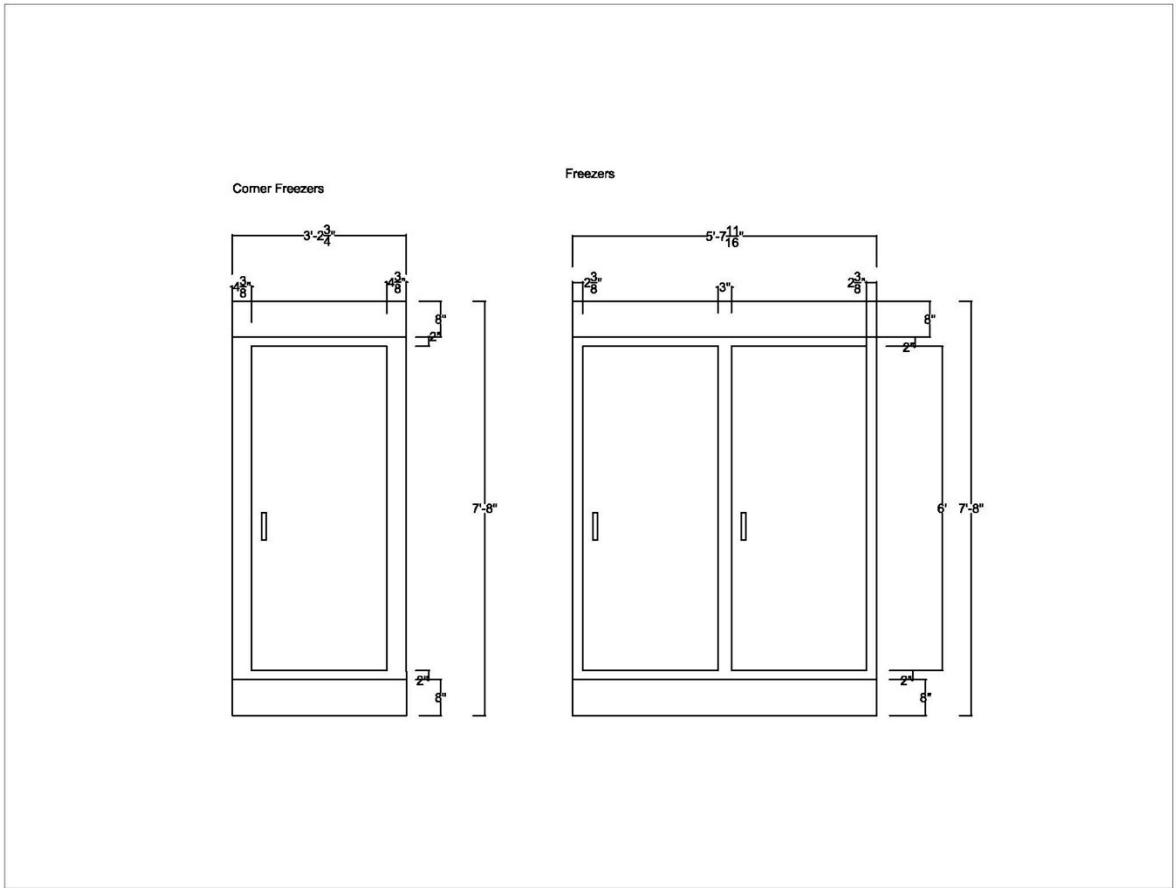
Figure 4.16. Cold storage front view
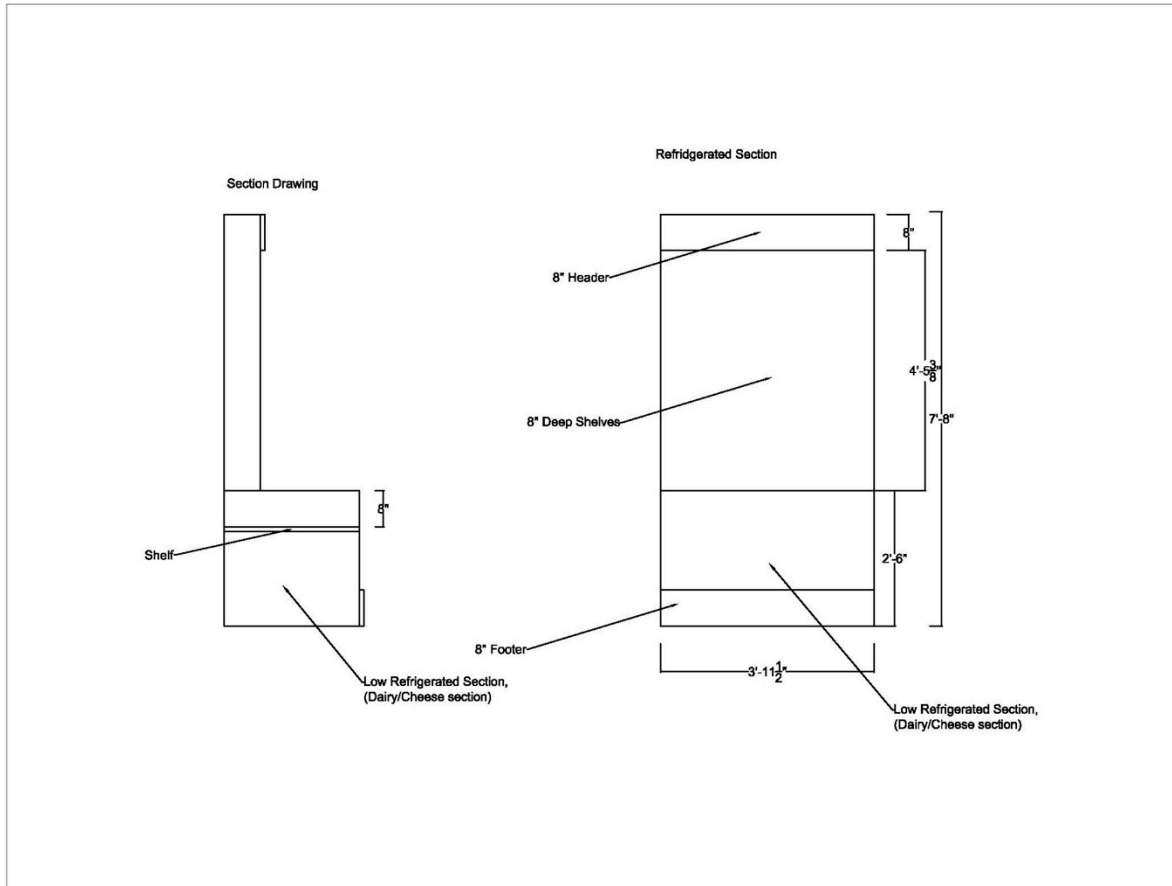
Figure 4.17: Cold storage side view

Figure 4.18: Cold Storage Rendering

- **Ceiling Panels.** It was determined in the store audits that specialization and character to the specific store is important to the overall immersion of the retail environment. The creative inquiry team brainstormed a complex series of angled panels cut with circles to treat the ceiling and was rendered (Figure 4.19). The fire marshal was consulted and the total surface area required for sprinklers was optimized to the total amount of possible blocked space. Thus, holes were

designed into the angled panels and milled out of 4-foot by 8-foot DiBond®

brushed stainless steel panels (Figure 4.20).
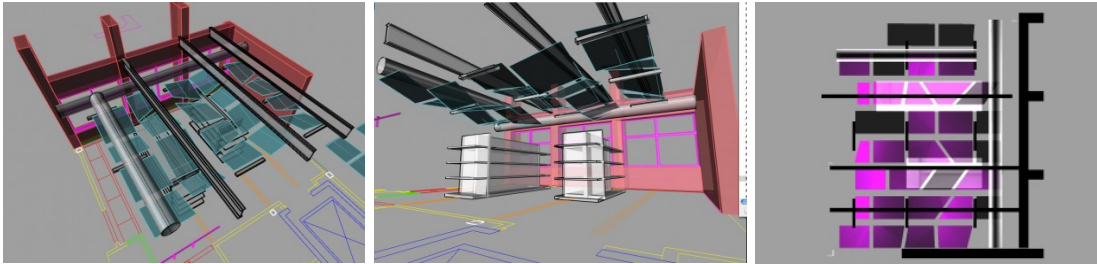
Figure 4.19: Rendering of ceiling treatment
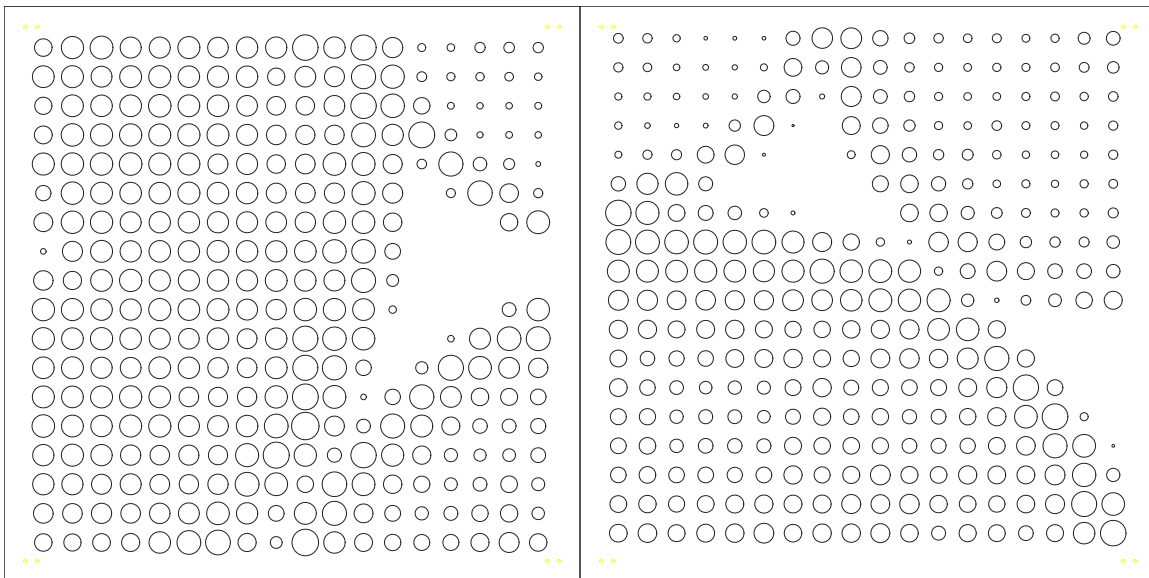
Figure 4.20: 4'x8' DiBond® Ceiling Panel

- **CU Shop Sign.** A customized and lighted store sign was designed and fabricated

  from Lexan® and DiBond® paneling along the brick wall of the consumer

  experience lab. The sign measures 7-feet long and includes LED lights between

the panels (Figure 4.21). The sign was fabricated on a Kongsberg iXL44 table and wired to a roll switch to power on and off.

Figure 4.21: CUshop™ Lighted Sign

- **Vinyl Graphics.** Various branded designs were developed to outfit blank walls, panels and the store entrance; similar to the stores audited. The goal of the vinyl graphics was to create a cohesive environment leveraging the existing color palette and promote the brand identify of the space. Adhesive-backed white and clear vinyl was used on a Mimaki UVJ or Roland VersaUV print system (Figure 4.22). The graphics designed were iconic of the features within CUshop™ and can easily be removed as the store is updated and improved.

Figure 4.22. CUshop™ Vinyl Iconic Branding

- **Paint.** During the design phase of the project, a color scheme was created and the
  environment was painted to reflect the design scheme. Benjamin Moore paint
  products were used to match the pre-defined Pantone® colors (Table 4.1). The
  color scheme for the logo was applied to the walls to modernize the space and
  create continuity in design. The creative inquiry team painted the walls during lag
  times in the shop production. The outside hallway was painted the darker grey,
  while the vestibule space was painted one shade lighter. The interior walls of the
  store were painted a lighter grey to create a feeling of movement into a larger
  space, as a consumer transitions from dark to light.

Pantone® swatch	Benjamin Moore equivalent color
325-4	Gunmetal (darker grey)
8C	Silver Half Dollar (lighter grey)
376C	Lime Green (green on column)

Table 4.1: Pantone® Swatches and equivalent Benjamin Moore paint

- **Blinds.** Automatic, black-out blinds were custom ordered for the store. Because the lighting in CUshop™ is controlled with Xrite® natural lighting products, it is important to control the amount and location of light in the store as changes in light sources have an effect on pupil dilation (Sunkara, Pomplun, 2009). Bally® Rollershades were specified in the design and matched to the existing windows. The blinds measure 52-inches long by 106-inches tall, and cover six windows. The Blackout-Basics: Classic White (60001) model was installed and fitted into the existing offset of the windows.

- **Window Graphics.** Though the audits reported windows being at the entrances of stores, the consumer experience lab had windows within the interior of the space. Yet, through the use of the blackout shades, a similar environment could be achieved. However, it was important to continue the brand identity to the outside of the store and vinyl window graphics were designed to illustrate the facilities of

the *Work/Flow* (Figures 4.23 and 4.24). Clear and white colored vinyl was printed, cut and applied to various glass surfaces around CUshop™.
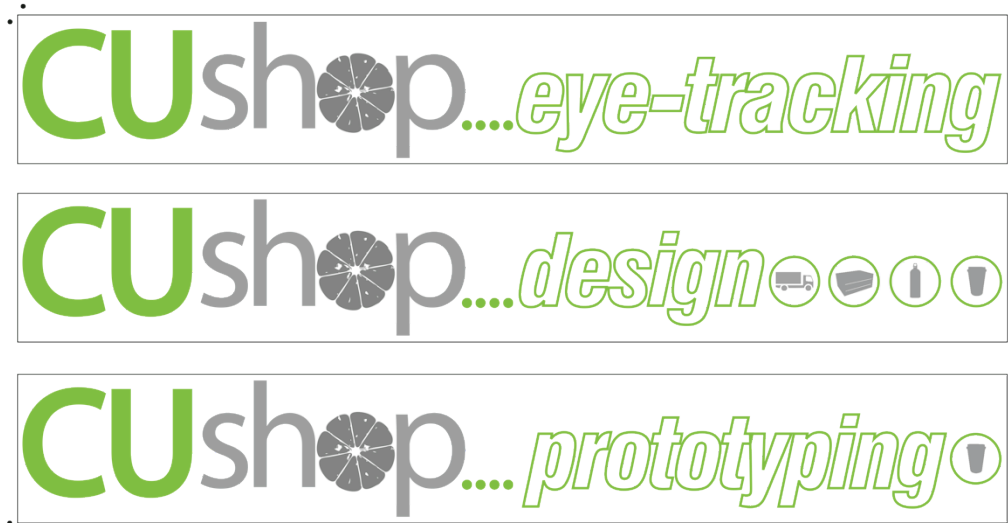
Figure 4.23: Vinyl Window Graphics
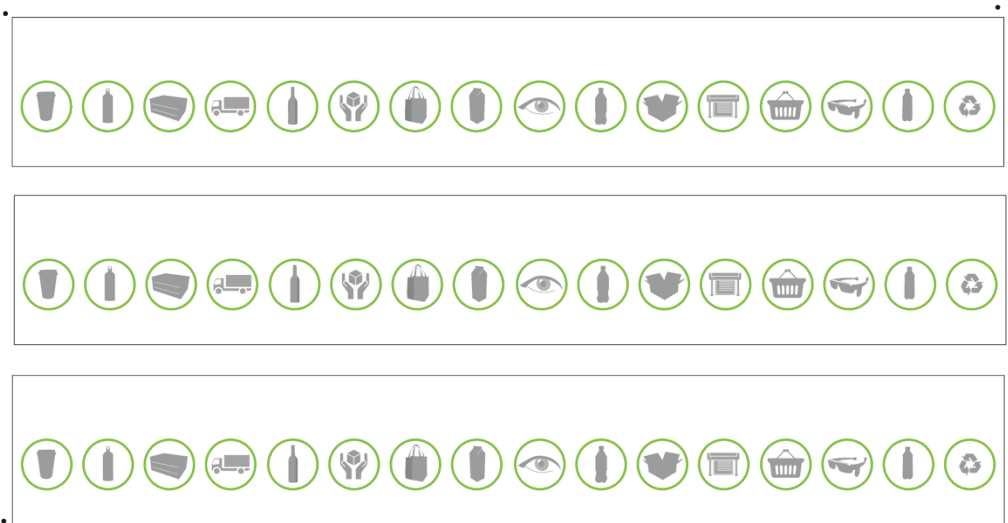
Figure 4.24: Vinyl Window Graphics

Technology

The technology utilized to construct the attributes of CUshop™ are defined and described in Table 4.2 and 4.3, where Table 4.2 details the software resources and Table 4.3 details the hardware resources.

Software	Description
Rhinoceros Nerbs 3D	CAD: Surface modeling and rendering
AutoCAD Drafting	CAD: used to generate machine cut files
Adobe® Illustrator	CAD: used to generate machine cut files and graphics
Kongsberg iCUT	CAM: machine software for the Kongsberg iXL44

Table 4.2: Software technology utilized for CUshop™

Hardware	Description
Kongsberg iXL44 (multi-cut head)	Sample table with spindle, knifes and creasers
Roland Versa UV LEC 330	UV Printer
Mimaki UVJ-160	UV Printer
Epson 7900	IJ Printer

Table 4.3: Hardware technology utilized for CUshop™

Final Images of CUshop™

Figure 4.25: Cold Storage Area

Figure 4.26: Produce Shelving

Figure 4.27: Ceiling Panels

Figure 4.28: Cold Hanging and Shelving

Figure 4.30. Final Stripped and Powder coated Shelving

Figure 4.31. Automatic Sliding Doors

Figure 4.32. Hallway and Signage

Future of CUshop™

The design and development of CUshop™ was an incredible experience for both the instructor and creative inquiry team. It took over six months to move from concept to completion and is only the start of an exciting experience for the future of the Harris A. Smith Sonoco Institute for Packaging Design and Graphics. This project not only underlines the importance of the Consumer Experience Lab by transforming it into

CUshop™, but also highlights the aspect of designing and building within one facility. Having the Consumer Experience Lab redesigned, prototyped, created, and installed within one building is a tribute to the institute itself, celebrating the true intention of the space since its groundbreaking. Furthermore, the *Work/Flow* was utilized to develop CUshop™, organizing communication, deliverable progress, and allowed stakeholders to observe and manage progress.

After the successful implementation of the *Work/Flow* in organizing and contributing to the creativity and *flow* for the students and instructor, the implementation of eye-tracking technology commenced. Thus, it is important to discuss how seduction and persuasion in designs staged within CUshop™ are not only identified, but recorded and analyzed to provide designers a better insight into how consumers interact with packaging.

CHAPTER FIVE

RHETORICAL PERSUASION, SEDUCTION AND EYE TRACKING

Introduction

The dissertation presents a Work/Flow, which an audience of rhetoricians will describe as a *techne.* Considering this status, theoretically justifying the procedure becomes complex, as a *techne* can be viewed one of two ways: the making of art or a procedure to production. *Techne*, from a rhetorical context, is useful within the latter, as it encourages discussion and argument. However, most classical rhetoricians would consider the rhetorical definition of *techne* as craft, where art is an end, inferior. Thus, the purpose of the dissertation is to cultivate the Work/Flow as a practical procedure to design a package. Little emphasis will be placed on the craft itself: software/hardware methods and design theory. It is important to present this claim, as the audience of the Work/Flow who has the power to implement it consist of rhetoricians, academics, and industry leaders interested in the *argument*, in which the Work/Flow improves productivity, creativity, efficiency, and comprehension of the retail context.

Because a *techne* is presented as an argument, it is important to maintain a level of practicality versus theory to justify its position. Therefore, an empirical study will be developed to *quantify* the *quality* of the Work/Flow. The empirical study outlined in Chapter 6 is an essential aspect of the dissertation project. In essence, 'knowing' and 'doing' a theorized Work/Flow represents only two-thirds of the project: it must be 'made' and confirmed to qualify its effectiveness. Though the Work/Flow is an empirical

study within itself, the experimental design of the dissertation will compare the results of three studies developed through the proposed Work/Flow.

The Work/Flow has limits, as any serious game does, but encourages designers to *play* and *participate* with others throughout the development of a packaging system. The Work/Flow is a map, or spatial guideline that enables a designer to develop successful packaging design projects. The Work/Flow initiates with the product and travels through a logical and linear path to an idealized design by utilizing selection algorithms, global product databases, go/no-go decision making, specialized design software, *participatory strategies*, and an iterative design process leveraging eye-tracking technologies.

It is also important to note that the Work/Flow itself utilizes *qualitative* methods when observing and analyzing data from eye-tracking technology. Data gathered to determine how one package differentiates from another is primarily visual, and aids in understanding how a representation of a target audience perceives the retail array. Though regions of the data received will be coded, the findings are subjective and are not intended to make a correlation between design and generalizable human behavior. However, the empirical study will utilize *quantitative* methods to observe and analyze data from the eye-tracking technology to confirm the effectiveness of the Work/Flow. While this study does not seek to find a correlation between design and human behavior, it aims to determine the effectiveness between concepts developed within the Work/Flow in respect to the competitive array.

This chapter will defend an experimental design, which will determine the statistical significance of the Work/Flow. The use of Rhetorical persuasion and seduction

in the context of eye-tracking methodologies, a core component of the Work/Flow, will be articulated as well. In addition, the Work/Flow will be outlined, identifying the use of *participatory strategies* in decision-making as well as an empirical study to confirm its significance.

<div align="center">Use of Rhetorical Persuasion and Seduction in Packaging Design</div>

It has been determined that to encourage the full potentiality of creativity, serious play and *flow* must be situated within an ideal Work/Flow, or *participatory strategy*. Yet, once within a creative state of exploration and design is initiated, one must consider how users perceive manifested objects in order to keep an ethical grounding and an understanding of the epistemic properties of packaging.

From a rhetorical perspective, persuasion and seduction are synonyms and defined as a communicative method to change attitudes or beliefs. Yet, at closer observation, persuasion is a tactic of rhetoric to voluntarily move audiences to action (Gass, 2010). Seduction, which is also a rhetorical tactic to move an audience to action, is conducted through arousal (Greene, 2003; Gass 2010). Though persuasion and seduction are traditionally aspects of human actions, there is much research in the field of object-oriented rhetoric that grants similar characteristics to artifacts (Bogost, 2010). According to B.J. Fogg, an established theorist in persuasive technologies, inanimate objects have the ability "[…] to change attitudes or behaviors or both (without using coercion or deception)" (Fogg 2003, 15). Though Fogg is particularly speaking about *captology*, the use of computers as persuasive technologies, similar logic applies to packaging. Fogg

notes that the main difference between coercion, the parent body of seduction, and persuasion, is in the method of how change is created. Seduction leverages force, whereas persuasion "implies voluntary change" (Fogg 2003, 15). Specifically, Fogg presents a serious notion that computers have the ability to persuade; and if this is the argument, so can packaging. From a rhetorical perspective, seduction inherently assumes an ideal (is one-sided) and most always forces a decision during a state of arousal (Greene, 2003). Conversely, persuasion is a tactic of rhetoric, which I define as the use of communicative methods to move audiences to action. Rhetorical persuasion relies on the dialectic (two-sided) and is intended to be effective irrespective of arousal. Furthermore, persuasion can be dissected into various elements, yet the two major subcategories are audience appeals and the five rhetorical canons. Yet, in terms of packaging, the use of persuasion within visual design is commonly referred to as "persuasion centered design" (Gass, 2011), and is a component of Fogg's concept of *captology*.

The field of persuasion-centered design is not a new topic and has extended into many contemporary fields, such as neurolinguistic programming (NLP). NLP illustrates how visual information is processed within the brain, and has been monitored by fMRI imaging technologies. For instance, it has been proven that humans utilize different mechanisms in the brain when perceiving distinctive types of persuasive media. From a retail context, it has been determined that a person who looks towards the upper-left accesses visual information, whereas someone who looks horizontally accesses auditory information (Gass 2011). Thus, the way humans view their surroundings is related to how persuasive the environment may be, or at least the impact the environment has on human

perception. The field of persuasion-centered design (PCD) focuses on exploiting

theorized correlations between user observation and action within persuasive

environments. PCD leverages eye-tracking in the design stage to confirm how users

observe and react to stimuli. Primarily utilized in web design, as the majority of eye

tracking devices are integrated into computer monitors, PCD focuses on advising web

designers how to best compose websites to optimize the persuasive environment (Pimm,

2007). PCD research has spawned a wealth of persuasive design strategies, illustrating

the various methods users view (or are persuaded by) objects. Specifically in web

development, users tend to view objects consistently, respective to the type of content.

Viewing highly visual, homogenous information commonly results in a viewing pathway

consistent with the *Gutenberg Diagram* (Lidwell, 2010). The *Gutenberg Diagram*, or a

visual pathway the eye travels, initiates with the top, left corner and concludes with the

lower right. Depending on content placement, there exists statistically significant

methods in the way users interact with websites. Some websites create a Z-pattern of user

eye movement, where others show F-patterns (Warwick, 2011). Regardless of the pattern,

the object is affecting the ways users perceive, and eye tracking is illustrating this

phenomena. It is clear that objects have a persuasive effect on observers and it is

indicative of how users perceive them.

From a persuasive context, PCD websites, computer programs and packaging all

inform users, are used as research mechanisms, influence human behavior and provide a

system of limits. Though this is the grounding theory of *captology,* it is synonymous with

Bogost's *procedural rhetoric.* Though Bogost discusses the rule-based infrastructure of

programs to craft arguments and influence behavior, the same arguments can be made for packaging. There are limits to and procedures for how one purchases, uses and disposes of packaging. Though not as influential in the United States, the impact packaging has on human behavior is not as legally apparent in other regions of the world. In countries such as Germany and Singapore, disciplinary action is taken if rules concerning packaging are not followed. Neither Fogg nor Bogost would disagree that a package is a rhetorical device that has the ability to persuade and influence human behavior.

It is not an argumentative stretch to suggest that the persuasive qualities of a package could theoretically be tracked through an observer's scanpaths. Within the field of eye-tracking, scanpaths are described as the flow of the observer's eyes within a defined environment. Scanpaths are composed of saccades and fixations, which are represented by the movements of the eye recorded by the eye-tracking device. More specifically, a saccade can be defined as point-to-point movements of the eye.

DANS, KÖN OCH JAGPROJEKT

På jakt efter ungdomars kroppsspråk och den "synkretiska dansen", en sammansmältning av olika kulturers dans, har jag i mitt fältarbete under hösten rört mig på olika arenor inom skolans värld. Nordiska, afrikanska, syd- och östeuropeiska ungdomar gör sina röster hörda genom sång, musik, skrik, skratt och gestaltar känslor och uttryck med hjälp av kroppsspråk och dans.

Den individuella estetiken framträder i kläder, frisyrer och symboliska tecken som förstärker ungdomarnas "jagprojekt" där också den egna stilen i kroppsrörelserna spelar en betydande roll i identitetsprövningen. Uppehållsrummet fungerar som offentlig arena där ungdomarna spelar upp sina performanceliknande kroppsshower

Figure 5.1: Reader Scanpaths (public image)

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In essence, eye-tracking technology allows a researcher to determine what attributes of an object persuade a user to perceive. In addition, eye-tracking visualization software is able to aggregate eye-tracking data into overall gaze points. Fixations and gaze points can be represented numerically as well as visually in the form of a heat map. Fixations are able to illustrate what objects had a persuasive impact on the subject and are defined as actual, cognitively aware areas of interest lasting between 200 and 300 milliseconds (Duchowski, 2007).

Eye-tracking methodologies have been practiced since the early 1960s, but standardized hardware did not become mainstream and commercially available until 2000, when Tobii entered the retail market. Eye-tracking studies have been and are still overwhelmingly connected to web applications, specifically in confirming site development. Since websites are 'evolutionary prototypes,' they have a unique property that permits constant updating and improvement (Lidwell, 2010). Most computer-based applications have this attribute as they can be updated automatically with little to no effort. This is impossible for the print world, as modifying designs requires removal or recalling of the product. Eye-tracking operates well within computer-based applications, as the majority of eye trackers are integrated into a computer monitor. Being the natural environment for using computer software, eye-tracking, in this context, is not intrusive. However in the situation of evaluating print, human behavior, or a dynamic (natural) environment, a camera embedded into a monitor is not realistic.

In attempt to naturally observe the eye movements of subjects shopping in a retail environment, a head-mounted device, specifically the Tobii Eye-tracking Glasses, would

theoretically function appropriately. The Tobii Eye-Tracking Glasses are lightweight and ergonomically designed for the human head. The glasses utilize an internal infrared light to illuminate the back of the eye and a proprietary camera records the right eye at 30Hz (30 times per second). The Tobii Eye-tracking Glasses are portable and collect data on a SD card, which is extracted within Tobii Studio. As a subject interacts with an environment naturally, the technology records eye movements as well as the diameter of the pupil at 30 Hz. Though the glasses are capable of recording for up to four hours, a typical study lasts approximately 15 minutes. The software is capable of aggregating data collected to determine saccades, fixations, gaze points and pupillary responses of multiple subjects where Tobii Studio provides visual playback of the data recorded in the form of a video with the eye-tracking data superimposed. Data can be modified to only reveal scanpaths (saccades and fixations) or visualized gaze points. In attempt to bridge rhetorical theory to this technology, one could argue that scanpaths represent the *visual persuasiveness* of a package design and the pupillary changes could be used to determine the *visual **seduction*** of a package design.

Seduction is defined as a rhetorical tactic to move an audience to action by use of conscious, invasive strategies during a state of arousal. Likewise, persuasion is also defined as a rhetorical tactic to move an audience to action, but by use of passive methods, specifically dialectic and audience appeals. It may be confusing for readers to comprehend the notion that a package can be persuasive or seductive, because it is inanimate. Yet, research conduced by Fogg clearly shows how inanimate objects, such as computers, have the ability to persuade (and seduce). At this point, the reader may be

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questioning the ethical implications of such research. In response, it is necessary to define the limits of how a package can affect a user-response in order to illustrate the persuasive and seductive potentiality of a package design. Theoretically, research within this area could establish an ethical bar in addition to assisting designers in making decisions based on consumer perceptions of packaging designs.

Arguing for Pupil Dilation as an Indicator of Seduction in Human Response

Understanding Pupil Dilation

The seductive attributes of a package design should be acquired differently than the persuasive attributes. Rather than mapping and analyzing the persuasive movements of the eye, physical changes in the eye can be observed, specifically the pupil. Since the early 1960s, changes in the diameter of the pupil have been correlated with the emotional state of the subject. Though still a highly contested subject, there exists a plethora of research that suggests the dilation of the pupil is a result of excitement, stemming from arousal. Typically appearing between 200 and 800 milliseconds after a subject views a seductive artifact, the pupil will dilate between 10 to 30 percent. This type of testing has been conducted through countless experiments on humans and primates. It is well documented that pupil dilation is the result of cognitive load, excitement and arousal (Oka, 2008; Mueller, 2008; Surakka, 2003). Though it would have been amusing to record the pupillary responses of Don Juan's victims, more controlled experiments shed light on the ability of this technology to understand seduction.

"Pupil size correlates well with cognitive load" (Iqbal 2004, 29), yet it was found that shopping is documented as a stress-reducing task and any 'cognitive load' from the activity should not result in increased pupil size. Though lighting has shown to manipulate the diameter of the pupil, research indicates that this is directly due to changes in brightness (Sunkara, 2009), and for the purposes of research in this area, it would be advised to control lighting in an eye-tracking research facility. However, arousal has been shown to have a direct relationship with pupil dilation. Studies show how both male and female participants had statistically significant pupil dilations when observing "good looking" images of the opposite gender (Shread, 1979). In a recent test conducted by a UK academic institute, researchers determined a significant pupillary similarity between shoppers discovering a bargain deal and others viewing pornography (Leung, 2010).

Methodology involving measuring the pupil in attempt to understand human behavior and decision-making has been conducted since 1960. In their classic study, Hess and Polt describe how statistically significant changes in the pupil were found when men, women and felines observed "interesting visual stimuli." The researchers observed a variety of important attributes of the pupil: the pupil can change from 2 to 8 mm and that the diameter is capable of a 10% change. It was also observed that contractions in the pupil are shown to reflect a mental disinterest (Hess, 1960). Four years after Hess and Polt's study, Herbert Krugman developed the first apparatus for tracking the pupil, and conducted his study within the context of static images. Krugman designed a device that would photograph the left eye at 2 Hz, or two photographs per second. Because changes

in lighting were reported to have a direct impact on pupillary response, Krugman developed a way to control images and remove this variable. Krugman concluded that pupillary dilation was statistically larger for "shoppers" when compared to "browsers" within a retail environment. Yet in his conclusion, Krugman noted that data reliability may be an issue for pupillary changes where "the odds are better than a thousand to one" that the consistency of pupil response ranking was not due simply to chance (Krugman, 1964). A decade later, within a comprehensive review of literature in 1973, David Corkindale and Sherril Kennedy indicated that isolated pre-trials of retail devices (packages, products and advertisements) were "doomed to failure." Corkindale and Kennedy specifically noted that retail evaluations should focus on consumer comprehension rather behavior and attitude evaluations (Corkindale, 1973). Yet, in 1973, pre-trial evaluations were limited by technology, for pupillary response to behavioral changes could not be observed by 2Hz equipment.

It was not until the late 1990s that eye-tracking techniques became commonplace to determine pupil dilation. Tobii, a leader in the field eye tracking technology, began producing integrated monitor solutions in 2001. Their initial flagship unit, the Tobii 1750, equipped researchers with the ability to track eye movements, fixations, saccades, gaze points and pupil dilations at 60 Hz. Computer-integrated Technology from Tobii released in 2011 offers units that track up to 300 Hz. There are very few competitors to Tobii: over 90% of eye tracking research conducted in the past decade utilized Tobii technology. 10% of research describes customized solutions (based on a Google Scholar analysis between 2000-2011 for keyword "eye tracking"). With modern eye tracking

technology, a subject's actual eye-movements, or 'saccades' can be recorded at up to 60 Hz (Duchowski, 2007). Because saccades are reflective of how one visually interacts with their environment, fixation points are in essence the areas that received the greatest amount of attention from the observer. Thus, by viewing saccades and fixation points, researchers have the ability to view how 'persuasive' an object is to a specific user, in respect to the remainder of the perceptual field. It has been determined through thousands of published eye tracking research articles that users will commonly scan through an environment (tracking saccades) as well as show 'fixations,' which are defined as cognitively aware points of interest lasting between 200 and 300 milliseconds (Duchowski, 2007). However, pupil dilation, in response to arousal, requires between 400 and 800 milliseconds to occur, after a fixation on an AOI (Wang, 2010). Thus, the technology that grounded eye tracking in the 1960s and 1970s was unable to record at frequencies great enough to detect the potential seductive qualities that objects and environments have on perceivers.

Pupil dilation is connected with many factors: changes in illumination (Sunkara, Pomplun, 2009), a result of deceit (Gas, Seiter, 2011; Wang, Camerer, 2010), difficulty of a task (Iqbal, et al, 2004) and arousal (Spezio, Camerer, 2010; Leung, 2010; Shread, 1979; Mueller, Jackson, Skelton, 2008). Due to the extensiveness of research with these areas, it is imperative that any study that is observing pupil dilation indicates a control over these variables. Wedel and Pieters (2008) suggest that due to the lack of a "bi-directional relationship, [the] emotional stimuli of positive and negative valence both dilate the pupil. This significantly reduces the value of pupil dilation for emotion

measurement, since the same pupil dilation can mean joy or disgust." Furthermore, within his text, Wedel describes that "[prompts] for pupil dilation are most likely accompanied by increased arousal and processing load, and these may actually be the responsible processes, which further lowers the validity of pupil diameter as a measure of emotional response" (Wedel 2008, 69).

<div align="center">Linking Pupil Dilation to Consumer Behavior</div>

Poker players, for example are said to wear sunglasses because their pupils dilate when they get a good hand. Similarly, pupil dilation can be a reliable indicator of deception (Gas and Seiter 2011, 253)

It is interesting that within social scientific research, there is tremendous evidence that pupil dilation is directly impacted by a human action or behavior. A study conducted in 1979 noted that when subjects observed photographs of the opposite gender, "young males and young-adult females rated female faces with enlarged pupils as significantly less good-looking" (Bull, 1979, p. 30). In similar studies comparing the differences of eye tracking between men and women, it was determined that males tend to visually explore areas of interest much earlier than females. In the same study, females tended to "demonstrate longer fixation durations" and increased pupil dilation in navigating space (Mueller, 2008). Thus, peer-reviewed journals are approving specific correlations between human action and pupil dilation. In a study observing pupil variation in affective processing, it was determined that subjects' "pupil size was significantly larger during

both emotionally negative and positive stimuli than during neutral stimuli [and that] the results suggest that he autonomic nervous system is sensitive to highly arousing emotional stimulation (Surakka, 2003, pp.192-193)." This article also linked gender-specific links to pupil dilation in that, "female subjects had significantly larger pupil responses than males only to neutral stimuli"(Surakka, 2003, p.185).

In a visual arts experiment with an eye tracking device, Robin Hawes illustrates the inherent complexity within attempting to find a commonality in how humans perceive the world. In an ironic study, Hawes tracks the eyes of participants viewing images of eyes (titled *Iris*), and concluded that each participant viewed the scenario differently. Hawes claims that eye tracking is not "modeling a replica of the external world […] but the 'species specific' and more importantly 'organism specific' *hypothesis* of it" (Hawes, 2009, p.9). In essence, eye tracking is a method for determining how an observer develops his or her own respective realities of a visual scenario. And by attempting to develop a correlation between eye tracking and decision-making at the retail level, it would undermine the proven uniqueness and creativity inherent within the human mind.

Empirical Methodologies, Apparatus, and Significance Testing of Pupil Dilation

It should be noted that the challengers to the significance of eye tracking on human behavior did not complete any pupillary empirical research themselves. Hawes (2009) neither discloses his subject population nor reports on any statistical methodology to support his conclusions; they were mere observations. Wedel (2008), argues against the correlation between pupil dilation and emotion appeal via a review of literature, but it

should be noted that Wedel is highly published in the field of eye tracking. In his article, *Eye Tracking For Visual Marketing*, Wedel notes, "research under controlled conditions and with appropriate statistical controls…is needed to make valid inferences about the influence of task characteristics…" (Wedel 2008, 299). Thus, it is important to review the commonly utilized methodologies, equipment and significance testing within the field.

Of the 75 studies reviewed for this research, 74 studies utilized a virtual environment, most cases on an LCD screen measuring between 22 and 24 inches. A fair amount of studies were conducted on 19-inch screens. One study utilized an ACM eye-tracker, where the remainder utilized Tobii eye-tracking devices. Overwhelmingly, the Tobii 1750 eye-tracker was the most popular device. Even with less expensive equipment available (i.e., Mirametrics), a comprehensive scholarly search was conducted and yielded no published studies with this device. The majority of studies describe subjects sitting in front of a monitor, but rarely are details given, such as the space between face of the subject and monitor. Out of the studies reviewed, only one study utilized an eye-tracking device to study non-virtual environments (Busey, 2010). Yet, this study utilized an unfamiliar eye-tracking device, *ExpertEyes*, which was unable to be found though an intensive online search. It is hypothesized that this research team created and named a device for the study. No record of calibration or comparison was provided for the *ExpertEyes* device.

In general, eye-tracking studies involve few subjects (usually less than 20) and involve inconsistent methods of data collection and statistical analysis. One study utilized a Tobii 1750 and 19 subjects where consistencies between viewing web pages were

studied. Fixation data was collected and heat maps were generated on defined AOIs. A T-test was utilized to analyze the data collected (Djamasbi, Siegel, Tullis 2010). In a similar study where a Tobii 1750 was leveraged to determine consistencies between latent print comparisons, 18 participants were monitored and recorded, yet a T-test was not utilized (Busey, 2010). In another experiment, fixation and gaze data was gathered between sixty-six high-action sports viewers, where an ANOVA table was utilized to analyze results on an ASL Eye Track 6 (Cummins, et al 2011). A 2010 study on how subjects interact with ads on a search engine utilized a Tobii x50, and 38 subjects recorded data from specified AOIs and gaze duration. However, a method of data analysis was not provided (Buscher, Dumais, Cutrell 2010). In 2009, a study conducted by Boucheix and Lowe (2010) utilized 26 participants with a Tobii 1750, defined AOIs and utilized a 2-way mixed ANOVA table. Peterson, Thomsen, Lindasy and John (2010) conducted a study with 20 middle school students on an Eye-Trac 6000. Unfortunately, statistical analysis data was not described. In 2010, 24 subjects were recorded on a Tobii 1750 (at 50Hz instead of the common 60Hz) where an ANOVA table was utilized to show commonality between primary focal points within the study (Freeth, Chapman, Ropar, Mitchell, 2010).

It is clear that the field of eye tracking has yet to define standard operating procedures and data analysis mechanisms that allow the universal sharing of data gathered. By publishing results without indicating the frequency of data collected makes comparing one study to another impractical. Secondly, data is analyzed in various ways along with ambiguous confidence intervals. Lastly, a few studies report the use of eye

tracking devices that are not commercially available and/or do not report specifications that aid in comparing devices to one another. With such high subjectivity, it becomes difficult to make assumptions on the impacts of eye tracking on consumer behavior. Yet, still, it is important to revisit the direct connections between pupil dilation and consumer behavior in the retail environment.

Linking Pupil Dilation to Consumer Behavior in the Retail Environment

Though the debate between pupil dilation and emotional appeal is fierce, it has been noted by many authors that "pupil size correlates well with cognitive load for interactive tasks" as well as being an indicator of mental difficulty (Iqbal, et al 2004, p.1480). This notion was recently supported in neurophysiology research where pupil dilation response (PDR) was found to be "a complex brain-mediated response rather than a simple sympathetic reflex" (Oka et al, 2007, p.2016). Yet, it is hard to toss out the numerous amounts of supporting evidences that pupil dilation *does* have a legitimate impact on consumer behavior, especially in the retail environment. Leung's (2010) research on correlating pupil measurements between excited subjects and those happening upon a good deal while shopping cannot be ignored. Mueller's research (2008) illustrates clear impact on the possibility that consumers may view arrangements differently in order to store items in memory. Scott Young's research (2004) specifically notes the "importance of packaging in influencing the decision to buy." This sits well with Pierre Chandon's research (2002) that illustrates how eye-tracking methodologies

that include pupil dilation have the ability to measure the "visual equity" of brands

displayed on a retail shelf.

<div align="center">Conclusion</div>

Though it is novel to empirically illustrate the persuasive and seductive attributes

of a package, it is not theoretically new. As previously discussed, both Fogg and Bogost

demonstrate the rhetorical attributes of inanimate objects. Likewise, Vilem Flusser

discusses the methods in which objects present knowledge. There are even

postmodernists, such as Kenneth Burke, who suggest that **all** knowledge can be derived

from objects. Thus, suggesting that objects (packaging) are rhetorically persuasive and

seductive is not outside the scope of the conversation. Though the links between pupil

dilation and seduction as well as perception and rhetorical persuasion are difficult to

disprove, the counter statements must be discussed.

In the study, *Private View*, Hawes shows the inherent complexity within

attempting to find a commonality in how humans perceive the world. In an ironic study,

Hawes tracks the eyes of participants viewing images of eyes (titled *Iris*), and concluded

that each participant viewed the scenario differently (Figure 5.2). Hawes notes how "each

time someone contemplates a work of art, that work of art is re-constructed internally

(Hawes, 2009, p. 2)." Hawes claims that eye tracking is not "modeling a replica of the

external world […] but the 'species specific' and more importantly 'organism specific'

hypothesis of it" (p. 5). In essence, eye tracking is a method for determining how an

observer develops his or her own respective realities of a visual scenario. And attempting

to develop a correlation between eye tracking and decision-making at the retail level

<div align="center">111</div>

would undermine the proven uniqueness and creativity inherent within the human mind. What is important, however, is that the persuasive and seductive attributes of a design are identified, keeping the designer and brand owner aware of their packaging's *ethos, pathos* and *logos.*
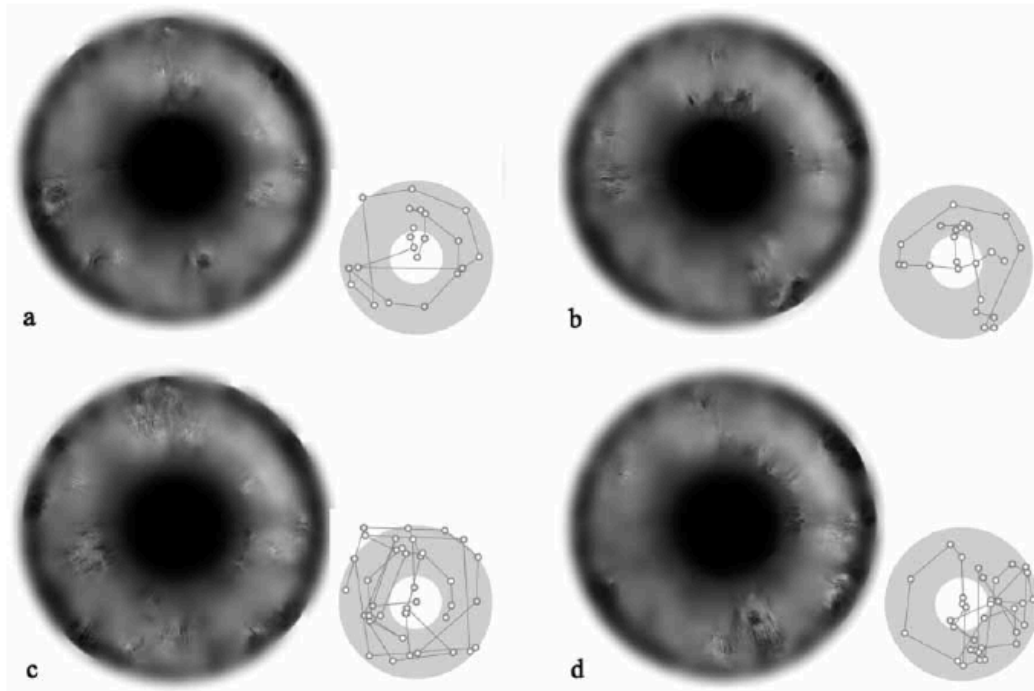
Figure 5.2: IRIS (Hawes, 2009)

The idea of correlating persuasion and seduction to eye-tracking metrics is a unique and novel empirical study. Theory grounds the experiment and data would be reflective of actuality due to the comprehensive calibration required by the eye-tracking device. However, the only arguments against the use of eye-tracking data are correlations to human behavior. Thus, the data collected within such an experiment needs to only inform designers of the impacts of their decisions, not make assumptions about culture or

people. The use of eye-tracking is not to better understand consumers, but to better understand design.

This chapter has presented a series of provocative and influential research tasks within three major areas: *serious play, participatory strategies* and *rhetorical persuasion and seduction.* The scholarship reviewed not only provides a foundational body of peer-reviewed research in the areas of interest, but also makes room for a remixing of the many findings into a purposeful creation for the field of packaging design.

The notion of *serious play* has been defined by a state of being, where one (or many) is engaged in an immersive learning activity. From within a state of *serious play*, an instance of *flow* may be achieved—and this is where creativity and uniqueness originate. *Serious play* enables designers to perform their best, but a hole was found in this research that was unable to determine the environmental requirements to best achieve a state of serious play; and this is where *participatory strategies* begins.

The research within *participatory strategies* segues from *serious play* as the context to optimize the potentiality of *flow* from a state of *play*. The literature reviewed within *participatory strategies* discusses the advantages and limitations of engaging groups to achieve a specific task, and digs deep into examples of when and where large groups of people outperform smaller groups of credentialed professionals. *Participatory strategies* sets up the foundation for creating a work/flow in which stakeholders of a packaging design project can come together to manifest an object that will meet the needs of the investors as well as the prospective consumer.

The literature discussing rhetorical *persuasion and seduction* is bipartisan: there is a clear theoretical (literary) notion as well as a strong, scientific (quantitative) definition of the terms. Both, however, are important to the proposed research. Persuasion is the act of influencing a behavior, while seduction does the same during a state of arousal. There exists many graphic/artistic design methods to achieve both persuasive and seductive qualities of a design, but the review of literature also discovered quantifiable elements to both. It was found that 'scanpaths' illustrate the visual persuasiveness of a design and 'pupil dilation' correlates to its potential seductiveness. However, this research will leverage the results of the eye-tracking methodology to 'further the creative process' in lieu of attempting to develop a correlation between design and behavioral impact.

In summary, the review of literature shows that the development of a work/flow to design successful packaging is an achievable goal. And if created, it can be tested and determined if effective. This now leads us into the empirical study.

CHAPTER SIX

EXPERIMENTAL DESIGN

<u>Introduction</u>

The empirical study of the dissertation is an experiment to confirm whether or not

the iterative design process of the proposed *Work/Flow* has a significant impact on

prospective consumer perception and purchase-decision concerning a package design.

Because the experiment also dovetails into the actual development of the specific

package design iterations, it will also determine whether or not the procedural aspect of

the *Work/Flow* benefited the design team's decision-making.

It should be noted that the experimental design is not generalizable to human

behavior. The purpose of the experiment is not to make assumptions about the specifics

of a consumer audience, rather to provide a design team with an advanced understanding

of how design iterations communicate to an audience. Secondly, the experiment is not a

replacement for a traditional focus group. Though the Work/Flow does provide

information concerning if and when a consumer made a purchase decision, the most

valuable data is observing how a consumer approached the design, what he/she

considered during their shopping experience, how many times was the iteration

considered prior to the purchase decision, pupillary response, and other beneficial

perceptual analyses. Furthermore, not only will perceptual analysis be available for the

design iterations being tested, but also competitive products.

Perceptual consumer data gathered from the experiment will be categorized as

either persuasive or seductive for the participants of the design team to consider in their

revision process. Physical movements and fixations of the eye are considered to be persuasive qualities, as these artifacts had an actual physical response on the consumer. Pupil dilation is considered to be a seductive quality, as this artifact had an actual emotional response on the consumer.

This chapter details the experimental design of the dissertation, where three products were developed and analyzed utilizing the *Work/Flow*. Packages that were designed and managed for stone-ground grits, extra virgin olive oil, and a home-grilling spatula were utilized for the empirical study.

<u>Institutional Review Board (IRB) Approval Information</u>

Prior to initiating any study involving human subjects, an IRB approval must be granted. For Clemson University, a full-expedited review was prepared and submitted. Appendix A shows the signed and approved expedited review, which reveals the details of the experiment, potential risks and experimental procedures. Appendix B shows the informed consent form, which each subject was required to read and accept prior to starting a study. Appendix C shows the pre-experiment questionnaire, which asked simple questions concerning demographics and health that could immediately excuse a subject from participating in the experiment. Appendix D shows the verbal recruitment document, which was used to recruit prospective subjects to the study. Appendix E shows the script, which details the discourse and interaction between the experimenter and subject. And lastly, Appendix F shows the post-experiment questionnaire, which involves

a series of questions concerning the subject's feelings on the experiment, experience, interaction with the Tobii glasses and opinions concerning CUshop™.

CUshop™ Preparation

The first step in readying CUshop™ for an eye-tracking experiment is to charge all of the Tobii equipment. Figure X illustrates the Tobii Glasses equipment. All of the IR (infra-red) markers, as well as the Recording Assistant battery, should be placed in their charging units at least seven hours before the designated time of the experiment. While charging, the LED lights on the equipment will be a bright blue. Once fully charged, the LED lights will appear green.
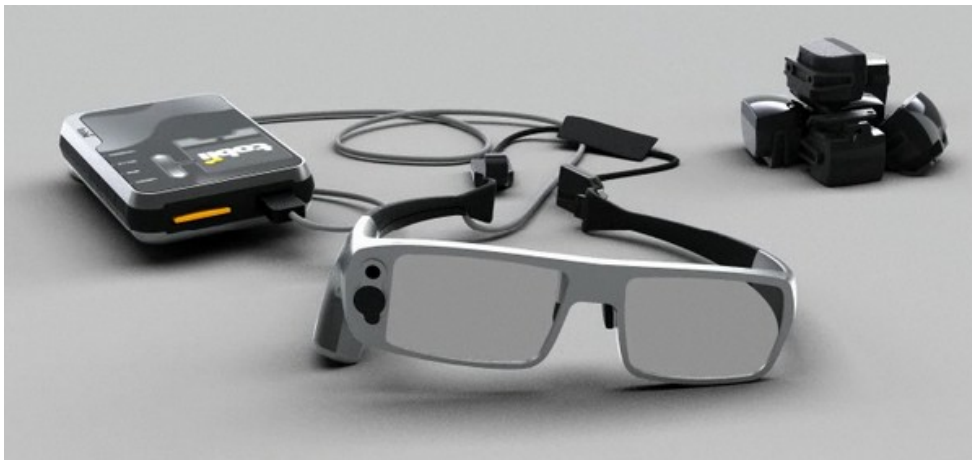

Figure 6.1: Tobii Glasses, Recording Assistant and IR markers (Tobii, 2010)

To begin basic lab preparation, check that the aisles and floor space of the lab are clear of any unnecessary objects or debris. Next, ensure that all of the correct products

for the experiment are on the shelves and are neatly arranged. Check that the automatic

sliding door has been switched on and that all other doors leading into the lab have been

closed. Next, check that the automatic blinds have covered the exterior windows.

Finally, confirm that there are no objects or situations that will be distracting to

participants during the experiment.

The shelving must be prepared with appropriate product. Because the dissertation

study is observing three products in three different product categories, the AOAs should

contain product found within the Mintel Database results in the brainstorming phase of

the Work/Flow. Once prepared, pricing should be applied to the shelving as determined

by the participants of the Work/Flow as well as the reported pricing on Mintel Database.

Because the clients in this particular study had not yet determined pricing, all of the

products were priced the same. In the case of grilling accessories, all competitive

products were priced at $9.99. Grits were priced at $2.99/lb (varied depending on the

respective weight of the package), and extra virgin olive oil was priced at $0.49/oz.

Thus, price became an independent variable on the experiment, it did not factor in the

subject's decision to purchase or not.

Once the lab is prepared, the Tobii equipment must be setup. Each fully charged

IR marker must be placed in an IR holder. Once correctly placed into the holder, the

bright green LED light will end, resulting in the marker emitting no light at all. These

holders are then affixed to the shelving units to define the specific AOA for the

experiment. There must be at least four markers to define each AOA. The markers

should be spaced 10-20 cm apart and should be angled towards the general eye level of

the participant. The markers all have assigned numbers and should be placed in the correct numerical order. Make sure that all markers are on the same two-dimensional plane. Finally, place the charged battery into the Recording Assistant.

The final step in preparing for the experiment is to take snapshots of the AOA, which can be done with either the Tobii Glasses or a digital camera in combination with the Tobii glasses. For the experiment defined in the dissertation, a digital camera will be used to increase the presentation quality of the data. Make sure to photograph the AOA in a normal perspective, directly in front of the AOA. When using the glasses to take snapshots, activate the camera by pressing the 'Main Menu' button on the Recording Assistant and selecting 'Camera'. The Tobii Glasses may now be used to capture the entire view of the AOA, press the Snapshot button and then the Save button. It is very important that the AOA is recorded with both the glasses and the digital camera.

<u>Methodology</u>

Once the design team completed the initial concept designs for all three projects, per the third phase of the Work/Flow, the experimental design initiated. Because competitive products were identified in the second phase of the Work/Flow, these products were procured as well as hundreds of other products to create an immersive atmosphere at CUshop™. Each iteration, competitive product and control (design created outside of the Work/Flow) received a random number next to the price tag to be used for the subject to identify which product he/she decided to purchase (Figure 6.2).

Figure 6.2: Randomized Numbers on Packaging Labels

Once each AOA was setup on the shelves, the AOA was recorded with the Tobii Glasses and setup on Tobii Studio. Figures 6.3, 6.4 and 6.5 show the AOAs and AOI bounding boxes for each of the design iterations, control and competitive products found via the Work/Flow.

Figure 6.3: Grits AOA with Defined AOIs

Figure 6.4: Olive Oil AOA with Defined AOIs
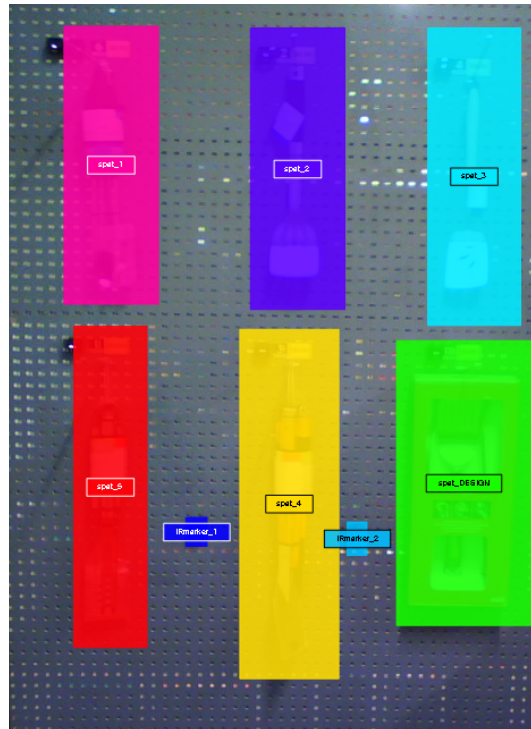
Figure 6.5: Grilling Accessories AOA with Defined AOIs

Once each product category was setup in CUshop™, a shopping list was constructed for each participant to record which product they wanted to purchase. This list was randomized in three orders to ensure the order on the list did not effect purchase decision. Appendix G shows the format of the shopping list. Once CUshop™ was prepared and the design method was established, participants could be recruited to begin studies.

Participants

Participants for the experiment were adult shoppers. Though the target audiences for the food products were female and the grilling accessory was male, all participants were asked to shop for all products, as the design teams could easily filter demographics.

Participants needed to be at least 18 years of age (with a range from 18-65) and have at least a high school education. Participants were not compensated for their involvement in the study. Participants were collected from classes offered at the Sonoco Institution as well as staff, students and employees at Clemson University. All participants were verbally recruited via the following message:

> Hello, I am recruiting participants for an eye tracking study for a summer research project. This study will attempt to investigate how packaging design elements have a result on perception of the package. We will be performing this study throughout the summer. It will take around 20 minutes to complete. Would you be interested in participating?

Once a subject enrolled in the study, a time was arranged to meet the experimenter in the lobby area of the Sonoco Institute. Upon meeting, the experimenter would initiate an oral discourse beginning with:

> "Thank you for agreeing to participate in this experiment. We will be examining eye movements collected while you perform a simple task that I will explain to you shortly. We will be asking you to wear this pair of glasses *[Experimenter shows participant the Tobii Glasses Eye Tracker]* which will collect your eye movements. These glasses are safe and not associated with any risks. We will also ask you to answer a few short

questions after you have performed the task. Do you have any questions about your participation so far?" *[Experimenter answers any questions that participant has].*

After any questions have been answered, the experimenter will state the following:

"Let's begin. Please authorize your participation by reading this informed consent form. We will then ask you to tell us a little about yourself by answering a few short questions." *[Experimenter hands Informed Consent Form to participant. Experimenter answers any questions the participant has concerning the Informed Consent Form. Then, experimenter asks the participant to fill out the Pre-Experiment Questionnaire].*

Once the Informed Consent Form (Appendix B) has been completed and signed and the Pre-Experiment Questionnaire (Appendix F) has been finished, the eye-tracking calibration procedure will begin. The experimenter will pick up an available IR marker and say the following:

"We have to begin by calibrating the eye tracker to your eyes. Please keep your head as still as possible and follow this target with your eyes. It may help if you open your eyes a bit wider than usual." *[Experimenter initiates*

calibration].

At this point, the experimenter will move an available IR marker throughout nine places on a blank wall. These spaces will coordinate with the Recording Assistant and determine the viewing adjustment for the participant. If the subject fails to calibrate, they will be informed that their participation in the study has been completed and may leave. If the subject calibrates successfully, then the experimenter will say the following:

"Now, let's start the experiment. You are going to the grocery store today to purchase a few items from a grocery store. Please enter into the store and shop as you normally would. Once you have found the packages you intend to buy, please circle the number of the product on your grocery list. Do you have any questions?" *[Experimenter shows the participant where to go, hands over the grocery list, and tells the participant to begin when he/she is ready. After the task is complete, the experimenter gives the Post-Experiment Questionnaire].*

When the subject returns from shopping, the experimenter will ask the subject to remove the Tobii Glasses and say the following:

"Thanks for completing the experiment. Please complete the Post-Task Questionnaire *[Experimenter hands participant the Post-Task*

Questionnaire]." [***After the participant completes the questionnaire***]

"The study is now complete. Thank you for your participation. Please feel

free to contact us if you have any additional questions."

At this point, the experimenter will file the completed questionnaire, write the

participant code on the forms, and remove the SD card from the Recording Assistant and

upload to Tobii Studio and rename the file to the participant's code. After 15 participants

have completed the eye-tracking experiment, the data can be processed and sent to the

BaseCamp® dashboards of the participants.

Experiment Management

A literature review was published in 2008 that outlined every major study that

correlated human behavior in response to a pattern found through eye-tracking. Over 60

studies were examined, and the average number of subjects tested was determined to be

14.7. This number is essential in determining the number of subjects required to confirm

experimental validity. The experimental study in the dissertation will run 15 qualified and

successfully calibrated subjects through the design scenario. Each participant will shop

all three projects per iteration. Thus, a total of 45 subjects are required for the experiment.

Each subject will be coded using the following metric:

<date><iteration><randomization>, which process provides anonymity for all subjects

participating. For instance, if subject Jane Smith calibrated successfully and entered into

CUshop™ as the first subject on July 7, 2011, her code would be 71A, and this would be

the only identifying information observers of the data would have for Jane Smith, besides her gender, age, corrective vision devices, and possible vision concerns. Once the participant is in CUshop™, the experimenter will write the code into the box provided on the Pre-Experiment Questionnaire.

Hypothesis Testing

The hypothesis of the experiment is that the use of the *Work/Flow* to develop packaging has a significant impact on target audience awareness of the design developed. The second hypothesis is that by analyzing and eliminating observed design issues determined via eye-tracking, consumer perception of the concept prototype will increase in respect to its competition in the retail array. The null hypothesis states that the use of the *Work/Flow* to develop packaging design does not have a significant impact on target audience awareness of the design developed (Table 6.1).

Hypothesis	Description
H1	The use of the Work/Flow to develop packaging design has a significant impact on target audience awareness of the design developed.
H2	By analyzing and eliminating observed design issues determined via eye-tracking, consumer perception of the concept prototype will increase in respect to competition in the retail array.
null	The use of the Work/Flow to develop packaging design does not have a significant impact on target audience awareness of the design developed.

Table 6.1. Experiment Hypothesis

The first hypothesis will be tested by comparing the total fixation time between the design created through the Work/Flow and a control, which is an initial design created prior to developing within the Work/Flow. The Work/Flow calls for three design iterations, thus the total fixation times from 45 subjects on both the control and designs will be compared using a Paired-Samples T Test. The second hypothesis, which observes the total perception of the designs created in the Work/Flow with respect to the retail array, will be reviewed via heat maps. Because heat maps aggregate all data collected and shows the specific concentration of data through color intensity, this method of analyzing data will quickly convey which designs were perceived the greatest and the least, as well as the effectiveness of each design iteration on consumer perception.

However, the ultimate purpose of the dissertation is to create a *Work/Flow* that allows the many participants of a packaging design project to come together, work efficiently, communicate competently, improve creativity via *flow*, and provide a means to show transparency and ethics throughout a design process. Though the hypothesis states that the *Work/Flow* will have a significant impact on the perception of a design in respect to its retail competition, the end objective is to show that a procedural rhetoric (*Work/Flow*) can be developed and managed efficiently.

Statistical Analysis

Data processing is an intensive procedure for each participant, involving both manual and automatic processes. The Tobii glasses outputs a raw video file where the fixations of the eye are superimposed. The Tobii studio software reads this data along with the locations of the IR markers, which allows the program to aggregate data. Instances where the participant was not observing an AOA (i.e. purchasing coffee) was still recorded, but was not processed. This greatly aided in quickly analyzing the design iterations. Statistical analysis was conducted via ten metrics and four visualization techniques. Metrics are aggregated dependent variables that can be processed via statistical methods to determine significance and variance between participants. Visualization techniques are methods in which combined data can be illustrated to simulate real-time observations for subjects superimposed over the AOA.

Metric: Time to first fixation

The 'time to first fixation' metric observes each AOI and reports back the length of time (seconds) upon entering the AOA to fixate. For instance, within the AOA defined for olive oil, each extra virgin product including the design iteration will be defined as a specific AOI. Once the subject views this area, the time (seconds) that elapsed between entering the AOA and fixating on each AOI will be reported.

Metric: First fixation duration

The 'first fixation duration' metric observes the length of time (seconds) that a participant fixated on the AOI for their first duration.

Metric: Fixations before

The 'fixations before' metric observes the total number of fixations prior to fixating on each AOI. For instance, in the olive oil AOA, each AOI will receive a number of total fixations prior to initially fixating on the specific AOI.

Metric: Fixation Duration

The 'fixation duration' metric totals the amount of time (seconds) on a specific AOI. For instance, within the AOA defined for grits, each product including the design iteration will be defined as a specific AOI. This metric will report back the total amount of time (seconds) that each participant fixated on each AOI. This is also referred to as 'dwell time' and 'gaze duration.'

Metric: Total Fixation duration

The 'total fixation duration' will total the number of fixations (seconds) for each AOI. This metric is foundational in determining whether or not the Work/Flow is effective in increasing the persuasiveness of a design iteration.

Metric: Fixation count

The 'fixation count' metric records the total number of fixations within an AOI for each participant. This metric is foundational in determining whether or not the Work/Flow is effective in increasing the persuasiveness of a design iteration.

Metric: Visit Duration

The 'visit duration' metric will display the total number of seconds each participant viewed each AOI.

Metric: Percentage Fixated

The 'percentage fixated' metric will determine each AOIs capture of fixations as a percentage of all other AOIs among all participants.

Metric: Pupil Dilation

The diameter of the pupil will be recorded at 30Hz for each participant. This data will be analyzed to determine if a 20-30% dilation of the pupil changed throughout the

process. If it is determined that pupil dilation occurred, time of occurrence will be determined and compared to the raw video file. The object that determined the dilation will be recorded as a seductive design to that participant.

Metric: Purchase Decision

When the participant completes his or her shopping experience and exits CUshop™, they will mark the number of the product on their grocery list. This information will be tallied at the end of the experiment to determine what products were purchased.

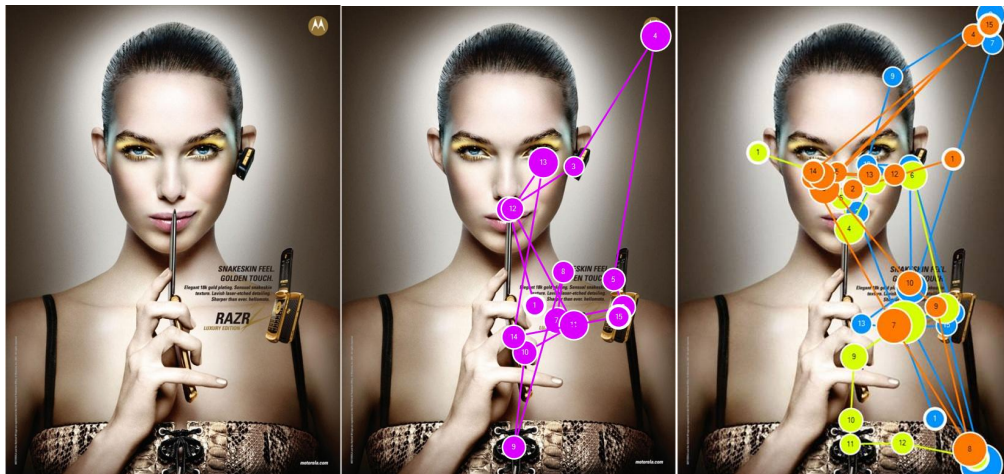## Visualization Technique: Gaze Plot

Figure 6.6: Series of Disclosed Gaze Plots Example (Eyetracking, 2011)

Gaze plots are useful in determining the order in which the eye moved, fixated and stayed within an AOA. In Figure 6.6, the first picture shows an AOA that was eye-

tracked. The second illustration shows the view of one subject. The lines between the circles, defined as saccades, represent the movement of the eye and the circles represent individual fixations. The number inside of the fixation is linear, where the first number is the initial point of view and the highest number is the last point of view. The diameter of each fixation is representative of the length of time spent on that fixation. The third image in Figure X shows the ability of the eye tracking software to superimpose more than one subject's gaze plot at a time. With respect to the *Work/Flow*, gaze plots allow designers to view in one instance the entire spectrum of views on an AOA. Gaze plots provide a great amount of information, but can become cumbersome and cluttered with data points.
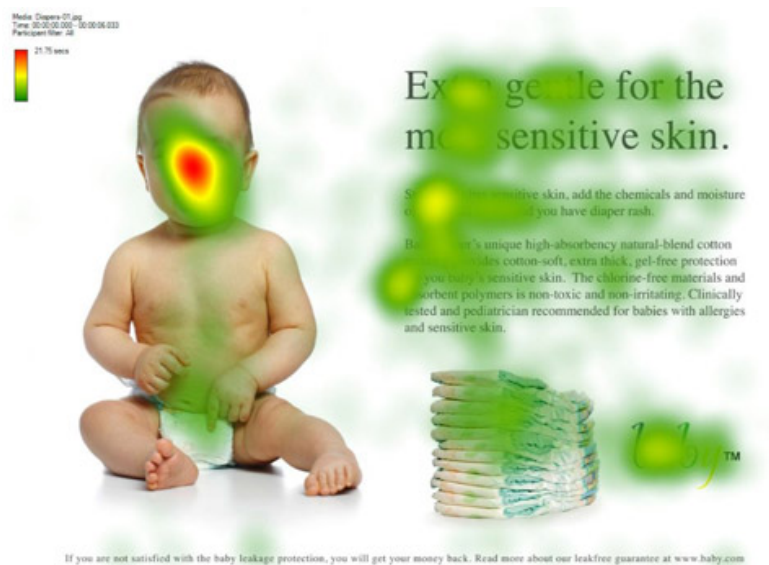
Visualization Technique: Heat Map

Figure 6.7. Heat Map Example (Smashing, 2009)

Heat maps are the most common visualization technique from contemporary eye-tracking devices. A heat map shows an intensity of fixations, represented by color. The color spectrum moves from a dark green through yellow to red, where green represents minimal fixations and red at the most concentrated fixations. Heat maps provide the design team with quick feedback on which designs received the most attention, but provide less detail on how/why and are unable to differentiate subjects.
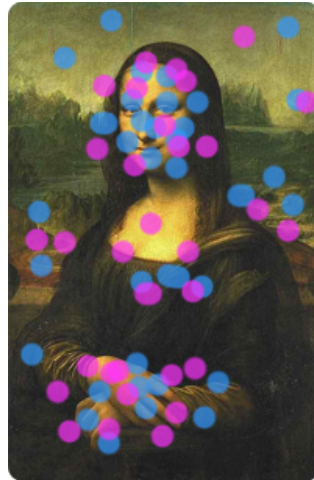
Visualization Technique: Bee Swarm

Figure 6.8: Bee Swarm Example (Consumer, 2011)

Bee swarms display the gaze duration of each participant by a linear, animated video output. It is useful in displaying how participants perceived different test iterations.

Visualization Technique: Raw Video

A video file that shows the real-time observations of each subject along with their scan paths overlaid.

<u>Data Analysis and the Design Team</u>

The goal of eye-tracking within the *Work/Flow* is to provide the design team a series of qualitative and quantities data on design iterations. It is to be used as a guide to see how the iterations were perceived and the persuasive and seductive influence on test subjects. There is no specific procedure on how to interpret the data, but only to review and seriously play with the data as the team determines best and to test again. The eye-tracking project may also allude to the market viability of the product if it is not noticed in the competitive array. The test to determine if the Work/Flow was successful is in testing the first hypothesis, where it will be determined if designs created through the Work/Flow are perceived significantly more than the control.

<u>Conclusion</u>

As iterations are tested in CUshop™, data will be organized and provided to the BaseCamp® Dashboard for participants in the design team to review. The review itself is qualitative and reflective and will be quantified through the test of the hypothesis. If the hypothesis is proven true, then the Work/Flow can be considered a legitimate design aid that enables designers to create better designs. The implications of this method are great, and would be a substantial benefit to industry as well as academia. However, the

empirical study is a necessary aspect of not only the dissertation but also the continual improvement of a packaging system via a participatory strategy; the only way to decipher the results is to include as many stakeholders as possible. In essence, the entire process is serious play: a game that is intended to help designers learn more about what they are creating. And the results are only used in aiding the creative process, thus bettering the game. Rhetorical persuasion and seduction play a major role in the development of packaging as well. The eye-tracking experiments not only inform the designer of the rhetorical implications of their designs, but the competition as well. Lastly, process is completely rhetorical: the ethos of the packaging is observed along with the effect of its logos (information design/visual structure) and the emotional (seductive) appeal to the audience or pathos. If this finding can be articulated for a packaging design project, then an entire new field of rhetoric can be established: the rhetoric of packaging.

CHAPTER SEVEN

RESULTS

This chapter will illustrate the data collected from the eye-tracking study and generated on SPSS. The results of each hypothesis test will be shown along with the purchase decision data and Post-Experiment Questionnaire.

The first hypothesis (H1) stated that the total fixation time for designs developed in the Work/Flow would be greater than designs developed outside of the Work/Flow. To determine this, a paired samples t-test was used to observe the validity of the hypothesis

Hypothesis Results

H1: The use of the Work/Flow to develop packaging design has a significant impact on target audience awareness of the design developed.

Category: Grilling Accessories

Metric: Total Fixation Duration (seconds)

Method: Paired Samples T-Test

N: 45 subjects (tests A, B, C)

Result: $t(101) = -4.1$, $P < 0.0005$.

Due to the means of the two designs and the direction of the t-value it can be concluded that there was a statistically significant improvement in total fixation duration of designs created in the work/flow from 0.84 ± 0.84 s to 1.48 ± 1.52 ($P < 0.0005$).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	control	.8081	45	.83670	.08285
	workflow	1.4840	45	1.51687	.15019

Figure 7.1. Paired Sample Statistics for H1: Grilling Accessories

Figure 7.1 illustrates the paired samples statistics information, showing the standard deviation (measured in seconds), the mean and standard error mean. This information illustrates the range in which the control differed in fixation time from the Work/Flow designs.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	control & workflow	45	.089	.372

Figure 7.2. Paired Samples Correlations for H1: Grilling Accessories

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	control – workflow	-.67588	1.66559	.16492	-1.00304	-.34873	-4.098	101	.000

Figure 7.3. Paired Samples Test for H1: Grilling Accessories

H1: The use of the Work/Flow to develop packaging design has a significant impact on target audience awareness of the design developed.

Category: Extra Virgin Olive Oil

Metric: Total Fixation Duration (seconds)

Method: Paired Samples T-Test

N: 45 subjects (tests A, B, C)

Result: $t(94) = -2.53$, $P < 0.0005$.

Due to the means of the two designs and the direction of the t-value it can be concluded that there was a statistically significant improvement in total fixation duration of designs created in the work/flow from 0.88 ± 1.08 s to 1.32 ± 1.40 ($P < 0.0005$).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	control	.880737	45	1.0811541	.1109241
	workflow	1.326316	45	1.3988042	.1435143

Figure 7.4. Paired Sample Statistics for H1: Extra Virgin Olive Oil

Figure 7.4 illustrates the paired samples statistics information, showing the standard deviation (measured in seconds), the mean and standard error mean. This information illustrates the range in which the control differed in fixation time from the Work/Flow designs.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	control & workflow	45	.062	.548

Figure 7.5. Paired Samples Correlations for H1: Extra Virgin Olive Oil

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2–tailed)
Pair 1	control – workflow	–.4455789	1.7136583	.1758176	–.7946690	–.0964889	–2.534	94	.013

Figure 7.6. Paired Samples Test for H1: Extra Virgin Olive Oil

H1: The use of the Work/Flow to develop packaging design has a significant impact on target audience awareness of the design developed.

Category: Grits

Metric: Total Fixation Duration (seconds)

Method: Paired Samples T-Test

N: 45 subjects (tests A, B, C)

Result: $t(86) = -3.94, P < 0.0005$.

Due to the means of the two designs and the direction of the t-value it can be concluded that there was a statistically significant improvement in total fixation duration of designs created in the work/flow from 0.36 ± 0.60 s to 1.13 ± 1.18 ($P < 0.0005$).

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	control	.626092	45	.5964592	.0639471
	workflow	1.136207	45	1.1767004	.1261555

Figure 7.7. Paired Sample Statistics for H1: Grits

Figure 7.7 illustrates the paired samples statistics information, showing the standard deviation (measured in seconds), the mean and standard error mean. This information illustrates the range in which the control differed in fixation time from the Work/Flow designs.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	control & workflow	45	.198	.066

Figure 7.8. Paired Samples Correlations for H1: Grits

Paired Samples Test

			Paired Differences						
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2–tailed)
Pair 1	control – workflow	−.5101149	1.2092189	.1296419	−.7678345	−.2523954	−3.935	86	.000

Figure 7.9. Paired Samples Test for H1: Grits

The second hypothesis (H2) stated that by analyzing and eliminating observed design issues determined via eye-tracking, consumer perception of the concept prototype will increase in respect to competition in the retail array. To determine this, an ANOVA table in combination with heat maps were used to observe the validity of the hypothesis

H2: By analyzing and eliminating observed design issues determined via eye-tracking, consumer perception of the concept prototype will increase in respect to competition in the retail array.

Category: Grits

Metric: Total Fixation Time (#)

Method: Heat Map

N: 45 subjects (tests A, B, C)

Figure 7.10: Grits Heat Map: Test A

Figure 7.10 illustrates there were four primary fixated designs, one being the concept

developed via the Work/Flow

Figure 7.11: Grits Heat Map: Tests B and C combined

Figure 7.11 illustrates there were four primary fixated designs, the Work/Flow concept was not one of these

H2: By analyzing and eliminating observed design issues determined via eye-tracking, consumer perception of the concept prototype will increase in respect to competition in the retail array.

Category: Olive Oil

Metric: Total Fixation Time (#)

Method: Heat Map

N: 45 subjects (tests A, B, C)

Figure 7.12: Olive Oil Heatmap: Test A

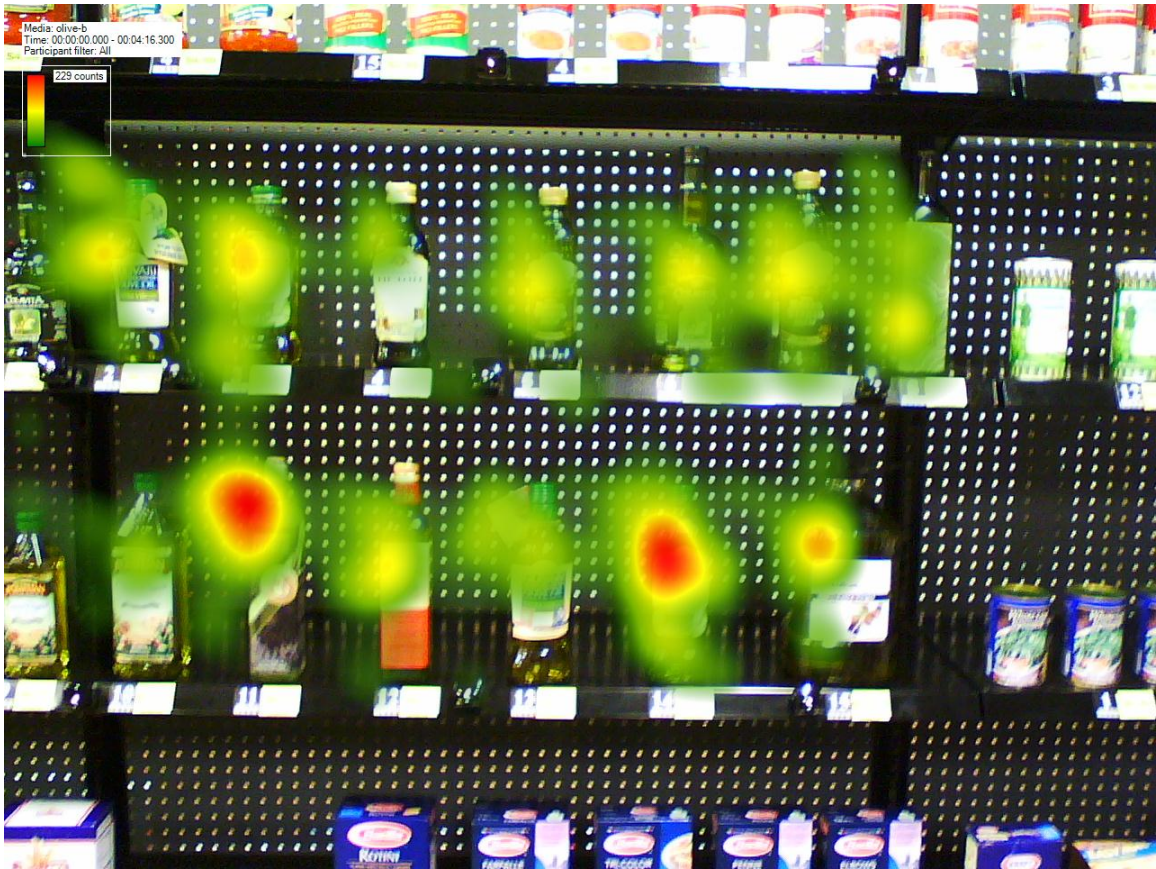Figure 7.12 illustrates there were two primary fixated designs in this array.

Figure 7.13: Olive Oil Heat Map: Tests B and C combined

Figure 7.13 illustrates there were two primary fixated designs, one being the concept developed via the Work/Flow. This shows improvement in fixation time as the design changed.

H2: By analyzing and eliminating observed design issues determined via eye-tracking, consumer perception of the concept prototype will increase in respect to competition in the retail array.

Category: Grilling Accessories

Metric: Total Fixation Time (#)
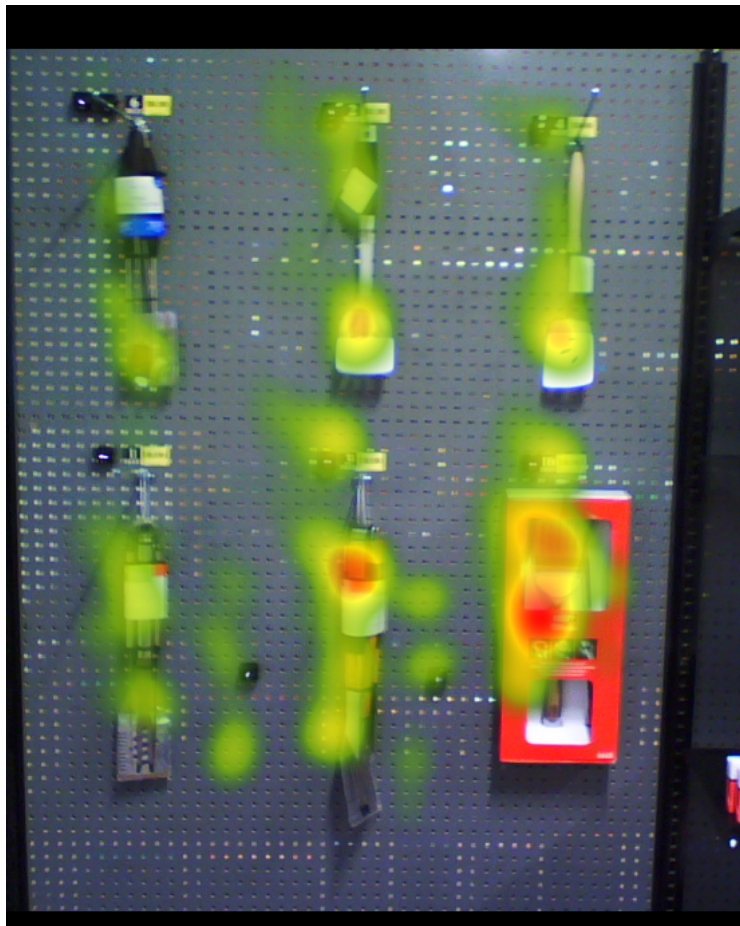
Method: Heat Map

N: 45 subjects (tests A, B, C)

Figure 7.14: Grilling Accessories Heat Map: Test A

Figure 7.14 illustrates there were two primary fixated designs, one being the concept developed via the Work/Flow.

Figure 7.15: Grilling Accessories Heat Map: Tests B and C combined

Figure 7.15 illustrates there were four primary fixated designs, however the amount of time fixated on the Work/Flow design stayed the same in these tests as it did in Test A.

Cluster Maps of Combined Tests

Figure 7.16: Cluster Map of Grits

Figure 7.16 cluster map shows the areas of focus from all subjects on the grits AOA.

Figure 7.17: Cluster Map of Olive Oil

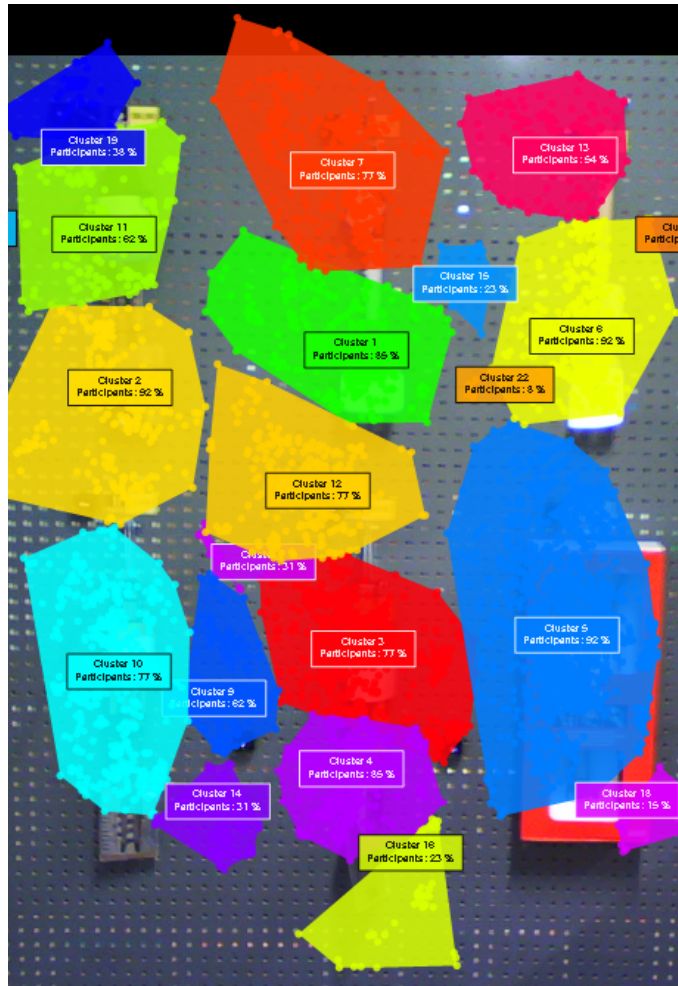Figure 7.17 cluster map shows the areas of focus from all subjects on the grits AOA.

Figure 7.18: Cluster Map of Grilling Accessories

Figure 7.18 cluster map shows the areas of focus from all subjects on the grits AOA.

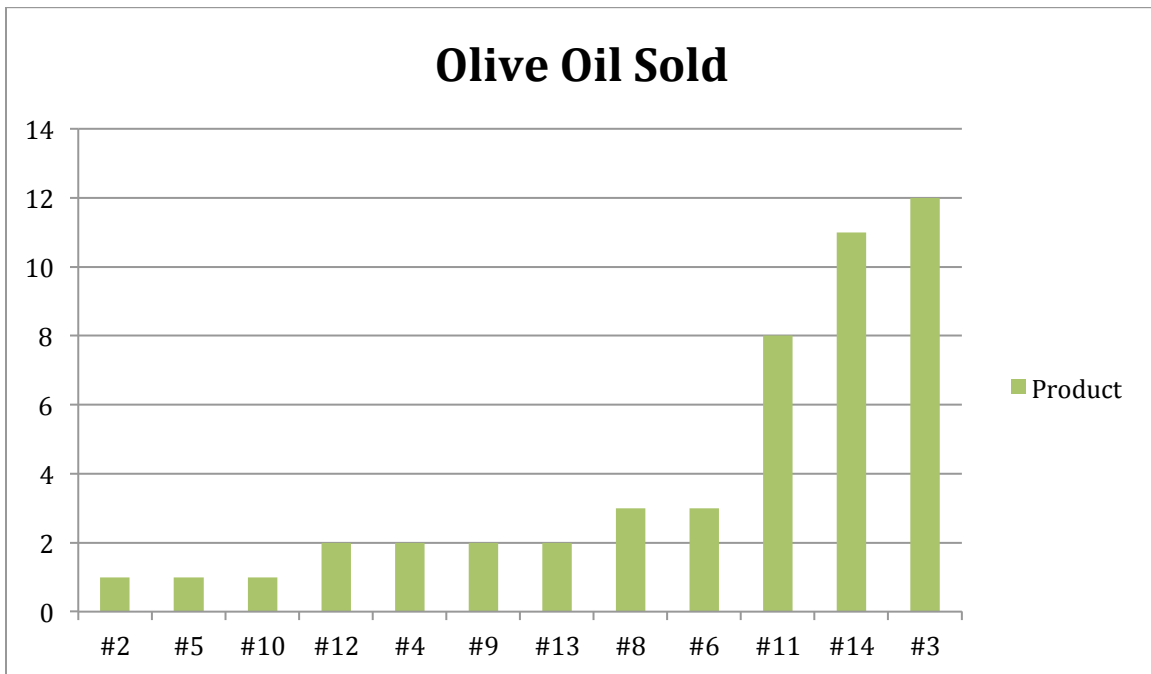Figure 7.19: Identification of Olive Oil on Shelf

Figure 7.20: Olive Oil Sold

Figures 7.19 and 7.20 illustrate the total amount of product sold for all tests. The superimposed heatmaps correlate in that the three primary designs fixated were the three primary designs observed.

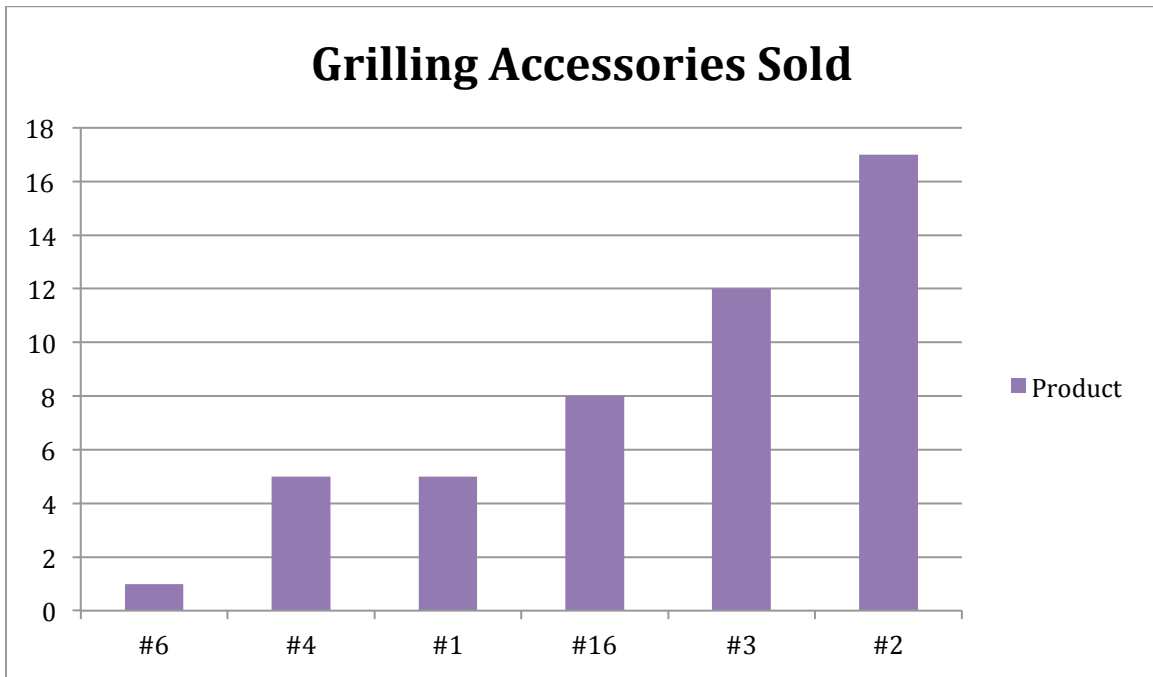Figure 7.21: Identification of Grilling Accessories on Shelf

Figure 7.22: Grilling Accessories Sold

Figures 7.21 and 7.22 illustrate the total amount of product sold for all tests.

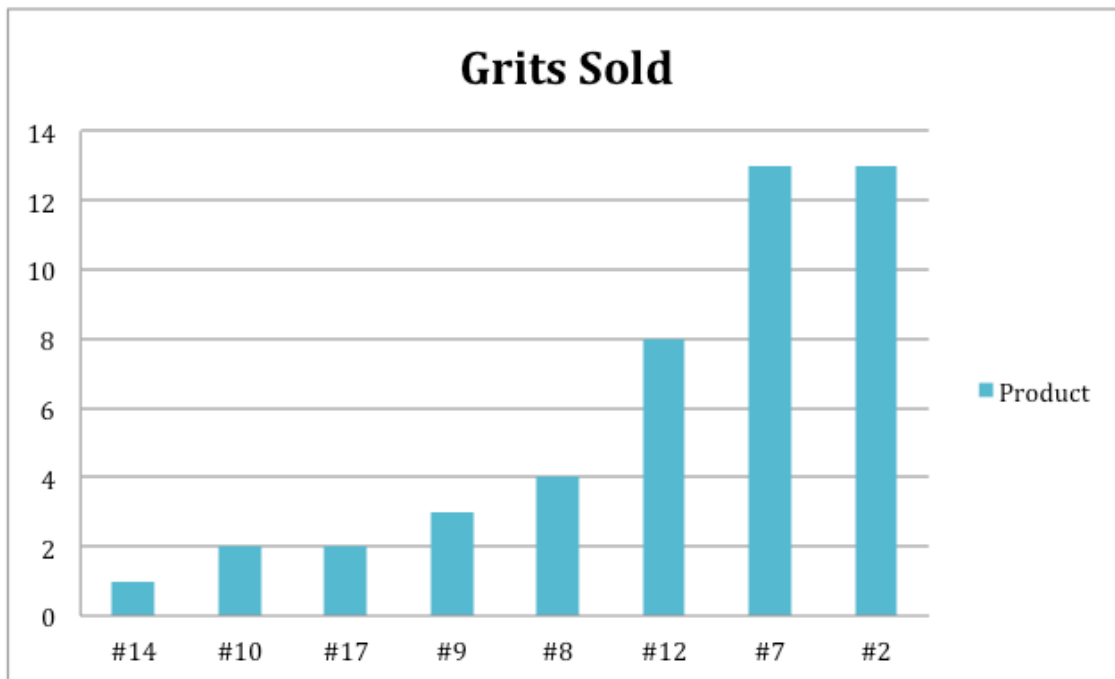Figure 7.23. Identification of Grits on Shelf

Figure 7.24. Grits Sold

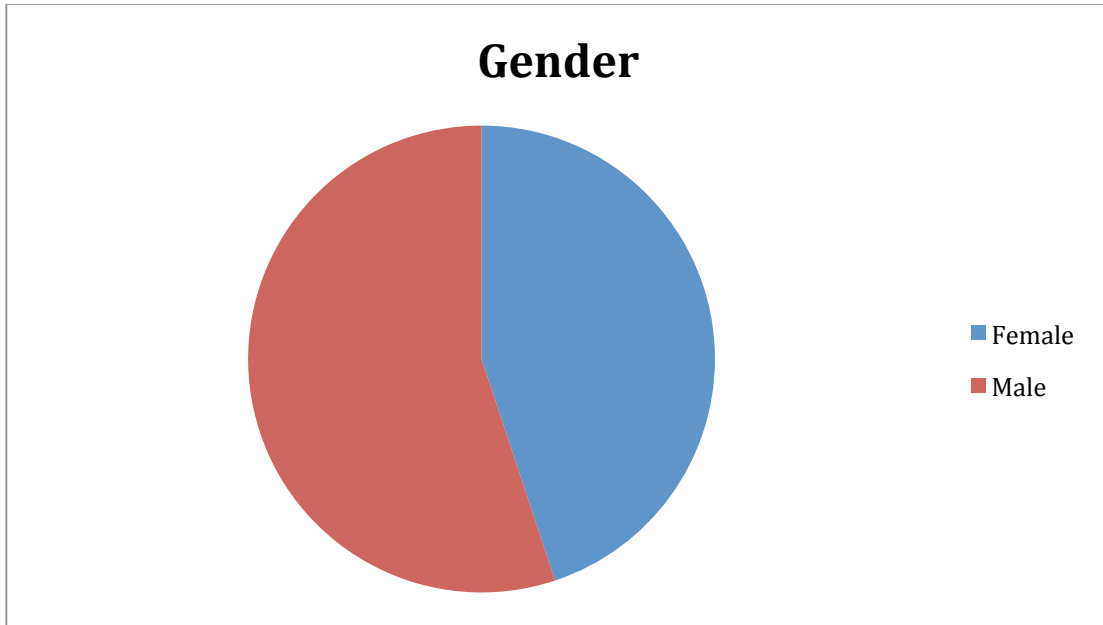Figures 7.23 and 7.24 illustrate the total amount of product sold for all tests.

Figure 7.25: Gender of Subjects
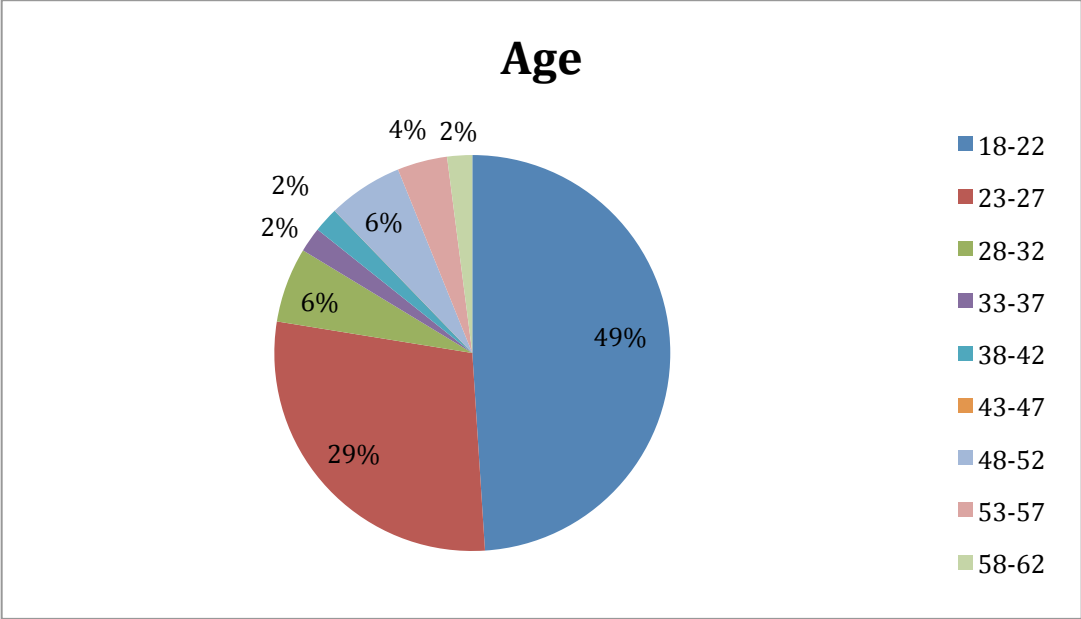
Figure 7.26. Ages of Subjects
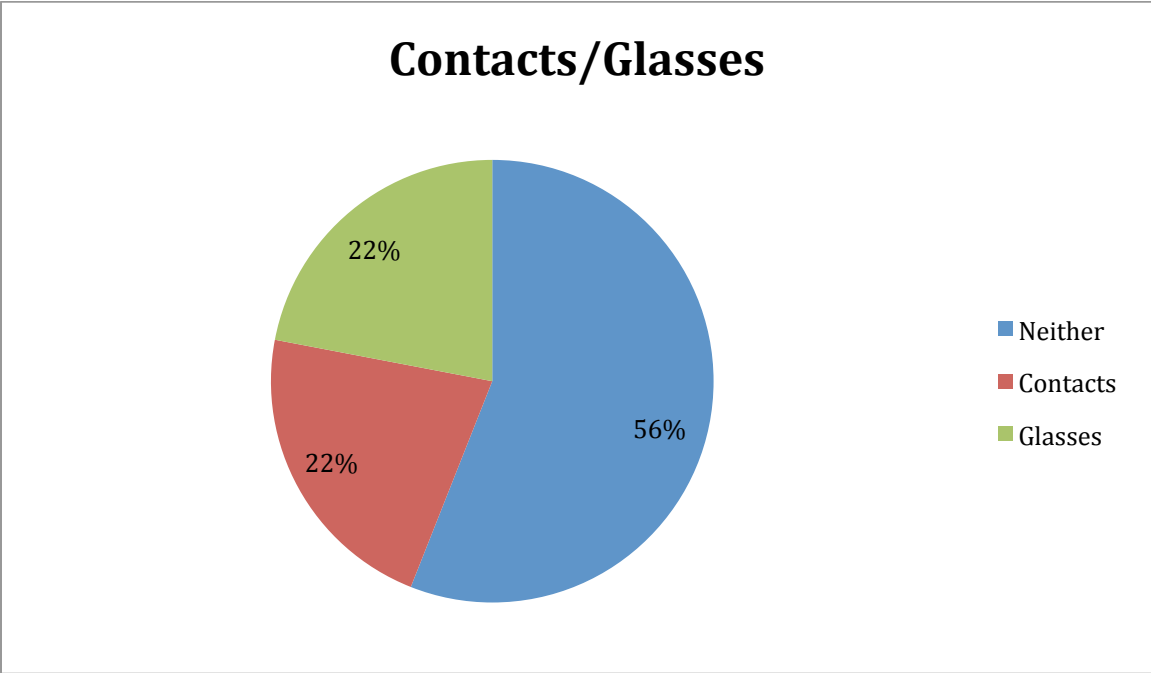
Figure 7.27: Eye Correction for Subjects

My interactions with the grocery store felt natural

- 2%
- 13%
- 19%
- 66%

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree
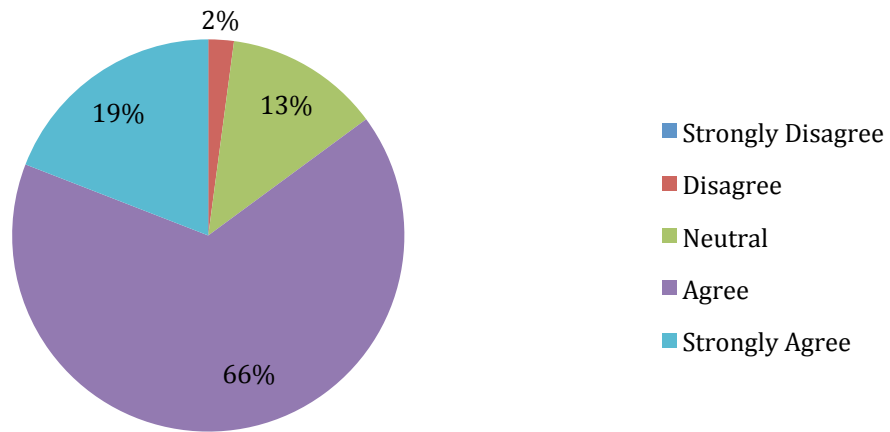
Figure 7.28. Subject Store Interactions

I felt immersed in the grocery store

- 0%
- 2%
- 8%
- 30%
- 60%

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree
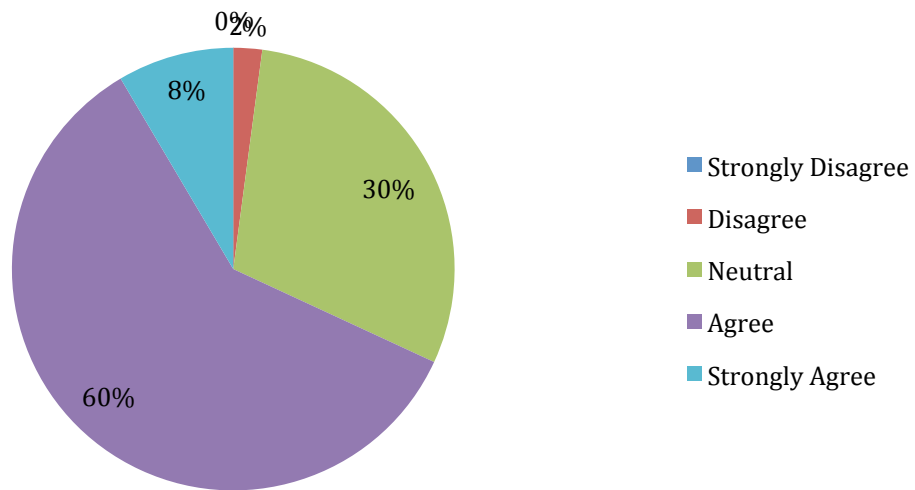
Figure 7.29: Subject Immersion
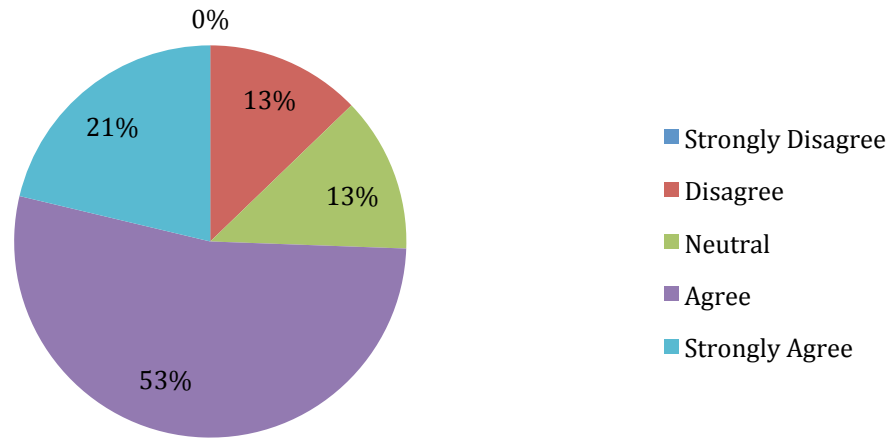
Figure 7.30: Subject Ability to Locate Products
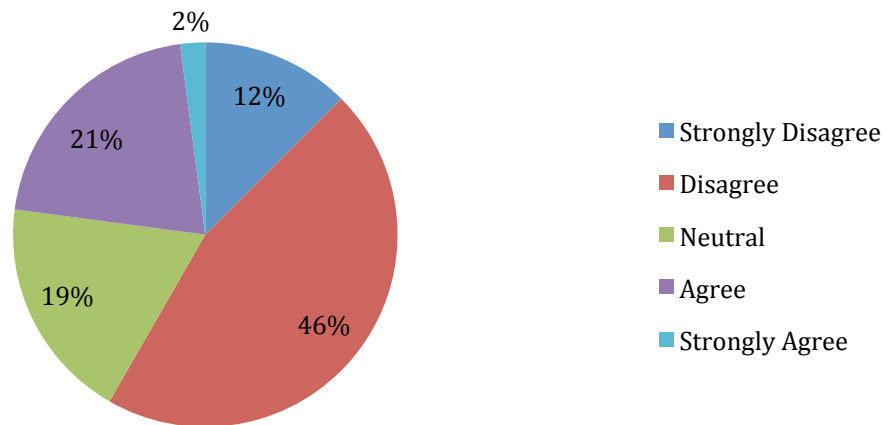
Figure 7.31: Subject Awareness

I felt like I was in an experiment
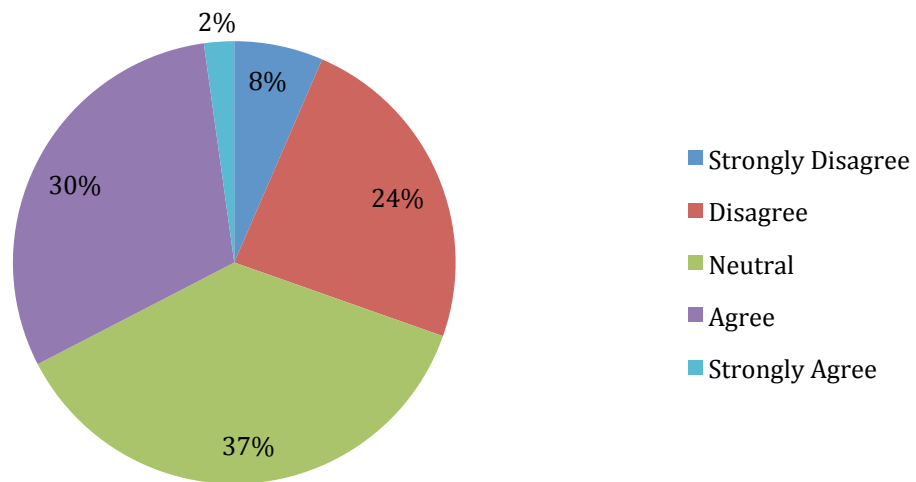
Figure 7.32: Subject Feelings of being in an Experiment

My experience shopping was consistent with my real-world experience
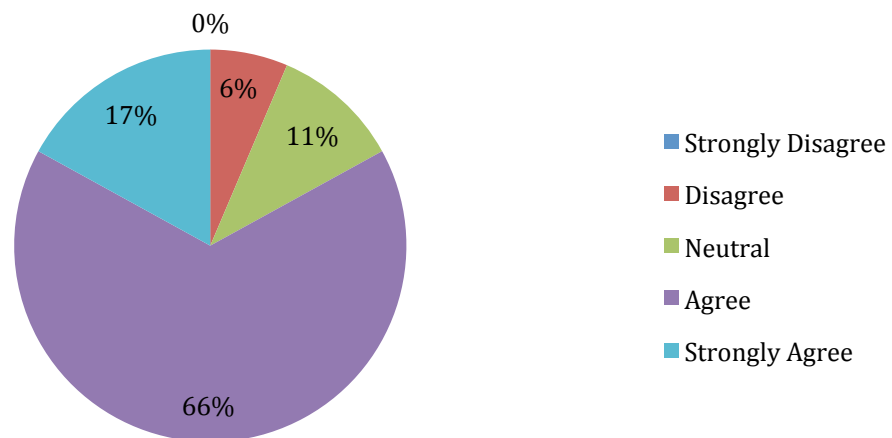
Figure 7.33: Subject Comparison of CUshop™

From the entrance, I was able to visually survey and search the environment

0%

13%

4%

24%

59%

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
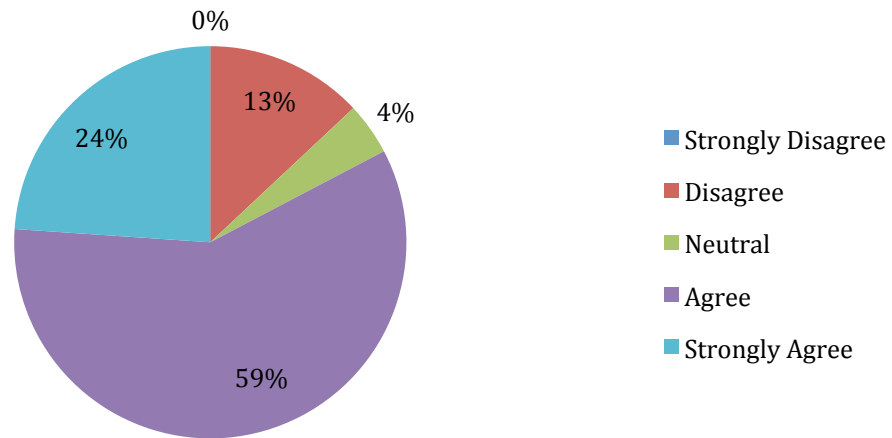
Figure 7.34: Subject Visuals and Survey

I was able to examine objects closely

36%

60%

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
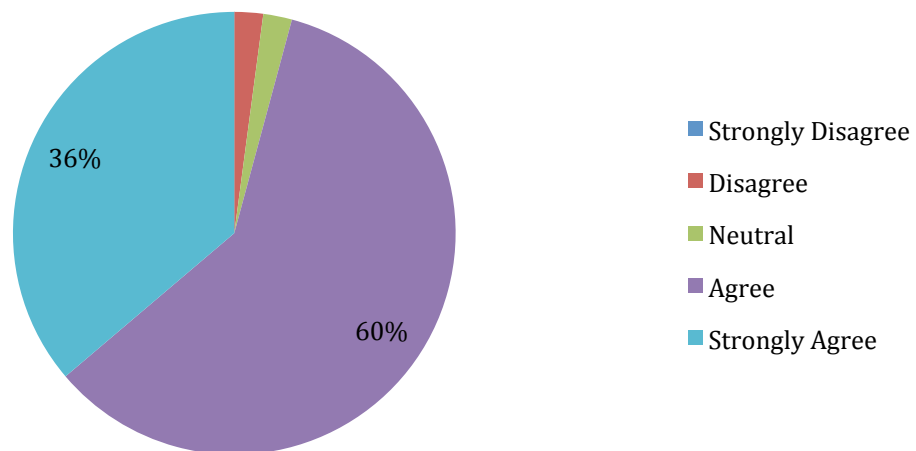
Figure 7.35: Subject Examination
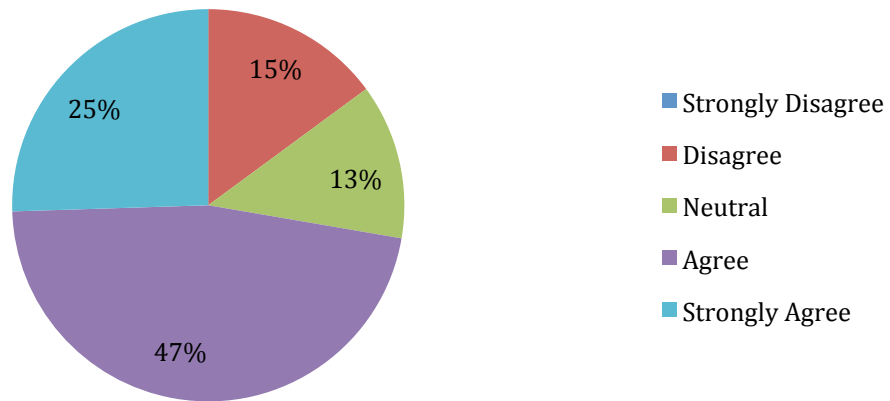
Figure 7.36: Subject Examination 2
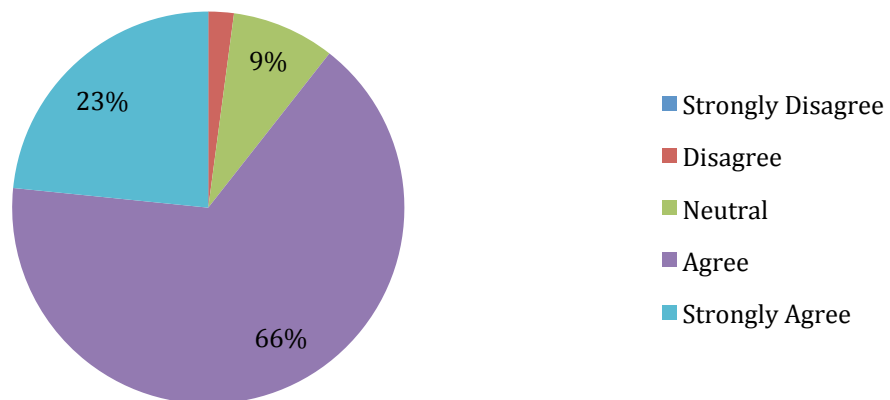
Figure 7.37: Subject Purchase Decision
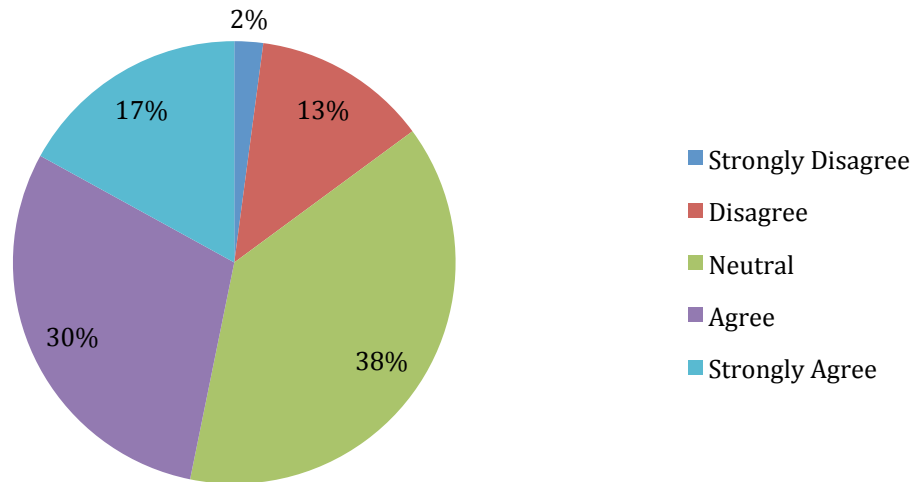
Figure 7.38: Subject Comfort
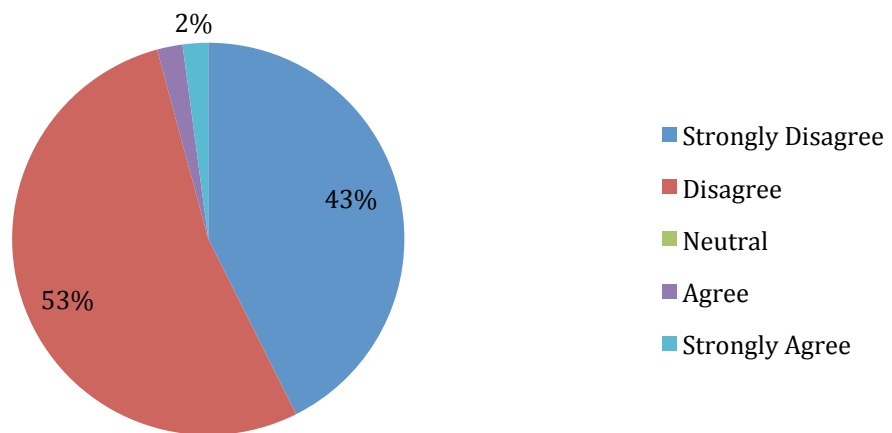
Figure 7.39: Subject Ability to Perform Tasks

The store felt like a real grocery store

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

9%
17%
17%
57%
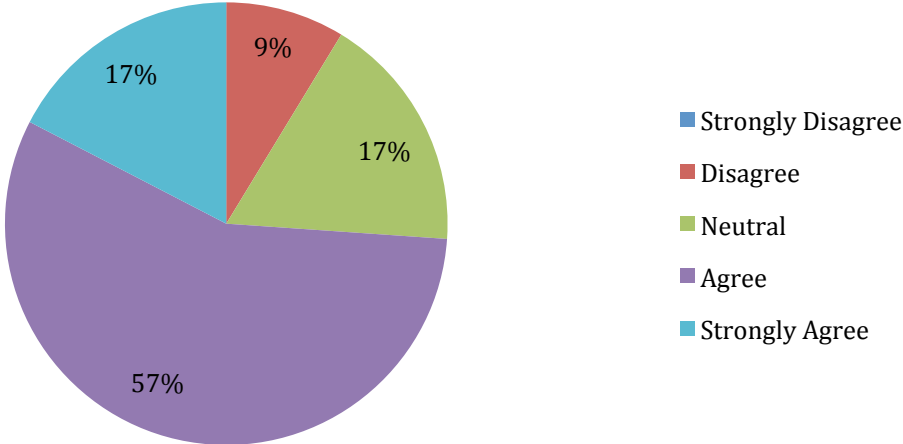
Figure 7.40: Subject Perceived Realism

I understood what was expected of me in the experiment

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

30%
68%
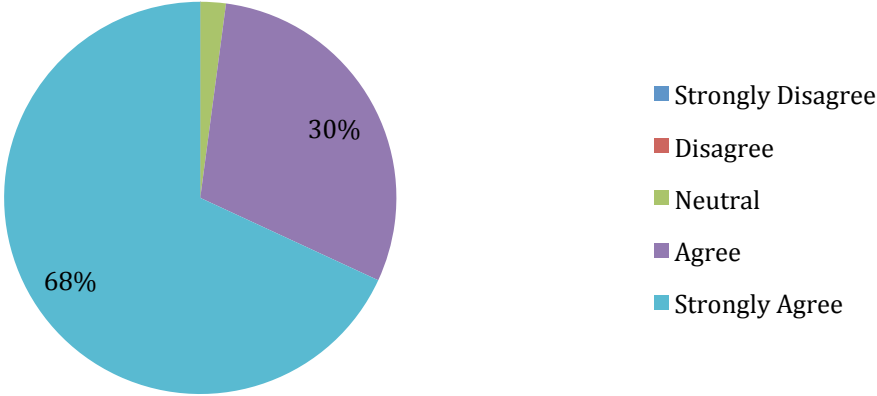
Figure 7.41: Subject Comprehension
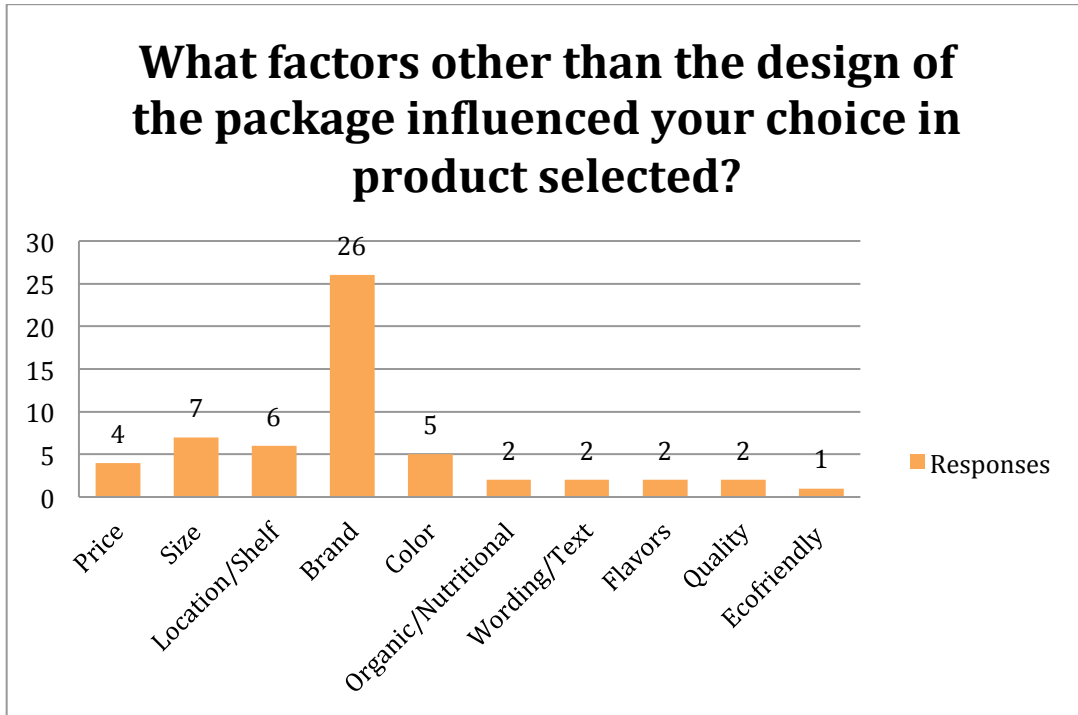
Figure 7.42: Subject Purchase Influences
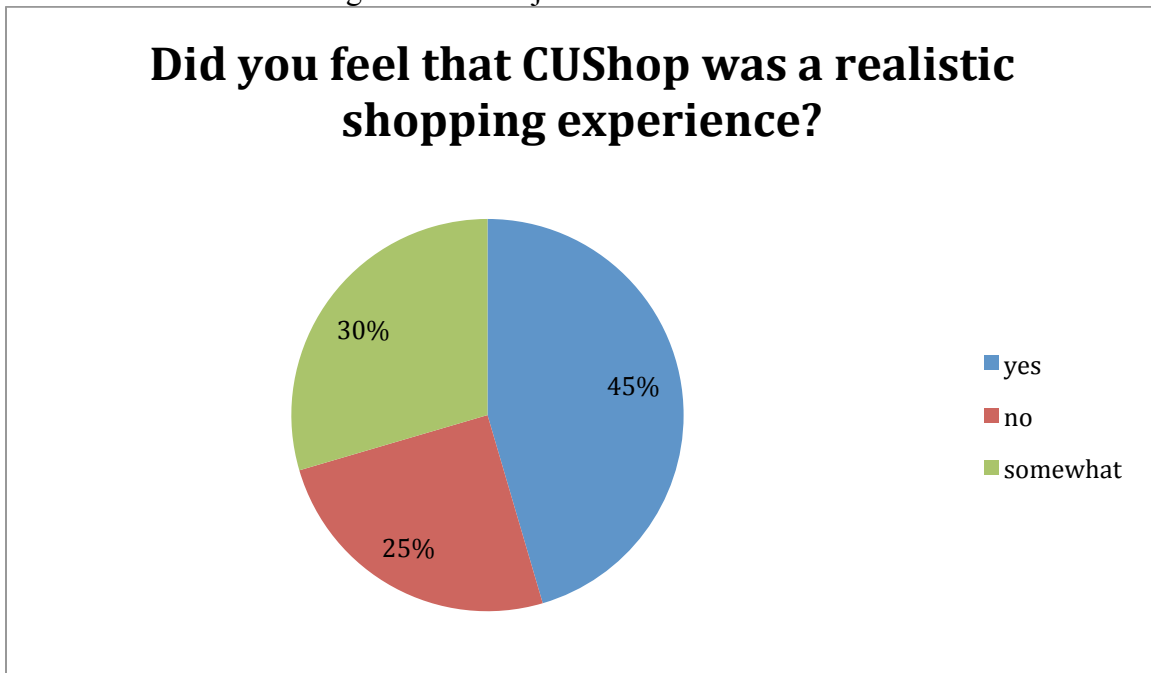
Figure 7.43: Subject Realism 2

165
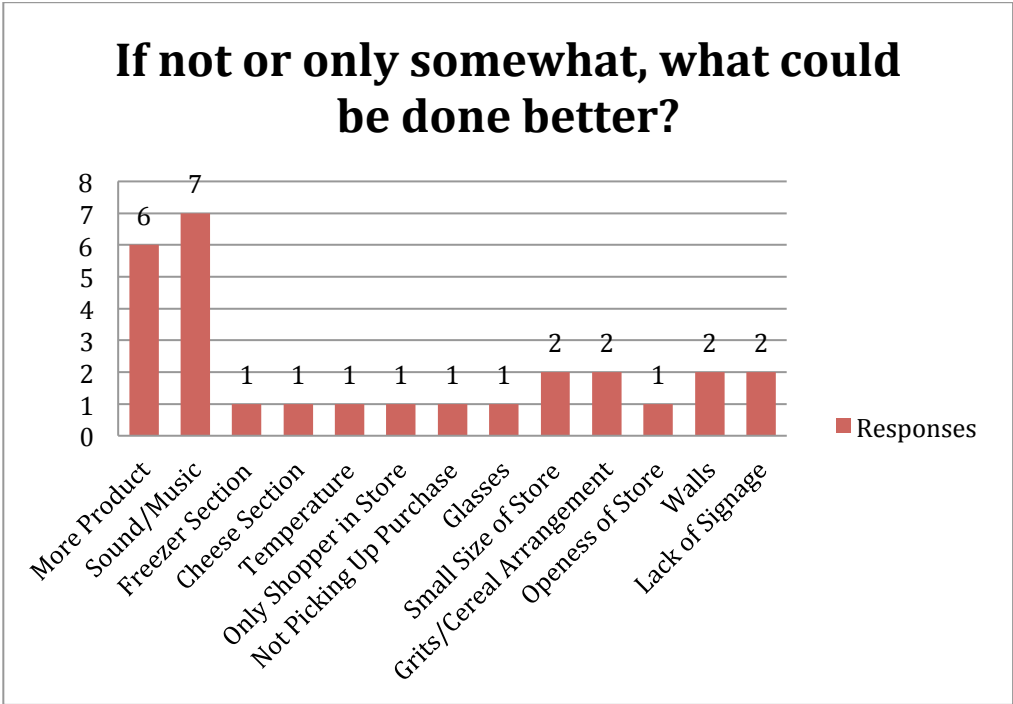
Figure 7.44: Subject Suggestions to improve CUshop™
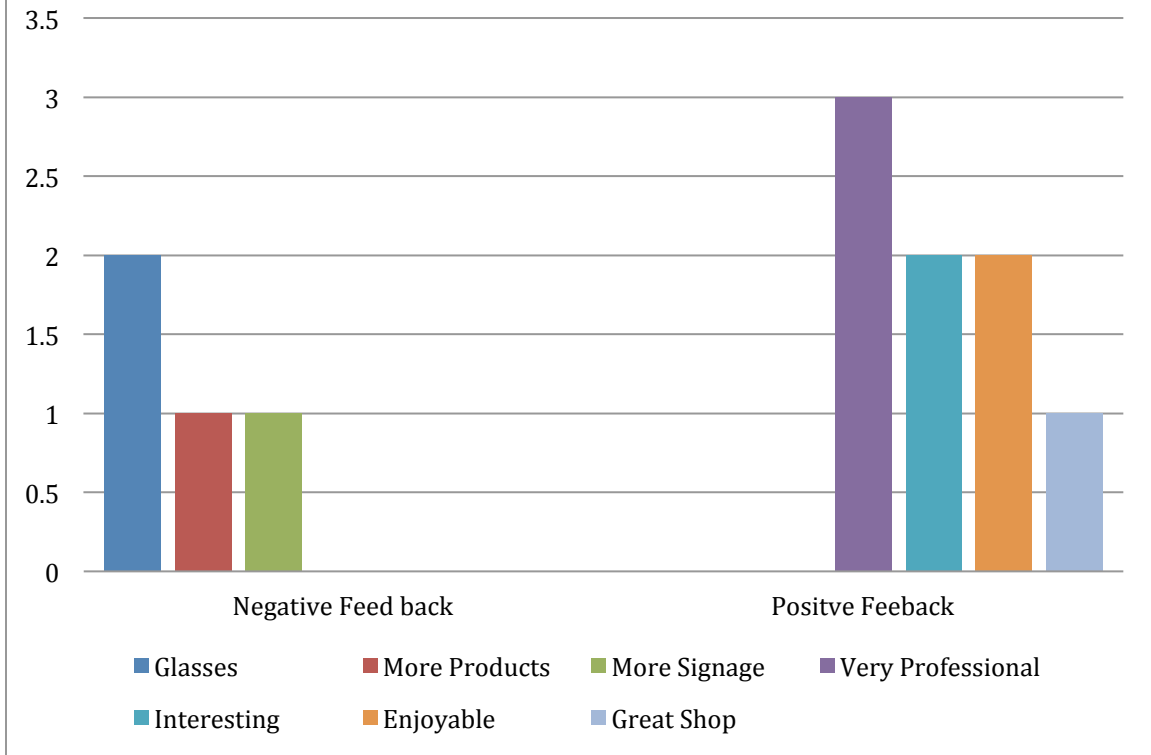
Figure 7.45: Subject Additional Feedback

CHAPTER EIGHT

DISCUSSION AND PEDAGOGICAL APPROACHES

Tobii Glasses and CUshop™ Setup

Though the methodology of preparing CUshop™ with the Tobii IR markers and Glasses setup was followed exactly as described in the instructions, it was found that many attributes of the shop required modification. First, it was very difficult for the Tobii Glasses to take a snapshot and identify all of the IR markers in the array. Though Tobii states that only four IR markers are required to define an AOA (Tobii, 2010), it was difficult to collect valid data with only four markers. The Tobii Glasses inconsistently identified IR markers, and after many different pre-trials, it was determined that at least eight markers needed to be present to cover a four-foot shelf span. Next, it was found that the Tobii Glasses inconsistently identified the top left IR marker, and thus two markers were used in these areas in hopes to collect better data. However, it required many attempts for the Tobii Glasses to take a snapshot with both upper left IR markers defined. It was also found that any presence of natural light dramatically reduced the effectiveness of the IR markers. Because quantitative data was important, data aggregation was necessary to visualize overall consumer perception.

Shelving had its own series of issues. During the first pre-trial, it was difficult to collect data, as one shelf was not perpendicular to the wall. The angle of the shelf was approximately 15 degrees off from normal, which had a dramatic effect on data collection. In summary, data was not useful if the shelves were not straight. Following this same logic, eye tracking data from participants approaching shelving at an angle

could also not be identified by the IR markers. However, most participants approached at an angle and then turned normal to the shelves to observe the array.

Overall, management and logistics concerning participants went better than expected. Some participants were unable to calibrate, but this is not unusual for eye-tracking. Though many consumers had a difficult time calibrating to the lower-left side, most achieved a five-star calibration regardless. This issue would be assumed for a right-eye, monocular eye-tracker. One interesting fact was that while observing participants from the one-way viewing room, many of the participants unintentionally adjusted the glasses during the experiment. However, raw data observed from these participants did not seem to be affected.

<u>Data extraction</u>

After meticulously setting up the IR markers and performing multiple pre-trails, data extraction from Tobii Studio was relatively painless. Though the built-in charts and graphs were unusable and slow to process, it was determined to be more efficient to export all data into Microsoft Excel and then into IBM's SPSS without major issue.

Collecting participant feedback was extremely easy with SurveyMonkey.com. There were no issues in collecting or analyzing data with SurveyMonkey.com, and the built in analysis checks were easy to preview and did not require a secondary analysis program to determine means and percentages.

Hypothesis Testing

Testing the differences in fixation times between the control design and Work/Flow design through a paired-sample T Test indicates that the Work/Flow designs were viewed significantly longer than the control. Thus, the null hypothesis can be rejected. Not only did the Work/Flow produce better designs than when compared to the control, but the design process was faster and more efficient when requesting the approval of the iteration from project stakeholders.

The second hypothesis, where total fixation duration on iterations would increase upon each revision presents mixed reviews. Statistical data via ANOVA testing indicates that fixations did not significantly differ from competitive products, with the exception of olive oil. The design team used data found on Test A, redesigned, and saw a significant improvement in perception in Test B and Test C. This is exciting news, however, the other two categories did not significantly increase in perception per iteration.

From a qualitative perspective, heat maps for two of the products show high concentrations of fixations on the iterations (olive oil and grilling accessories). Yet, because the statistical analysis could not determine significance, the null hypothesis is accepted in that the Work/Flow did not improve as iterations increased, except in the case of olive oil. However, it should be noted that eye-tracking did provide immediate identifications of what designs were perceived the most. In the case of olive oil, the Work/Flow produced a design that was viewed longer than the majority of the retail array. Thus, data provided to the design team was beneficial, yet did not have a significant effect in continually improving

A major finding in this experiment was identified in that the participants looked longer at items not purchased than purchased. Interestingly, participants looked the longest at the Work/Flow olive oil design than the competitive product that was purchased. Figure X best illustrates this phenomenon, where the Work/Flow design was actually viewed longer than the competitive product purchased. In Figure 8.1, the Work/Flow design received the greatest attention, were it was purchased twice, and a competitive product viewed minimally was purchased 14 times.
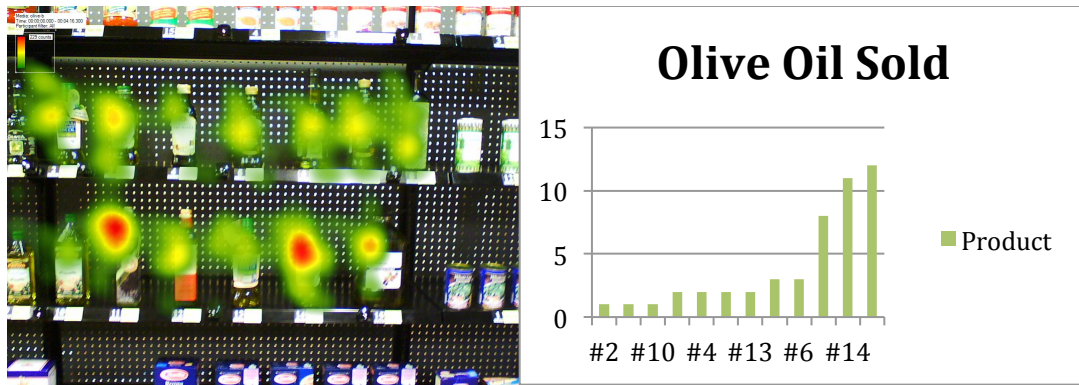
Figure 8.1. Olive Oil Sold vs Olive Oil Heat Map

The answer to the phenomenon was found in the survey results, Figure 7.44, where 26 of the 45 participants reported that "Brand" had the greatest influence on their purchase decisions. From the data recorded, it is clear that brand recognition and trade colors have an impact on not only product purchase decisions, but also perception. Thus, it can be theorized that consumer perception is independent of purchase decision.

Overall it was determined that the Work/Flow significantly improved fixation time of designs developed within the process when compared to designs not developed within the process. However, this is not due to the results from eye-tracking experimentation, it is directly due to the influence of the global products database and the organizational system of Basecamp™. Secondly, it is clear that eye-tracking provides a clear indication of success in the retail array by observing the total fixation time on each AOI in the product category AOA. Though eye-tracking cannot determine the hierarchical order of success within designs in the retail array, it can, however, quickly identify successful products and unsuccessful products, as fixations had a direct correlation on product sold.

Experiment and CUshop™ Experiences

Next to the development and successful implementation of the Work/Flow, one of the most exciting aspects of the study was designing and constructing a successful research area for consumer eye-tracking. 85% of participants agreed or strongly agreed that their interactions with CUshop™ were natural. This was confirmed with the 84% who agreed or strongly agreed that the experience was consistent with real-world experiences. 74% stated CUshop™ felt like a real grocery store. 68% stated they were immersed in the grocery store and 58% stated they were not constantly aware of the glasses and sensors. The experiment was logistically successful as well. 98% of participants understood what was expected of them. Participants were also asked to make

suggestions to improve the store, where the feedback was overwhelming in having music play during the experience as well as stock the store with more product.

Pupil Dilation

One may have noticed that the results for pupil dilation are not illustrated in the Results section. This is due to the fact that although promising data was captured from the Tobii Glasses during the pilot studies, after analysis, the data could not be utilized to make any logical assumptions. After processing, data gathered showed that subjects either had no significant dilations, or hundreds. The variability observed out of the 45 subjects along with 32 others in various pilot and start-up experiments was too great. It is assumed that due to the low recording rate and monocular design of the Tobii Glasses has a dramatic effect on pupillary responses. Though pupil dilation is outputted from Tobii Studio from the Tobii Glasses, it is not reflective of the actual participant pupil diameter.

However, it is still the assumption that pupil dilation is reflective of seductive attributes in a design. The review of literature cites many sources that this is the case, and as Tobii releases software updates, the experimental data will be re-reviewed to determine if pupil dilation was coherently recorded and was the result of packaging design.

Implications on the Work/Flow

When all of the data collected is evaluated in its entirety, it becomes apparent that the Work/Flow allows designers to be more efficient, organized, and launch quicker to

market. Also, all data points towards CUshop™ as an effective, realistic, immersive, and impressive facility by not only the design team, but the 60+ subjects who participated in the study (including pre-trials). The eye-tracking experiment provided better results than hypothesized – not only did the empirical study increase target audience awareness and perception of the design over the control, but it immediately identified the competitive products which attract the most attention in the context of the retail array. This data allowed the design team to benchmark the design, understanding what type of attributes of a package make a difference in consumer perception. Overall, the data analysis forces an improvement to the Work/Flow, simplifying it to only two eye-tracking tests: the initial test and the second, a confirmation of the redesign (Figure 8.2). A statistically significant difference was found only in the second iteration for one of the product categories. Though the null hypothesis was accepted, it is now hypothesized that significance may be found if more categories are tested. This leads to the conclusion that the Work/Flow was effective in generating a design concept and the eye-tracking experiment provided the necessary attributes that the retail array demands.
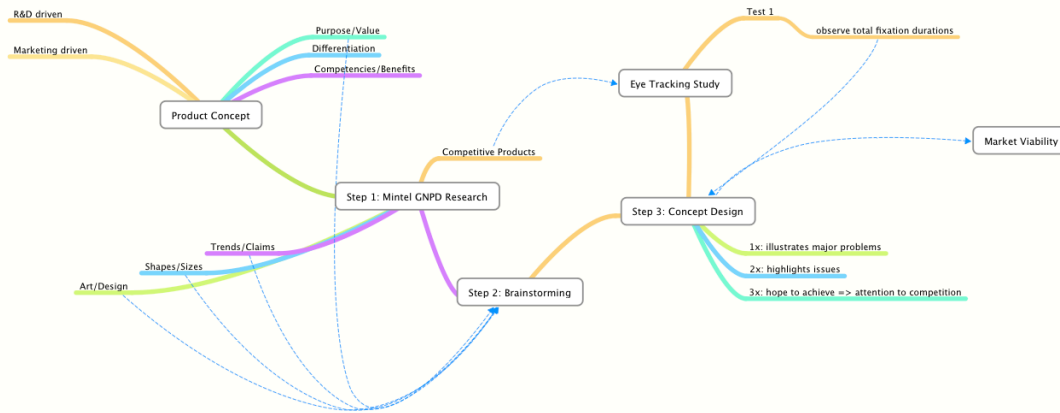
Figure 8.2: Modified Work/Flow

From a realistic perspective, the data makes sense. Competent designers who understand the retail array using the techniques outlined in the Work/Flow will be able to produce designs to a similar aesthetic to what is available in the retail array. However, what a designer is unable to do is know which designs have the greatest impact on the consumer. The eye-tracking experiment does just this—with less than 15 subjects, it became clear what designs received significant attention. Even after randomizing the packages on the shelves, the designs that received the most perception, regardless of their placement, continued to be viewed the most.

For Olive Oil, the persuasive factor was color and differentiation. After the first eye-tracking round, the designers noticed that the bottles that had a dark, natural green label stock as well as a differentiated look, received the most attention. The design team reacted to this data and created a unique dark-green label and raised varnish over metallic

seal. The results were immediate: this design was significantly more persuasive than the prior iteration.

For grits, it was assumed the persuasive factor was size. The initial concept was too short. It was clear from the first eye-tracking experiment that the packaging in the retail array had a similar width and height. This change did not show an increased amount of perception of the design.

For grilling accessories, it was assumed the persuasive factor was the showcase of the product and presence of packaging. The initial eye-tracking experiment (Test A) showed the majority of fixations actually being on the design iteration. Yet, when Tests B and C were combined (Figure 7.15), the illustration dramatically changed. The grilling accessories category varied significantly between fixation times between tests. This may debunk the notion that 15 participants are all that is necessary to perform a successful eye-tracking study. However, because the Work/Flow does not call for a generalizable study, this statement is only an assumption.

Because the Work/Flow is proven to be a viable and effective solution to developing packaging, it can be taught to the many participants who may benefit from its use. Below describes the details of teaching and communicating the Work/Flow to academia and the community.

Pedagogical Methods of Communicating the Work/Flow

The Work/Flow is effective in the bridging of departmentalized siloes within the packaging supply chain and will enable many to participate within the packaging

development process. The Work/Flow is a procedural *techne*: it can be taught, utilized

and applied without *a posteriori* knowledge and experience. In essence, the Work/Flow is

a content and procedural management system, similar to a computer program. Most well

designed software allows users to begin 'making' quickly if the GUI (graphic user

interface) is intuitive. The user does not require an understanding of the programming

code (language) in order to operate the software (*techne*). Furthermore, a user could

participate within an application without having any knowledge of how a computer

functions. Understandably, this is an attribute of most procedural *techne: a priori* and

posteriori knowledge lie outside of comprehending the procedure. However, the

Work/Flow has its limits, as does any *techne*. The Work/Flow will neither make one a

better graphical or structural designer nor will it improve personal and/or communicative

skills. Thus, it is merely a system of operation – literally visualizing how *Work* should

Flow.

In attempt to complement the procedural system, *Participatory Packaging Design*

would communicate the Work/Flow parallel to the teaching of *posteriori* knowledge

(language) of design. From a pedagogical application, both *a priori* and *posteriori*

knowledge must be taken into consideration. Undergraduate students, for the most part,

will not have a *posteriori* understanding of the design community, and the course should

rely on *a priori* decision-making. An ideal course would run controlled design scenarios

and utilize the Work/Flow to solve the many issues within the package development

process.

The course would embrace a pragmatic approach to design – relying heavily on justification, design strategy and empirical research. A packaging design project will be initially developed conceptually, and then quickly framed within theory presented in lecture and readings. Once complete, the design will be evaluated within the Work/Flow, where its effectiveness within the retail context will be determined.

Below will describe a course of instruction along with a syllabus and recommended list of readings. The difference between the course and current offerings of the standard packaging science curriculum will be articulated along with a unique pedagogy. Lastly, the course format and industry involvement will be communicated as it affects course management.

Course Description

The course needs to align with the following documents: the course description, catalog description and syllabus. Preferably, these documents should be written to appeal to each of the approving entities (the department, college, and university curriculum committees). One point of issue is the inherent intrusiveness of packaging science into other academic departments. By definition, packaging must package *something*, and that *something* is most likely owned by another department. For instance, the Work/Flow is heavily concerned with visual design, technology, rhetoric, and communication. Any representative from the university undergraduate curriculum committee could reside in one of these departments and present a counter argument towards approving the course. Secondly, the Work/Flow follows a systems management approach, which would overlap

with industrial design, engineering and business management. Thirdly, the Work/Flow leverages CAD (computer aided design), and could be countered by engineering, architecture and/or computer science. Fourthly, the course involves the teaching of visual design theory. This may conflict with art and/or architecture. For a procedural implementation strategy, the departmental undergraduate curriculum committee should not be of concern. The college curriculum committee will also be tranquil, as the majority of packaging programs reside in the public extension sector, land-grant section (typically agriculture) or food science. Thus, the college committee will not typically include any adversarial faculty. However, the university undergraduate curriculum committee may be an issue if the course is not represented and supported effectively.

Therefore, the course description needs to be carefully constructed, depending on the supporting faculty and departmental relationships with all of the curriculum committees. Ideally, the course should be described as the study of the principles and practices of designing and developing packaging systems, rather than Work/Flow management or any mention of a visual design process. From the course description level, an emphasis should be placed on the following items (course objectives):

1. Development of constraints to guide a packaging development procedure
2. Market analysis and brainstorming
3. Interaction and parallel collaboration with product development
4. Familiarization of analytical methodology to confirm development
5. Determining manufacturing constraints and strategy

6.   Procurement consideration and costing

7.   Work/Flow evaluation of the system design (eye-tracking)

8.   Commercialization of a product

From an instructional perspective, the course should focus on *teaching* methods of organization, following a procedure (Work/Flow), and providing students an experience to complete a project from concept to commercialization. To conduct the project, a focus should be on *participatory strategies* and team building. Ideally, course projects should be sponsored by industry, where supporters must agree to run their project according to the course environment. The course should neither be considered a revenue stream for the department, nor a service extension. If suitable industry projects cannot be located, then a fictitious project should be created.

Because projects within the course will be preferably sponsored by industry, students will interact with a client, engage suppliers, and participate in a cross-functional academic team. The ideal composition of the course would include students from visual arts, architecture, graphic communication (printing), marketing, communication, material science, and engineering. It would be highly advantageous if the course is cross-listed and/or approved as an elective in these other departments. From an instructional position, *participatory* (mandatory) *teams* would be organized to represent industrial cross-functional teams.

Though the transdisciplinary definition of the course calls for students from many other departments, *Participatory Packaging Design* is an upper-level course that has pre-

requisites. Thus, a comprehension of CAD (at least a solid modeling program) and Adobe Create Suite experience should be listed as a requirement. However, depending on the background of the student, the customary "or consent of instructor" should be listed as some students may have developed these skills independently or at previous institutions. From a student perspective, the course should enable undergraduates to demonstrate the following learning outcomes:

- Demonstrate a basic understanding of human design factors: perception, cognition, fashion, appeal, consumer studies, usability, and ergonomics
- Develop a foundation in universal design theory: line, space, shape, texture, form, value, pattern, unity, type, symbols, and color
- Display a portfolio showing the practical application of theory within a package development Work/Flow

The Course Project

For the sake of differentiation and portfolio building, the course should vary between the three design examples studied in the dissertation: a new product launch, a packaging redesign and a line (range) extension. Depending on the number of teams, student composition and total number of students, an ideal project should be selected for each team. And, in order to prevent the undesirable pairing of teams, different scenarios should be cycled throughout the groups. For instance, a class composed of primarily packaging students with a material and shelf-life emphasis should receive a project

containing a new food product. A class composed more of architecture and visual art students should receive a redesign and or range extension project. The instructor should consider him/herself the project manager, delivering the best-suited project to his or her teams. Preferably, projects are from actual clients. With the uniqueness of a packaging science program, local industry is commonly excited to participate in the classroom. However, the instructor is required to be in constant communication, year round, to correspond and schedule projects within the academic calendar. Clients should be willing to sign legal documentation that relinquishes the university's liability for developments. In my personal experience, I have yet to have a semester where I was unable to schedule industry projects that complemented the course schedule. I have traditionally asked each client to provide $1200 to reimburse student expenses, and this has worked well for the past five years at Clemson University.

Topical Outline

The course manages two distinct, yet parallel operations: lecture and 'laboratory.' The course should be marked as four credits, specifically 4(3,3), where three hours of lecture are presented each week along with three hours of lab. The laboratory portion of the course will be located in a 'creative-smart-room,' where tables are available for hands-on design as well as computers equipped with software that complements the Work/Flow.

Lecture topics will constitute approximately forty-five hours of the course and include three brief group presentations on project developmental iterations (as described

within the Work/Flow). Lectures will be organized into four topical categories: human factors psychology, marketing theory, design theory, and consumer theory.

Topic 1: Human Factors. Lectures: human perception, human cognition, fashion/appeal, and design decisions.

Topic 2: Marketing Theory. Lectures: packaging design brief, Mintel Database, consumer profiling (target audience, cultures, age groups), and branding/marketing.

Topic 3: Design Theory. Lectures: color, typography, symbols and pattern, and layout architecture.

Topic 4: Consumer Theory. Lectures: Usability and ergonomics, sustainability/LCA, consumer experience, and contemporary packaging case studies.

The laboratory portion will satisfy the remaining forty-five hours of the course. Each week, students will meet in groups and work toward completing their development projects. The laboratory will be split into three phases:

- Phase 1 (15 hours): Development of the design brief and Mintel audit
- Phase 2 (15 hours): Initial structural/graphic design, product testing
- Phase 3 (15 hours): Final revisions and eye-tracking qualification

Syllabus

Though the majority of the syllabus has already been discussed, there are still formalities that need to be addressed. As far as required materials, access to the course website (discussed in the pedagogy section) requires either FireFox® or Google Chrome® web browsers. It should also be noted that class participation is required, and if more than three unexcused absences are recorded, then a letter grade will be removed each day thereafter. Assessments are also apart of the course, which measures student comprehension of the content presented in each topic category.

Forums (blog postings) are also required by the course. After each lecture, every student should post a discussion on the course website, which overviews and expands at least one subtopic of the lecture. Discussions should focus on expanding the course content, not only repeating what was communicated in lecture. Ideally, forums are where the course readings are discussed.

Grading will be issued per university policy, where 20% reflects participation and forums, 60% reflects project work, and the remaining 20% reflects assessments. Students must abide any software licensing agreements and accept the academic integrity statement. Lastly, the syllabus will have a section on general education competencies and special needs.

Pedagogy

It is important to note that as an advocate of *serious play* and Csikszentmihalyi's notion of *flow*, as well as a pupil of Baudrillard, Barthes and Burke, knowledge (language) is subjective, exists within a social context, and is defined by its environment. From a McLuhan-ian approach, the course focuses on mediums, rather than messages. Personally, I am also a supporter of the true Montessori method, where spontaneous self-development, or *flow* is required to achieve learning. Teaching is a serious game: a task where the instructor must engage students in *serious play,* where learning is the ultimate goal.

The course provides a space where students from different backgrounds enter in to *seriously play*. As the Montessori method advocates, students are competent and teaching should be adaptive to support the multiple backgrounds and disciplines present in the classroom. One way of encouraging cohesion within the groups is to allow students to define their own group roles and develop their own project timelines by the first quarter of the semester. Not only will this relieve group issues from the instructor; it will also differentiate groups from one another.

Lastly, because the course leverages industry sponsorship, the motivation for students to perform at their best is not only influenced by a final grade, but also to satisfy a commitment outside of academia. This also extends the course to the portfolio, where completion of the project is evidence of prior success in the industry before taking a job.

Format and Course Management

Managing such a course may seem as a challenge to most university instructors, but the logistics are relatively easy with online, CMS-styled tools. For instance, a customized Moodle course will be designed to manage the classroom online. The instructor can easily access student information, participation history within groups and itemized activity on the course website. *Participatory Packaging Design* is a hybrid course, leveraging a physical lecture hall, a physical laboratory, as well as an online space. Specifically, the development projects will be managed online, along with blogs (forums), course assessments, and reading comprehension. The course will be organized weekly, where students may easily access and upload information online. Furthermore, students will be able to communicate and work on projects remotely (as it is commonly done in industry) via built-in video chat modules, text editing, collaborative Google Docs, and VNC computer operations.

Readings

Though the class will not be focused heavily on readings, there will be an overabundance of video tutorials, which demonstrate how to utilize equipment within the design laboratory. When initially drafting the course, I identified over 50 texts, but realizing the impracticality of this in a four-hour undergraduate course, I organized the list into the following categories: universal design, color theory, graphic design, information design and human factors psychology. After careful review, the following texts were selected along with a brief justification.

Lidwell, *Universal principles of design*.

Though the first publication of this text would suffice, its presence in the course is mandatory. The text should be read cover-to-cover, over the entire course. Lidwell's text is dramatically important for students to quickly grasp and reference important elements of design. This text could be appropriated in many ways throughout the course, but it would be highly recommended that students reference the text in order to construct justification reports of design iterations. This is a required text for the course.

Norman, *The design of everyday things*.

Though initially published in 1988, only the cover has changed in the latest edition. Norman presents a plethora of information on the topic of design in a casual, non-academic vernacular. Specifically, Norman discusses the psychopathology of objects as well as human factors. The combination leads into a design process that considers a holistic understanding of how people react within their environments and how objects should share this understanding. This is a required text and should be read over the first two weeks of the course. From a practical application, it would be useful for students to discuss the text within their groups or post a blog, requiring student commentary on the postings.

Itten, *The elements of color*.

No design course would be complete without an inclusion of a Bauhaus professor. Itten is known for his appropriation of RYB-color theory into a color star. Itten uses a unique template for determining the appropriate colors for a particular season. Because a large portion of packaging displays are seasonal, the color star provides a novel application of color integration in design. This text is a complement to the more Newtonian-based color-theory in White's and Lidwell's texts and should be listed as recommended. The content is relatively straightforward and could be presented in lecture.

White, *The elements of graphic design*.

White presents a generous overview of graphic design principles along with a solid chapter on the history of design. The text is well organized and can easily be referenced to answer concerns with layout/architecture, space, unity and type. This text should be included in the syllabus as a recommending reading, where elements from this text should be referenced in lecture.

Tufte, *Envisioning information*.

Ideally, Tufte's text should be a required reading for the course, however it is difficult to find and may be expensive. Tufte presents a style to layout and organization that is unique and novel. Most importantly, Tufte exposes readers to a variety of examples that allow one to consider the many approaches available to organizing and

presenting visual information. Selections from this text would be best assigned as homework and discussed in small groups.

Required Handbooks

In addition to the required and recommended texts, the following handbooks are necessary for the course. However, these texts are quintessential, and most students have likely already procured and utilized them in lower-level packaging science courses. The trade journals do not have ISBN numbers and must be provided by the organization itself; all are listed below:

- Hanlon, Handbook of package engineering
- AICC (Association of Independent Corrugated Converters) Corrugated Handbook
- PPA (Paperboard Packaging Alliance) Paperboard Handbook
- GPI (Glass Packaging Institute) Glass Handbook

Conclusion

Participatory Packaging Design would be unlike any other course in academia. When completely actualized (industry sponsorship of projects and multiple departments crediting students for participating), the learning benefits would run parallel to an internship. However, the probability of launching a course to these specifications is highly unlikely for the first few years. Being so, the course is designed with multiple solutions: packaging students can still compose the majority of the class and learning outcomes will still be achieved if industry is unable to sponsor projects (the instructor

will develop multiple scenarios). The course also provides a legitimization of the entire

dissertation project. If a group of students were able to embrace the Work/Flow and take

a development project to commercialization, then the course would provide a reoccurring

confirmation of its effectiveness. Furthermore, the course embraces the concepts of

serious design and play as well as *participatory strategies* to move a project from

ideation a production. In the end, the design manifested through the Work/Flow is

observed within a rhetorical context to determine its overall retail effectiveness.

CHAPTER NINE

CONCLUSION

This dissertation sought to improve the rhetoric of developing packaging. More specifically, this work aimed to observe and improve the unique language used in communicating between members of a packaging development project (participatory strategies), packaging designers and their work (the Work/Flow), and consumers and packages (empirical study). The project was grounded by theory in serious design and play as well as rhetorical persuasion and seduction, which guided and directed the development of the project.

When the Sonoco Institute performed its survey of packaging professionals in 2010, it was apparent that the majority of professionals working in packaging did not have an academic or professional background in the packaging industry. Most reported that their specific developmental workflows were antiquated. Thus, the dissertation intended to:

1. Provide a space where designers from any background can participate on packaging development projects

2. Provide a procedural Work/Flow that fosters *flow*, inspires creativity, and ethically guides decision-making utilizing a participatory strategy

3. Provide a method of quantitatively observing the effectiveness of packaging designs within the retail array.

This research project leveraged facilities and resources provided by a nine-million dollar gift from EskoArtwork, a $150M gift from TOPS, a $30M gift from Luxology and a $100M gift from Harris A. Smith. Though it justifies and validates the legitimacy and urgency of the research project, it represents the overwhelming desperation of the packaging industry for solutions to improving work/flow, design research, and educating packaging students.

In reflection, the project provided a solution to all three issues found in the survey. The BaseCamp® Work/Flow provides a space for anyone on a design team to participate within development projects. The Work/Flow shows a significant increase in developing persuasive packaging over not using the Work/Flow, and designs were more creative and ethically transparent than any other process published. Lastly, the eye-tracking experiment provides an ideal method of observing how consumers perceive the retail array, as well as what designs attract the most attention.

Some of the major findings, besides the effectiveness of the Work/Flow, were that consumer perception and sales are not related. It was observed on many occasions that highly perceived designs were not necessarily the designs purchased. It was also determined that there are inherent issues and variability with monocular eye-trackers and IR markers.

The future plans for this project reside in seeking alternative methods to tracking pupil dilation in a dynamic environment. Once this technology is developed, the literature and theory presented can be used to determine if design attributes are seductive, and have

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a reactionary effect on perception and purchase decision. Secondly, it is hypothesized that if this experiment were to be continued into more product categories, it would be determined that developing through the iterative process proposed by the Work/Flow would show a significant increase in consumer perception in respect to the retail array.

APPENDICES

Appendix A

Expedited / Full Board Review Application

CLEMSON
UNIVERSITY

June 24, 2011

Mr. Rupert Hurley
Clemson University
Department of Food, Nutrition, and Packaging Sciences
318 Harris A Smith
Clemson, SC 29634

**OFFICE OF
RESEARCH COMPLIANCE**

Clemson University
321 Calhoun Drive
Room 223 Brackett Hall
Clemson, SC
29634-5704

P 864-656-1525
F 864-656-4475

SUBJECT: IRB Protocol # **IRB2011-191**, entitled "**CUshop Eye-Tracking
Study**"

Dear Mr. Hurley:

The Institutional Review Board (IRB) of Clemson University reviewed the above-
mentioned study using Expedited review procedures and has recommended
approval. Approval for this study has been granted as of **June 24, 2011.** Please
find enclosed with this letter your original, stamped consent document[s] to be
used with this protocol.

Your approval period is **June 24, 2011 to June 23, 2012**. Your continuing
review is scheduled for May 2012. Please refer to the IRB number and title in
communication regarding this study. Attached are handouts regarding the
Principal and Co-Investigators' responsibilities in the conduct of human
research. The Co-Investigator responsibilities handout should be distributed
to all members of the research team. The Principal Investigator is also
responsible for maintaining all signed consent forms (if applicable) for at
least three (3) years after completion of the study.

No change in this approved research protocol can be initiated without the
IRB's approval. This includes any proposed revisions or amendments to the
protocol or consent form. Any unanticipated problems involving risk to
subjects, any complications, and/or any adverse events must be reported to
the Office of Research Compliance immediately. Please contact the office if
your study has terminated or been completed before the identified review
date.

The Clemson University IRB is committed to facilitating ethical research and
protecting the rights of human subjects. Please contact the Office of Research
Compliance at 656-6460 if you have any questions.

Sincerely,

Laura A. Moll, M.A., CIP
IRB Administrator

Enclosures

www.clemson.edu/research/compliance

Information Concerning Participation in a Research Study
Clemson University

CUshop Eye-Tracking Study

Description of the Research and Your Participation

You are invited to participate in a research study conducted by Andrew Hurley. The purpose of this research is to better understand the perceptual impact packaging design has on a consumer.

Your participation will involve purchasing a few products from CUshop, a prototype grocery store in the Harris A. Smith building, while wearing a pair of eye tracking glasses.

The amount of time required for your participation will be twenty minutes.

Risks and Discomforts

There are no known risks associated with this research.

Potential Benefits

Potential benefits are a greater understanding of packaging design's impact on consumer perception

Incentives

No monetary incentives are offered.

Protection of Confidentiality

We will do everything we can to protect your privacy. During this study, your name will be omitted from record. Your data will be assigned to a single identification number for analysis purposes only and will in no way be correlated with your personal identity. Hence, your identity will not be revealed in any publication that might result from this study.

Voluntary Participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study. If you decide not to take part or to stop taking part in this study, it will not affect your grade in any way.

You may choose to stop taking part in this study after today. If you do, we will remove your information from the study. However, if we have already completed our research analysis, we will not be able to remove your information from the study.

This form is valid only if the
Clemson University IRB
stamp of approval is shown here:

CLEMSON UNIVERSITY
IRB CONSENT FORM
APPROVED 6/24/2011
EXPIRES 6/23/2012

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Contact Information

If you have any questions or concerns about this study or if any problems arise, please contact Andrew Hurley at Clemson University at (864) 650-4954. If you have any questions or concerns about your rights as a research participant, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-6460 or irb@clemson.edu. If you are outside of the Upstate South Carolina area, please use the ORC's toll-free number, 866-297-3071.

A copy of this informational letter will be given to you.

This form is valid only if the
Clemson University IRB
stamp of approval is shown here:

CLEMSON UNIVERSITY
IRB CONSENT FORM
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EXPIRES 6/23/2012

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Appendix B
Informed Consent Form

Information Concerning Participation in a Research Study
Clemson University

CUshop Eye-Tracking Study

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The amount of time required for your participation will be twenty minutes.

Risks and Discomforts

There are no known risks associated with this research.

Potential Benefits

Potential benefits are a greater understanding of packaging design's impact on consumer perception

Incentives

No monetary incentives are offered.
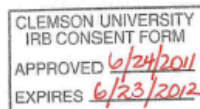
Protection of Confidentiality

We will do everything we can to protect your privacy. During this study, your name will be omitted from record. Your data will be assigned to a single identification number for analysis purposes only and will in no way be correlated with your personal identity. Hence, your identity will not be revealed in any publication that might result from this study.

Voluntary Participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study. If you decide not to take part or to stop taking part in this study, it will not affect your grade in any way.

You may choose to stop taking part in this study after today. If you do, we will remove your information from the study. However, if we have already completed our research analysis, we will not be able to remove your information from the study.

This form is valid only if the
Clemson University IRB
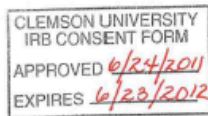stamp of approval is shown here:

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│ CLEMSON UNIVERSITY      │
│  IRB CONSENT FORM       │
│                         │
│ APPROVED 6/24/2011      │
│ EXPIRES 6/23/2012       │
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Page 1 of 2

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A copy of this informational letter will be given to you.

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stamp of approval is shown here:

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Appendix C

Pre-Experiment Questionnaire

Age: _____

Gender: _____

Do you wear (circle):   contacts   glasses

Do you have the following (circle):   cataracts

                                             glaucoma

                                             eye implants

                                             permanent dilation

do not write below this line

_____
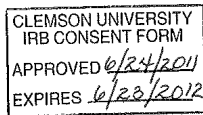
Appendix D

<u>Verbal Recruitment</u>

Verbal Recruitment Message

CUShop Eye Tracking Study

I am recruiting participants for an eye tracking study for a summer research project. This study will attempt to investigate how packaging design elements have a result on perception of the package. We will be performing this study throughout the summer. It will take around 20 minutes to complete. Would you be interested in participating?

Experiment Script

SCRIPT

Experimenter:

"Thank you for agreeing to participate in this experiment. We will be examining eye movements collected while you perform a simple task that I will explain to you shortly. We will be asking you to wear this pair of glasses [*Experimenter shows participant the Tobii Glasses Eye Tracker]* which will collect your eye movements. These glasses are safe and not associated with any risks. We will also ask you to answer a few short questions after you have performed the task. Do you have any questions about your participation so far?" *Experimenter answers any questions that participant has.*

"Let's begin. Please authorize your participation by reading this informed consent form. We will then ask you to tell us a little about yourself by answering a few short questions." *Experimenter hands* **INFORMED CONSENT FORM** *to participant. Experimenter answers any questions the participant has concerning the Informed Consent Form. Then, experimenter asks the participant to fill out the* **PRE-EXPERIMENT QUESTIONNAIRE.**

"We have to begin by calibrating the eye tracker to your eyes. Please keep your head as still as possible and follow this target with your eyes. It may help if you open your eyes a bit wider than usual." *Experimenter initiates calibration.*

"Now, let's start the experiment. You are going to the grocery store today to purchase extra virgin olive oil, grits, and a spatula. Please enter into the store and shop as you normally would. Once you have found the packages you intend to buy, please collect them and exit the store. Do you have any questions?" *Experimenter shows the participant where to stand and tells the participant to begin when he is ready. After the task is complete, the experimenter gives the* **POST-TASK QUIZ.**

When the task is complete, the experimenter gives the participant the **POST-TASK QUESTIONNAIRE and the POST-EXPERIMENT QUESTIONNAIRE.**

"The study is now over. Thank you for your participation. Please feel free to contact us if you have any additional questions."

Appendix F

Post Experiment Questionnaire

Post Task Questionnaire   Subject #:

	Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
1	My interactions with the grocery store felt natural					
2	I felt immersed in the grocery store.					
3	I was able to quickly locate the products I was interested in purchasing					
4	I was constantly aware of the eye-tracking device and the sensors					
5	I felt like I was in an experiment					
6	My experience shopping was consistent with my real-world experience					
7	From the entrance, I was able to visually survey and search the environment					
8	I was able to examine objects closely					
9	I was able to examine objects from multiple viewpoints					
10	It was easy to make a purchase selection from the store					
11	My purchase choice was the best choice available in the store					
12	The glasses were comfortable					
13	The glasses hindered my ability to perform tasks					
14	The store felt like a real grocery store					
15	I understood what was expected of me in the experiment					

16. What factors other than the design of the package influenced your choice in product selected?

17. Did you feel that CUshop(TM) was a realistic shopping experience? If not, what could be done better?

18. If you have an additional feedback about this experiment or your participation, please tell us below.

Grocery List

GROCERY LIST

Spatula
1   2   3   4   6   16

Extra Virgin Olive Oil
1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

Salt
1   2   3   4   5

Coffee
1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

16   17   18   19   20   21   22   23   24   25   26   27   28   29   30

31   32   33   34   35   36   37   38   39   40   41   42   43   44   45

46   47   48   49   50

Cereal
1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

16   17   18   19   20   21   22   23   24   25   26   27   28   29   30

31   32   33   34   35   36   37   38   39   40   41   42   43   44   45

46   47   48   49   50

Grits
1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

16   17   18   19   20

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