DETERMINING THE PROPER POINT SIZE FOR DISPLAY TYPE ON PACKAGING

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ABSTRACT

Through the use of a preference test, the proper point size of display text on a package was evaluated in relation to a package’s proportions. The test involved the examination of packaging images displaying the product or brand name in various point sizes by 150 participants who were then asked to choose the option they most preferred. The participants were then provided with a post-survey intended to gather additional information regarding potential preference motives.

The primary purpose of this study was to determine the most preferred display type size of a package based on its relationship with the package’s proportions. It was hypothesized that this proportion would be related to the golden ratio, a ratio of about $\frac{2}{3}$ that has been found to be the most aesthetic proportion throughout nature and human history. The results of the study revealed that the preferred ratio was actually greater than the golden ratio, equaling $\frac{10}{12}$ths of the package’s width. These results were found to be further influenced by the participant’s gender and the packaging structure on which the display type is applied. These findings make way for future research within this area of typographic design.
DEDICATION

This text is dedicated to my family, without whom this endeavor would not have been possible.
ACKNOWLEDGMENTS

I would first like to express my gratitude towards my advisor, Dr. Rupert Andrew Hurley, and my committee members, Dr. John Leininger and Dr. Ronald Thomas for all of their guidance and support.

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CHAPTER ONE

INTRODUCTION

Packaging

Today’s store shelves are packed tightly with rows and rows of packaged goods. In fact, it is estimated that there are currently over 38,000 different products within a single store, a number that continues to rise rapidly each year (Hesterman, 2011). Obviously, this makes competing within a retail environment a very challenging endeavor, causing manufacturers to rely heavily on marketing to persuade consumers that their product is indeed the ultimate choice within the product category (Meyers & Lubliner, 1998).

Though the packaging is the primary means of product protection and preservation, it is also one of the most valuable marketing tools available to a manufacturer (Meyers & Lubliner, 1998). Packaging design actually produces the highest return on investment in comparison with all other forms of marketing (Wallace, Edwards, Klimchuk, & Werner, 2009). In fact, the vast improvements in packaging design over the last few years are responsible for the increased importance of marketing itself (Meyers & Lubliner, 1998). Though an average person living in a first world country is bombarded by 3,000 marketing messages a day, packaging design is the only form of marketing that is viewed by 100% of the brand’s consumers (Calver, 2004; Dupuis and Silva, 2008).
One of the reasons packaging is so important is because it is the last point in which the brand owner has the opportunity to persuade the consumer to purchase the product. The packaging accomplishes this task by presenting the product to the potential consumer in the retail environment (Meyers & Lubliner, 1998). Quite often, the first encounter a consumer has with a brand is through its packaging when displayed on a store shelf (Ambrose & Harris, 2011). Nearly 51% of all grocery store purchases are bought on impulse (Nancarrow, Wright, & Bruce, 1998). This means that a package must be able to differentiate itself from other competing products, draw in the shopper’s attention, and clearly communicate the benefits and characteristics of the product (Ambrose & Harris, 2002). Because many purchasing decisions are made in less than ten seconds, it becomes very important that all of this is done quickly and efficiently (Meyers & Lubliner, 1998).

Unlike other forms of marketing, packaging is a very intimate marketing tool. Packaging is not simply viewed, but also touched, used, stored, and put on display. Consumers do not only interact with packaging when in the retail environment, but also continue to form a relationship with the packaging once taken home. In reality, the packaging of the product can also become a part of a consumer’s daily life due to its continuous use by the consumer (Meyers & Lubliner, 1998). Consumers become extremely familiar with the packaging of their products, causing the packaging to be the primary source of product recognition when on the store shelf (Ambrose & Harris, 2011). The consumer will recognize the product via the packaging shape, color, and graphic style, which will in turn call to mind images of the product itself. Many times, the
Packaging even becomes synonymous with the product (Meyers & Lubliner, 1998). The characteristics of the product become inseparable from that of the packaging. This allows the perceptions of the product’s usefulness and value to be perceived through the packaging (Ambrose & Harris, 2002).

Packaging is able to communicate ideas and emotions through its two distinct elements: its physical shape and its graphic design. While the shape of the package is most concerned with the ergonomics and overall form of the package, the graphics concentrate on communicating the product’s story to consumers. Through the combination of text and images, the packaging graphics are able to speak to the consumer, persuading the consumer to pick up the package, place it in the shopping cart, and eventually commit to the purchase (Ambrose and Harris, 2011).

**Packaging Graphics**

While it may seem as though the graphics of the package are just a decorative afterthought, in all actuality it is an extremely integral component in the attempt to emotionally connect with a consumer (Meyers & Lubliner, 1998). It is the exterior graphics of the package that truly converse with the consumer and express the brand. In fact, most consumers believe that the package’s graphic elements are the most influential portions of the package’s entire design (Ambrose & Harris, 2011).

In order to connect with consumers on an emotional level, the graphics must be based on a distinct positioning strategy that will help to humanize the product and demonstrate its unique benefits. The ideals and beliefs of the company should be clearly
presented through the graphic design so as to attract and retain the target audience. The graphic style, formatting, colors, imagery, and typography will help to reinforce the messages and emotions that the brand wishes to express. The product attributes and features that represent the principles of the brand should be highlighted in order to validate how the product upholds the values of the company. By incorporating graphics that relate to a specific marketing scheme, the product will appropriately be set apart from competitors (Meyers & Lubliner, 1998).

Another way to ensure that a package attracts more consumer attention than its competition is to implement a unique, iconic graphic design. Obviously, a different graphic appearance will help the package to stand out against a sea of similarly designed packaging. Even a well-designed package with clearly defined ideals will blend in if it appears graphically analogous. A package with well-designed graphics should be new and different; this will allow the consumer to experience the product in a unique way, forming an emotional bond with the product itself (Meyers & Lubliner, 1998). As David Ogilvy states, “you cannot bore people into buying your product: you can only interest them in buying it” (Berman, 2010). Keep the graphic design fresh and original, and the package will keep the consumer’s attention and loyalty.

The overall aesthetics of graphics are also an extremely important factor when forming an emotional connection with the prospective consumer. Well-designed graphics make packaging appear friendlier and more approachable. A distinctive design will have a much better chance of catching a consumer’s eye and convincing them to investigate further (Meyers & Lubliner, 1998). Good graphic design will also hold the attention of a
consumer for a greater period of time and can even cause them to remember the product longer (Wallace et al., 2009). A package with an attractive graphic style will communicate with the shopper more effectively, and will therefore be more successful in invoking emotions towards the product (Meyers & Lubliner, 1998). Additionally, research has shown that more aesthetically pleasing designs are thought to be easier to use than those that are not as attractive. In general, people will possess a more positive opinion of a well-designed package and will even be more tolerant of design malfunctions when they consider the package to be beautiful (Lidwell, Holden, & Butler, 2010). In summary, the overall aesthetics of the graphics are more than just a trivial matter, and are in fact quite essential to the success of the product.

*Typography*

Though there are many graphic components that aid in differentiating a package and expressing the value of the product, typography is one of the most essential. Packaging designs that use typography as the major visual element, with other graphic forms playing more minor roles, can be very successful in communicating information about the product. Using typography effectively can increase consumer comprehension of the product to a much greater degree, therefore increasing consumer loyalty and product sales (Wang & Chou, 2011). Therefore, a reasonable place to start any visual communication is typography (Ryan & Conover, 2004).

The word typography comes from the Greek *typos*, meaning impression, and *graphein*, meaning to write. Typography is essentially the practice of using letters to
visually communicate a verbal language (Klimchuk & Krasovec, 2006). It can be described as an art form that depicts how a language appears on paper (Lupton, 2004).

A more in-depth exploration of typography will involve the arrangement of typographic elements into a comprehensible whole. This describes the combination of letters into words, words into sentences, and sentences into paragraphs of text (Carter, Day, & Meggs, 2007). This aspect of typography is what has allowed the human race to record history, create literary masterpieces, and spread knowledge to the masses (Meggs, 1992).

In order to create messages that are both aesthetic and easy to read, typography incorporates complex visual relationships between negative and positive spaces. The positive spaces are made up of tediously designed letterforms that have been created using exact measurements and proportions. These letters are drawn to be both highly legible and visually pleasing in order to promote easy message comprehension. The negative space is composed of the white space, or unprinted substrate, that works to organize the letterforms into words and sentences. This spacing also must aid in legibility while contributing to the overall look and feel of the design (Meggs, 1992).

Even though packaging is not as heavy with type as some other forms of print media, there are still many pieces of information that must be expressed to the consumer through the use of the written word. The product name, brand name, instructions, nutrition facts, and beneficial features must all be expressed to the audience through typography. Various typographic choices, such as the typeface, layout, sizing, and
spacing, will determine how the message is read and interpreted (Klimchuk & Krasovec, 2006).

Typography does have two very different approaches. One involves very formal rules that are more traditional in nature. The other is more modern, often breaking the rules of tradition to create something very new and different. The new informal approach involves more risk. By breaking the traditional rules of typography, the designer is taking a gamble by creating a design that may not be well-received by viewers. On the other hand, by taking this risk, he or she can possibly create a design that is viewed as modern and trend setting. So while risky, informal typographic designs have the possibility to acquire more acknowledgement and notoriety. It is important to keep in mind that the informal design approach is based on bending and breaking the rules and traditions of formal design. Thus, both approaches require a complete understanding of the traditions of formal typographic design (Felton, 2006).

The packaging typography is one of the most important visual elements because words directly explain a message to the consumer, unlike images and other decorative elements that must be interpreted by the consumer (Ambrose & Harris, 2011). Utilizing words to impart a message is often the most succinct method due to the fact that language is the clearest form of communication (Conover, 2011). The typography acts as the voice of the package, explaining the important aspects of the product and persuading the consumer to purchase the item (Klanten & Ehmann, 2009).

In addition to the literal transmission of the packaging message to the consumer, the packaging voice can also add flavor and emotion to the messages it relays. Through
the use of innovative, attractive type designs, the typography can begin to satisfy a wide range of functions (Conover, 2011). Typography has the ability to take a simple message and transform it into a creative, attention-grabbing visual element that will attract the intended audience and persuade them to commit to the purchase (Klimchuk & Krasovec, 2006). The style of the typography will help the consumer to visualize the product, collect the product information, connect emotionally with the product, and ultimately bond with the entire brand (Conover, 2011). When used consistently, typography also becomes an integral part in forming the brand identity that consumers will recognize and respond to (Ambrose & Harris, 2011).

While typography has been present since the invention of the first press in 1450, only recently have the processes of type design and type setting been made available to the masses. With the invention of the computer, typefaces and word publishing software became available. Before this, typography was only a discipline available to those working in a type foundry (Unger, 2007). Once typefaces became digital, typefaces could be produced at a much lower price and could easily be distributed to others electronically. No longer is typography only the concern of a typesetter, but now a common practice of all those in the design field. As the importance of typography increases within our society, it becomes more and more imperative that designers understand how to create beautiful and effective typography. If the packaging designer is knowledgeable in the principles of typography, they will be able to create type that is both attractive and effective, further enhancing the package itself (Conover, 2011).
Due to typography’s vast history, there are many current texts available that describe the various typographic styles and rules. But unfortunately, most of these texts describe typography that is designed for two-dimensional media, such as books, magazines, and newspapers. Packaging, however, is a three-dimensional object with multiple surfaces and can therefore not be thought of in the same way as other more traditional printed media (Ambrose & Harris, 2005).

In addition to the differences in surface shape, readers approach the text of a package in a much different manner than the text of a book or periodical. The type on a packaging surface must be interesting enough to quickly grab the attention of the consumer and persuade them to buy the product (Ambrose & Harris, 2005). But the text also must be legible enough to be read off of a store shelf in less than the ten seconds it will take for the consumer to make a purchasing decision. Contrarily, typography for two-dimensional media is generally read over long periods of time for the simple purpose of information gathering (Unger, 2007).

Because of the differences between type for books and type for packaging, the rules that apply to each are very different. One cannot simply implement the rules meant for a book or magazine onto the text of a package. This has left many unanswered questions for designers wishing to implement appropriate typography on packaging. Typical typographic uncertainties encountered by designers involve choosing the correct typeface for a package, appropriately placing the type on the package, and setting the packaging type to the proper size.
CHAPTER TWO
REVIEW OF LITERATURE

Legibility, Readability, and Aesthetics

With modern design technology, it has become possible to manipulate type in incredible ways on packaging. Manipulation can work to add flare and originality to branding, while other methods are destructive and counterproductive to the intended message. Because of this, it is important to understand typographic legibility (Carter et al., 2007). Unless a consumer is able to grasp the meaning, he will remain an observer, and not a reader (White, 2011). If he never becomes a reader, he will never fully understand all that the product has to offer.

Reading

Understanding how consumers read is key to understand how a typeface or typographic design can be legible and/or readable. When reading, the eyes move along the lines of text in a sequence of jumps called “saccades” (Unger, 2007). Between saccades, the eyes stop for a moment; this is called a “fixation” (Beymer, Russell, & Orton, 2008). During a fixation, the brain processes the text through chunks that can range between two and eighteen characters. Both the internal and external characteristics of these letterforms combine to form patterns, or words, that our brain can instantly recognize (Unger, 2007). As the eye registers the distinctive silhouettes or shapes of different words, the message is interpreted (Hill, 2010). It is important to understand that
we do not usually read letter by letter, but through the recognition of words. When the formation of these instantaneously recognizable word shapes is disrupted, reading is impaired and the eye must begin reading letter by letter. Reading in this manner requires more work from the brain and adds additional strain to the eyes (Faiola. 2000).

Legibility

Legibility is the ability to identify a letterform and distinguish it from other letterforms (Hill, 2010). For example, is there an adequate difference between the “h” and the “n” within a typeface (Unger, 2007). Therefore, legibility is a yes or no question. It is defined on the basis of whether or not the letter can be determined. This is dependent on both the letterform itself, and its relationship with other letterforms in the typeface. For instance, a “d” by itself is quite legible, but its legibility could be compromised when set in a text that contains letterforms tightly squeezed together. In this situation, it can easily be mistaken for the letter combination “o” and “l.” Highly legible typography provides significant distinction between letterforms (Hill, 2010).

Legibility is also affected by our familiarity with the letterforms (Hill, 2010). If a character has an odd shape, we will not easily recognize the letter or the word shape of which it is a part (Williams, 2006). This aspect of legibility is closely tied to culture and the kinds of letterforms and typestyles with which we are accustomed (Hill, 2010). The legibility of type can be affected by its size, typeface, contrast, text block, and spacing (Lidwell et al., 2010). Through the control of these features of typography,
legibility can be realized (Carter et al., 2007). Control is learned through the study of typography and the experience gained through setting type in various ways (Hill, 2010).

**Readability**

Readability and legibility are a pair of typographic terms that are incorrectly used interchangeably. While legibility is the aptitude for distinguishing different letterforms, readability is the ease with which text can be read and comprehended (Lawler, 2005). Instead of being a yes or no question, readability works on a scale (Lidwell et al., 2010). It is determined through the ease or difficulty involved in reading a paragraph of text. So while typography that has adequate readability is also automatically legible, typography that has high legibility is not necessarily readable (Felici, 2003). Though the two terms are distinctly different, one can see that they are also interdependent (Hill, 2010).

Readability is determined through background and text contrast, spacing, typeface, and line length, among other factors (Ambrose & Harris, 2006). A typeface has high readability when it has moderate features, thus making it “invisible” as it is read. If the typeface is noticed as it is read, it becomes distracting, which is counteractive to the reading process (Williams, 2006). Generally, this makes typefaces that are familiar more readable (Felici, 2003). If a typeface, or even a classification of type, is extremely familiar, then the letters won’t seem unique, and therefore will not be a distraction during reading. This same ideology applies to spacing of text; when spaced moderately and consistently, text is easy to read (Faiola, 2000).
Good readability will hold the reader’s interest (White, 2011). If a text is comfortable to read, the reader will be able to read for longer periods of time without experiencing fatigue (Unger, 2007). If a passage is easy to read, people, especially consumers, will want to read it (White, 2011).

**Balancing Reading with Aesthetics**

There is an ongoing battle between the staunch supporters of legibility and the advocates for creative typography. Many typographers are partial to one of the two extremes. Half believe that calm, disciplined typography is the most important factor, while the remaining half pursue variety and originality in their typographic designs (Unger, 2007).

Those in favor of strict adherence to typographic legibility believe that typography’s sole purpose is to facilitate a message through organized content that is unobtrusive (Ryan & Conovor, 2004). They closely relate to the idea of accessibility; that all forms should be designed to be usable by all people without modification (Lidwell et al., 2010). The reduction of ornamentation can be used to create maximum clarity and legibility that will present complex messages in a simple way (Carter et al., 2007). As Emil Ruder summarized, “Printing that cannot be read becomes a pointless product” (Unger, 2007).

In contrast, there are other typographers who believe that whether or not typography is readable, it can still interact with the viewer through unique patterns and shapes that emphasize the gray area between what is letter and ornament. This type of
typography works to create a certain identity and uniqueness that attracts attention and
creates emotions (Klanten & Hellige, 2008). As Herb Lubalin stated, “Sometimes you
have to compromise legibility to achieve impact” (White, 2011).

In reality, good typography is both an art and a science. A balance must be struck
between aesthetics and legibility. The proper line length, leading, point size, and spacing
should be paired with typographic aspects that embody emotions (Ryan & Conovor,
2004). Typographic principles should be used as guidelines that help to build effective
communication, but do not stifle creativity (Carter et al., 2007). This is especially true in
jobs where people can take a bit more time to grasp words. In the more common short
paragraphs and sentence fragments found on packaging, one can often use a design
element that lessens readability, but works to enhance the aesthetics and impact. A
typeface used for a logo design can be a bit more abstracted if it better distinguishes the
product through its originality and character (Williams, 2006).

Display Type verses Text Type

Typography is divided into two major categories: text type and display type. While many define these terms simply as “display type is large” and “text type is small”, the definition is much more complex. The more purposeful explanation of the two is that display type is type that is meant to grab the attention of the observer, while the text type is the text that the person, who is now a reader, is drawn to (White, 2011).

The difference between text type and display type is not only how they are used, but how they affect reading. Text faces are designed for paragraphs of information,
therefore placing great emphases on the readability of the type (Felici, 2003). On the contrary, display type is more concerned with legibility than readability. When consumers encounter display type they are glancing at either a word or short phrase, merely skimming the letters (Williams, 2006). This form of reading is intermingled with looking, meaning that the letterforms also become images, not merely symbols used for reading. This allows the letterforms to be more creative and emotionally connected; as long as the word is still ultimately legible, it can afford to surrender some of its readability in the name of aesthetics (Unger, 2007). In summary, text faces are unpretentious and “invisible” to aid readability, while display type is bolder, ornate, and more evocative (Felici, 2003). Text faces are classic, while display faces are generally the result of experimentation and recent trends, as seen below in Figure 1 (Hill, 2010).

Figure 1. Display Type and Text Type Examples
For packaging, the brand name and product name are usually set in display type. The product name is the general or common name of the product that is required by law to be on the front panel of the package. Other product descriptors that specify information about the contents of the package can also be written in display type. This can include the flavor, variety, special benefits, or features of the product. The descriptor information is used to market the product to consumers by pointing out how the product is special and more superior to other competing products (Klimchuk & Krasovec, 2006).

Text type is used for the longer portions of text on the package. Packaging often includes what is called romance copy, or copy that describes the product or brand in greater detail in order to persuade the consumer. This is set as text type on the back of the package. Recipes and product directions are other forms of text type also located on the back of the package. There is also a lot of mandatory information placed on the package that is required by the government, such as nutrition facts, ingredients, warnings, net weight, and manufacturer information. This information is required to be highly legible and is therefore always set as text type (Klimchuk & Krasovec, 2006).

Type Measurements:

The two main units for measuring type are the point and the pica. These two units of measurement are as valuable to typography as feet and inches are to architecture (Ryan & Conover, 2004). Points and picas are much smaller than inches, making this unit of measure more accessible when defining typography (Parker, 2006).
The point is the standard form of measurement for both the height of the letter (point size) and the distance between lines of text (leading) (Lupton, 2004). It can also be used to measure the thickness of a line, or in type terminology, a rule (Faiola, 2000). The point equals 1/72 of an inch, or .35 millimeters (Lupton, 2004).

The pica is used to measure both the dimensions of a page and the length of a line of text (Felici, 2003). A pica is equal to twelve points, which equates to 1/6 of an inch, or 4.16 millimeters (Bringhurst, 2008).

**Point Size for Text Type**

The point size of a typeface is the height of a letter, measuring from the beard line to the ascent line or cap line, as shown in Figure 2 (Faiola, 2000). The process of reading is greatly affected by a typeface’s point size, especially when dealing with text type. When type is set at a small point size, people fixate longer on each word, slowing the reading process. This is due to the fact that the characters suffer from reduced visibility when at smaller sizes (Beymer et al., 2008). Oppositely, texts displayed at large point sizes require more total fixations, also slowing the reading process (Carter et al., 2007). A higher number of fixations also hinders reader comprehension. Larger type produces more fixations because the larger size causes the word to be too large to fit within the visual field of a single fixation (Beymer et al., 2008).
Research by Paterson and Tinker in the 1920s-1940s found that types set at 10 points, 11 points, and 12 points were ranked easier to read than types at smaller or larger point sizes (Paterson and Tinker, 1929). Types within this range are moderate, thus avoiding the fixation problems encountered with smaller and larger typefaces. There is a range of readable text sizes because different typefaces, due to their various structures, will have different ideal point sizes. A type with certain characteristics might work best at 10 points, while a typeface with different features might look better at 12 points (White, 2011).

*Display Type Point Size*

Unlike the text type, the display type of a package must be readable from a few feet away due to the nature in which packaging is viewed in stores (Klimchuk & Krasovec, 2006). It is important that the sizes of the product name and brand name are large enough to capture the attention of a consumer strolling down the aisle of a convenience store. If too small, the consumer will not notice these important elements and will more than likely bypass the entire package. This characteristic of display type
makes it impossible to simply employ the rules for text type sizing when sizing the packaging display type.

Because display type is used to grab the attention of browsing consumers, it often employs very decorative and ornate typefaces. These different type styles will necessitate larger type sizes than seen with text typefaces. This is due to the fact that typefaces that are unfamiliar to people, such as novelty, script, or blackletter typefaces, are harder to read. Placing this text at a larger point size will help to compensate for this and regain lost legibility (Ryan & Conover, 2007).

Additionally, the increased point sizes and novelty typefaces often seen with display text allow the type to take on a more graphic quality (Ambrose & Harris, 2011). This can make the brand name, product name, and other product descriptors appear to be more visually appealing to consumers. The image-like nature of display type changes the way the observer interacts with the type. As discussed, display type is often examined by the consumer in a manner that combines looking and reading. Because of this, the problems that are encountered with overly large text type do not occur with display type.

Many times, the point size for a design will be chosen based on the amount of space available for the text (Berman, 2010). Because a typographic scale should always be proportionate to the overall size of the package, using the size of the package to determine the display type point size can be quite helpful (Klimchuk & Krasovec, 2006).
Typographic Hierarchy

A typographic hierarchy involves the organization of type in a ranked sequence, commencing with the most important component and descending to the least important. The value of each element on the package is analyzed to determine its placement within this sequence. When evaluating these elements, the relationship between the consumer, the product, and the message should also be considered (Carter et al., 2007). It must be decided which element of the packaging text the reader should see first. It is imperative that at least one visual element be responsible for grabbing the attention of the consumer. If there is no initial reason for the consumer to become engaged with the package, then they will never be convinced to pick up the package and examine it further (Berman, 2010). Once this initial catalyst has been activated, the hierarchy of the package works to carefully and purposefully guide the consumer through the packaging text, hopefully resulting in the purchase of the product (Unger, 2007).

The creation of a typographic hierarchy requires the assignment of different typographic values to each element of the text. These values will help create the cues needed to steer the consumer through the text and are of great importance to the package (Lupton, 2004). If all of the packaging elements were concordant, or of equal value, then the reader would not know how to proceed through the design (Berman, 2010). A concordant design would employ only one typeface in a single weight, size, and posture (Williams, 2008).

However, a good package design will incorporate contrasting typographic elements. The contrasting elements will be emphasized through different typefaces, type
styles, type sizes, colors, and effects that will work to provide a clear structure to the package (Williams, 2008). It is important that these contrasts be distinctly different, allowing the differences between them to be distinguished at first glance (Squire, 2006). These contrasts give the elements of the design different functions, some of which are more valuable, and therefore more prominent, than others (Carter et al., 2007).

Additionally, contrasting elements can increase the aesthetics of the package through the creation of visual tension. This visual tension is the result of the dissimilarity between the major and minor design elements that gives interest to the package (Parker, 2006).

Point Size as a Hierarchal Cue

Graphic designer Rob Roy Kelly once said “If you can’t make it good, make it big, if you can’t make it big, make it red” (Williams, 2008). While typographic designs should always be “good,” Mr. Kelly is right in the fact that making something large can make it more effective (White, 2011). The size of an element is one of the easiest ways to determine its importance within a typographic hierarchy (Parker, 2006).

Research has found that the size of an element does demonstrate its importance and the attention of the viewer will respond in accordance (Cummins, Tirumala, & Lellis, 2011). This is demonstrated on a package through the brand and product name, or display text, which are generally the two largest pieces of information on the package. Their size is due to their importance in relation to the product. Additionally, the increased size causes them to be the first two items observed by the consumer (Djamasbi, Siegelb,
Tullisb, 2010). This occurs because larger objects take up larger portions of the visual field, a situation in which humans will innately respond (Cummins et al., 2011).

When creating contrast through point size variation, make sure to do so with gusto (Williams, 2008). If only slight variations of type size is utilized then it may be observed as an error rather than an effort to imply importance (Hill, 2010). If the package being designed puts a much greater emphasis on the product name, opposed to the brand name, then there should be a significant difference between the point sizes of the two elements.

Another interesting way to assign point sizes to different valued text elements is through the use of the Fibonacci sequence. The Fibonacci sequence is a chain of numbers in which each number is determined by adding together the two numbers that precede it. The first ten numbers in the sequence are 1, 2, 3, 5, 8, 13, 21, 34, 55, and 89, but the sequence continues on infinitely. The Fibonacci sequence is displayed throughout nature and is considered inherently beautiful (Lidwell et al., 2010). To use the sequence for point size variation, use two or more numbers that appear consecutively. For example, you could set the brand name at 89 points, the product name at 55 points, and the product information text at 34 points (Ambrose & Harris, 2006).

*Typography and Packaging Shape*

The ambiguous process of graphic design is further compounded by requiring the designer to place two-dimensional elements upon three-dimensional substrates (Ambrose & Harris, 2007). While many packages provide an ample surface with which to communicate product and brand information, applying such information will demand a
very different approach to the layout design process. Instead of solely dealing with a single surface, packaging will require for the designer to account for at least two surfaces, usually more. The packaging shape will determine the proper size and placement of graphic elements (Klimchuk & Krasovec, 2006). Packages have edges, corners, tops, bottoms, sides, and curved surfaces that must all be considered when designing the graphic layout (Ambrose & Harris, 2011).

Packages are held, used, and viewed from all angles. Rarely is a package viewed only as a two dimensional entity (Ambrose & Harris, 2005). Because of this, no area of a package should be ignored (Wallace et al., 2009). The development of packaging graphics should always be approached in a holistic manner, viewing the design as a three-dimensional structure instead of a planar surface.

Packaging Panels

Obviously, not all packages have the same shape. The packaging for a product can be a simple cube-form, a cylinder, or even something quite amorphous. Though packaging comes in all sorts of three-dimensional forms, they all typically have a designated front and back (Ambrose & Harris, 2011). The size and shape of both of these areas will be determined by the size and shape of the package itself (Klimchuk & Krasovec, 2006).

The front of the package is known as the primary display panel, or PDP. The primary display panel is the section of the package that is most likely viewed by the consumer when displayed in the shopping environment. Regardless of the packaging
structure utilized, there will generally be an area that is allocated as the PDP. The PDP is the portion of the package that is designated for establishing the brand identity and product marketing. It is this area of the packaging that is responsible for selling the product to the consumer when in the retail setting (Klimchuk & Krasovec, 2006).

The back panel of the package, known as the back-of-pack, is used to display product information important to consumers (Calver, 2004). The back-of-pack generally contains nutrition facts, product ingredients, recipes, instructions, and other information to help consumers make informed purchasing decisions (Ambrose & Harris, 2011). The information and graphic elements chosen for the back-of-pack are reliant on the type of consumer interaction desired for the package. For instance, a cereal box wishes to engage the attention of children, and therefore typically displays games and puzzles on its back-of-pack. Oppositely, organic food products want to provide health-conscious consumers with nutritional information to persuade them that their product is a nutritious option (Dupuis & Silva, 2008).

The remaining sides or areas of a package can be used to support the information on either the PDP or back-of-back. They can continue to promote the brand and product, providing the opportunity for a deeper connection with potential consumers. The top of the package often provides more space for product branding. This will allow the product to be placed on the shelf either vertically or horizontally without hindering the consumer’s ability to identify the product (Dupuis & Silva, 2008).

Generally, it is the PDP that receives the most attention during the packaging design process, leaving the other sides more or less neglected. Because the primary
display panel is the portion of the package exhibited on a store shelf, it is the obvious design focus (Carver, 2004).

Packaging Surfaces and Graphics

The overall shape of the packaging structure will contribute to the surface characteristics of the package’s panels (Klimchuk & Krasovec, 2006). More rounded and fluid packaging forms will have more complex surfaces on which graphics must be placed.

While each surface of a box is flat, and therefore can work much like a two-dimensional substrate, the box is still a three-dimensional form whose edges are not hard and fast boundaries. Text can travel across the edges of one panel onto another to create very interesting graphic effects, as seen in Figure 3 below (Ambrose & Harris, 2011). Instead of addressing the carton as a compilation of multiple faces, many carton packages utilize graphics that wrap around the entirety of the package, making for very aesthetic pieces when viewed from various angles (Ambrose & Harris, 2005).
Cans, bottles, and pouches, however, are farther removed from two-dimensionality. These packaging structures are all comprised of arched surfaces that will affect the final appearance of the graphic design. Each of these packages will have varying amounts of curvature, causing there to be no formulaic method for their graphic arrangements (Klimchuk & Krasovec, 2006). The visual effects experienced by the consumer while viewing the product will change from package to package depending on its shape and surface curvature, as well as the perspective in which the consumer observes the package (Wang & Chou, 2010).

Research has found that the curvature of a surface will reduce the amount of area that makes up the primary display panel of a package (Wang & Chou, 2011). For example, the primary display area of a cylinder, seen with can, bottle, and jar packaging,
only represents 40% of the total package area (Meyers & Lubliner, 1998). The leftover 60% will become distorted and unrecognizable when viewed from the front (Wang & Chou, 2011). Flexible packaging will also have a very different surface shape when filled with product, creating non-display areas on the package’s PDP (Meyers & Lubliner, 1998).

Text placed within the non-display area will be very hard to read and will greatly hinder the consumer’s ability to understand the package when it is placed on the shelf (Wang & Chou, 2011). Miles Tinker conducted research in the 1950’s that found that curved surfaces could reduce reading speed by as much as 36% depending on the angle from which the surface is viewed. Tinker hypothesized that this was due to the fact that the eye must adjust its focal distance to read each word as it is placed a further distance along the curved surface. These changes are very slow, thus retarding reading speed. Additionally, Tinker states that the letterforms become more and more distorted the farther along the curve they appear. This will cause the eye to focus longer on more distorted words, also slowing down the reading process (Tinker, 1957).

New research has found that this hindrance to reading can be somewhat counteracted when the text is made to be highly legible, i.e. proper letterspacing, easily distinguishable letterforms, and appropriate leading. The more severely the package’s surface is arched, the more attention must be paid to its final affects on the typography (Wang & Chou, 2011).
The Typographic Elements of a Package

When one thinks of graphic design, photographs, illustrations, and vector art may be the first elements that come to mind. But typography is also a graphic element. Because text blocks and even individual words bring color to a design, they should be incorporated within the packaging design layout in the same manner as other graphic components (Ambrose & Harris, 2007).

While not every package will contain all of the same types of information, there are many key elements that will be displayed on a majority of packaged goods. In fact, there is so much information that is generally displayed on a package that it may seem as though there is not enough space to fit it all (Calver, 2004). But all of this information should not be viewed as an annoyance (Roncarelli & Ellicott, 2010). Each typographic element is vital to the success of the package. They can represent emotions and take on unique graphic qualities. Through the use of these typographic elements, the package can communicate and relate with the consumer. It is through these components that the package has the opportunity to truly express itself. Some of these elements can be seen in Figure 4 below.
Product Name: The product name, also known as the statement of identity, is the textual element on the package that specifies the common name of the product (Klimchuk & Krasovec, 2006).

Brand Name: The brand name informs the consumer which company is responsible for the creation of the packaged product. This can be expressed through a simple typographic design or through a more graphic-based logo.

Product Descriptor: These typographic components declare the specific packaging contents. They can describe the edition, flavor, or variety of the product, or can be used to highlight special features or product benefits. These pieces of information are generally subordinate to the product and brand names when displayed within a typographic hierarchy (Klimchuk & Krasovec, 2006).
*Offers:* Offers usually demonstrate when the consumer will receive a promotional extra that is not normally offered. An example of this could be a package that now contains 25% more product while still sold at the original price. Offers are usually very flashy due to their intent of grabbing the consumer’s attention. Many times, these features will be placed on top of a graphic or vector shape in order to enhance their attention-grabbing capabilities (Ambrose and Harris, 2011).

*Romance Copy:* Romance copy is the text that is used to describe the product or brand in greater detail. It generally promotes the product or brand by describing various attributes or product benefits. Romance copy can even portray a background story to help the consumer better connect with the product. Because this is generally a sizable paragraph, text type is usually employed.

*Directions and Recipes:* Some products display information that explains how to properly use the product. This can be through step-by-step instructions describing how to operate the product or through recipes or craft ideas that demonstrate possible product uses. This kind of text is also rather lengthy and therefore utilizes text type.

*Mandatory Copy:* The kind of information that must legally be placed on a package will vary according to the product, as well as the country in which the product is sold. Generally, the mandatory copy is comprised of nutritional information, ingredients lists, manufacturing information, and product weight or quantity. Because this information has been determined by the government to be
of great importance to the consumer, it is always written in a highly legible format, thus utilizing text type.

The key marketing elements, such as the brand name, product name, product descriptors, and offers, are all located on the PDP (Klimchuk & Krasovec, 2006). These elements are the most important for grabbing the attention of the consumer and creating an emotional bond. Therefore, by placing them on the front of the package, they will be easily viewed by browsing shoppers. Because they are comprised of a relatively small amount of copy, they can be placed at larger sizes along side images and other graphic elements.

Romance copy, directions, and recipes will all be displayed on the back-of-pack. This is because they are generally large amounts of text that take up a larger amount of the packaging surface. By locating these elements on the back-of-pack, the PDP is left with more space to incorporate images and photographs, in addition to the key typographic elements it normally displays. The small text that forms these large paragraphs would be hard for a consumer to read while sitting on a market shelf. Therefore, these elements are intended to be read after the package has been initially noticed. After the PDP has successfully enticed the attention of the consumer, the consumer will pick up the product and view the back-of-pack where they will find this secondary information and be further persuaded to purchase the product.

A majority of the mandatory copy is located on the non-PDP areas. Nutritional facts, manufacturing information, and ingredients lists are always located together. However, the net weight or product quantity information is legally required to be placed
on the lower front panel of the package (Klimchuk & Krasovec, 2006). As customer concern regarding product nutrition increases, more and more packages have also begun to place nutritional information and certain ingredients on the PDP. This is due to the fact that consumers now actively search for this information when shopping. By placing portions of this text on the front of the package, manufacturers are responding to the new desires of their consumers (Ambrose and Harris, 2011).

*The Gutenberg Diagram*

The Gutenberg diagram is often used to establish the prime display sections within a panel or PDP in order to create a design’s positional hierarchy. The Gutenberg diagram is established based on the way the human eyes move across a surface when reading (Lidwell et al., 2010). Because people in the Western world read from left to right, top to bottom, the eye will always start at the top left section of a layout and scan down to the bottom right corner (Berman, 2010). Research has found that because of this scan pattern, the upper left area is the most valuable region within the design. This research confirmed that the eye always rested first on the upper left region, most likely because this is viewed as the starting point for evaluating the package (Djamasbi et al., 2010).

Use of the Gutenberg diagram will enhance comprehension and define a reading rhythm (Lidwell et al., 2010). Following these principles helps guide readers easily through the package design because it imitates their natural reading tendencies (Parker, 2006). When this diagram is not utilized, the consumer can become very confused. For
example, if the primary element was placed within the center of the display area, the eye would immediately move towards it, thus disrupting the consumer’s natural evaluation pattern of the package (Berman, 2010). It may then become difficult for the consumer to know where their eyes should move next within the design. The Gutenberg Diagram is visually explained in Figure 5 below.

Figure 5. The Gutenberg Diagram Displayed on a Packaging Label
The Grid

One way to ensure that all vital design principles are addressed within a packaging design is through the use of a grid. A design grid is a formal design construction that divides the surface of a package in order to aid designers in the placement and sizing of images and typographic elements (Claire & Busic-Snyder, 2005). It forms the fundamental structure of the graphic design by breaking the packaging surface area into units. All of the graphic components will be arranged based on the vertical and horizontal factors of the grid. Therefore, the grid will have a great overall influence on the package’s aesthetics. The grid should not be viewed as a concrete entity that constrains the design, but as a guide that helps designers properly place the pieces of the design (Conover, 2011).

The most important contribution of the grid is the order and organization it brings to the design of the package. Grids create visual clarity by establishing the appropriate placement for each element of the design, creating a rhythm within the packaging layout. This rhythm will help the consumer easily understand the package and the order in which the various elements should be viewed. The grid will navigate the consumer through the two-dimensional graphics that surround this three-dimensional form (Faiola, 2000). Therefore, grids are organizational tools for both the designer and the consumer.

Design grids are additionally used as a method for making consistent design decisions about the placement of images and type within the design. This alleviates the designer from much of the stress involved with making such decisions. Consistent element placement creates unity and cohesion within the packaging graphics, especially
across multiple panels. Cohesion is further ensured when the various elements align properly with one another, achieving an overall even appearance (Conover, 2011). The structure of the grid will help the designer balance the components of the design in an organized, yet creative way (Ambrose & Harris, 2007).

Grids also simplify the process of creating unity among multiple package variations. The packaging for different products within a product line will achieve cohesion when utilizing the same placement for text and images (Faiola, 2000). When graphic elements are spaced and placed uniformly on the dieline, it will appear as though these various products relate to a single overall package design (Conover, 2011). By simply employing the same grid structure for each product within the line, the various elements of the design will be placed in the same manner.

Graphic designs are always created on two-dimensional dielines. But because these dielines will become three-dimensional when produced, it is important to visualize how the package’s final shape will affect the two-dimensional graphics. This can be done both digitally and through the creation of physical mock-ups (Meyers & Lubliner, 1998). Though applying grids to these dielines will help designers create the layout, it is important to note how the grid interacts with the creases and cuts of the dieline. The designer must be aware of where each grid line will fall on the three-dimensional package and how it will be viewed once physically realized. On box packaging, each panel can be treated as a separate entity, thus employing its own grid. It is also possible to place the grid over the entire dieline, therefore creating one large, wrapped graphic design. On curved surfaces, the designer must be aware of which portions of the design will be
viewable from the front, forming the primary display area. Obviously, these are all considerations that are package specific, therefore lacking precise rules and guidelines.

*The Vertical Grid*

The most basic method for grid creation is through the use of vertical columns (Conover, 2011). These vertical columns span the panel or entire dieline from left to right, creating vertical units of space (Lupton, 2004). Elements of the graphic design are then aligned within these vertical units, allowing the width of each column to help determine the element’s size (Conover, 2011).

A grid for a single panel can technically consist of a single column, thus defining margins for the package face. But because even a single panel within a packaging design contains multiple text and image components, a single column grid will not be of much help to packaging designers. Multi-column grids for entire dielines and individual panels will provide more flexibility within the design, and are thus much more suitable for packaging graphics. When multiple columns are employed, elements can absorb one column or can span across multiple columns (Lupton, 2004). This adds versatility to the design, making it less strict and rigid (Conover, 2011). To best ensure that the grid is maintained, elements within the column should consume most or all of the column’s width (Lupton, 2004).

The surface area of the packaging panel or dieline will assist in determining an appropriate amount of columns. Smaller surface areas will not be able to incorporate as many columns as larger surface areas. This is due to the fact that the more columns added
to a design, the narrower the width of each column becomes. Obviously, very narrow columns would create awkwardly sized images and text blocks with line lengths much too short for good readability (Conover, 2011). The graphic components of the package, as well as the use of an outer frame of space, or margin, will also play a role in determining the design and sizing of the grid (Lupton, 2004).

*The Modular Grid*

A modular grid is constructed with both vertical and horizontal lines. While the vertical columns move from the left side of the design to the right, the horizontal rows span from the top to the bottom. The units of space created by the intersections of the vertical and horizontal lines give the graphic elements both width and height limitations (Lupton, 2004). These individual units establish the smallest possible size for any element within the graphic design (Claire & Busic-Snyder, 2005).

As with vertical grids, the more units, or modules, created within the grid, the more flexible the design will become. When only a few modules are created, the design becomes more static with fewer options for the graphic layout (Claire & Busic-Snyder, 2005). Multiple modules can be used for a single element, thus increasing the number of layout options and the ease of appropriate element placement within the grid.

The added horizontal lines of the modular grid help to ensure that elements also align across the design. Because this gives a specific proportion that both images and text must adhere to, it may take some added manipulation of each element to ensure that it can be appropriately placed within the grid. It may be necessary to crop images slightly
or adjust the line length, type size, or leading of a paragraph to allow it to better fit within its module or modules.

*Grid Creation through the Golden Ratio*

Grids can also be created so that they incorporate the ideals of the Golden Ratio. The golden ratio, also referred to as the golden section, has been employed within art and architecture for over two thousand years (Lupton, 2004). It has been found throughout nature and is seen as the most ideal and aesthetic proportion (Lidwell et al., 2010).

The equation of the golden ratio is $B:A = A:(B+A)$. This translates to the smaller of the two elements, deemed $B$, relating to the larger element, deemed $A$, in the same manner that the larger element, $A$, relates to the two elements, $A$ and $B$, combined (Lupton, 2004). Numerically, the golden ratio translates to approximately $0.618$, which is often rounded to $\frac{2}{3}$. So the width of a grid’s module could be $\frac{2}{3}$ of the module’s height, allowing it to adhere to the golden ratio. A package façade or dieline could simply be divided into three rows or three columns to create a golden ratio grid, or it could use both three rows and three columns to create a grid with nine equal modules. This type of grid can be very visually appealing and can produce very well designed graphic layouts (Lidwell et al., 2010).

Interestingly, when a square is cut out of a golden rectangle, or a rectangle employing the golden ratio, the remaining segment of the rectangle is also a golden rectangle (Lupton, 2004). This will happen every time the golden rectangle is subdivided by a square, allowing yet another method for designers to create interesting, well-
proportioned grids (Lidwell et al., 2010). A diagram of the golden ratio is shown below in Figure 6.

![Golden Ratio Diagram](image)

Figure 6. Golden Ratio Diagram
CHAPTER THREE
MATERIALS AND METHODS

Objectives

This research was conducted in order to determine the proper point size for the display text of a package. The proportions of the package, along with the ideals of the golden ratio, were used to accomplish this goal.

A custom preference test was utilized to establish the proportion of the package that should be covered with the display text in order to achieve a design found to be the most preferable by the general public. Images of products with varying sizes of display text were used as the stimuli for this experiment. This experiment allowed the participants to choose which display type size variation of a product appeared to be the best rendition. A survey was used to record general demographic information, preference test responses, and post-test design related questions.

Experimental Design

It was gathered from the review of literature that the many differences between text type and display type prevented the rules for appropriate text type sizing to be applied to the display type of a package. It was also understood that there is no current method for determining the correct size for packaging display type. Though it was learned that packaging display typography needed to be large, exactly how large it needed to be was an unanswered question. Terms such as “large” are quite ambiguous,
causing information of this type to be unhelpful during the design process. Designers, especially inexperienced designers, need actual numbers. Without a mathematical means for determining the display type’s appropriate size, designers are ultimately left to their own opinions when setting display type.

According to Klimchuk and Krasovec, there is a connection between the display type of the package and the size of the package. After careful consideration, this fact began to seem more obvious. After all, it is the package that will determine the amount of area available for the text. Since it is necessary for display type to appear “large” in order to convey its value within the typographic hierarchy and attract the attention of browsing consumers, the display type must take up a large portion of the package’s primary display panel, or PDP. While type sized at 72 points may fill most of the PDP of one package, on a much smaller package, it may be so large that it extends off of the PDP. Additionally, if one were to place 72 point type on a much larger package, over half of the remaining PDP may be left blank, causing the text to appear very small. Since the size of the display type must therefore be dependent on package dimensions, there cannot be a specific point size or point size range for the display type due to the considerable variation among packaging PDP sizes. Consequently, the ideal display type size for packaging must involve a ratio between the amount of space the type encompasses and the total amount of space the package has to offer.

Since the type size is related to the geometry of the package, then a specific ratio must exist to define the proper aesthetic. The hypothesis was that this ratio corresponds with the golden ratio. Because the golden ratio is the most aesthetic proportion and has a
long history of human preference, its implementation in the search for the appropriate
display type size is the most logical. If history tells us that the golden ratio is the most
ideal proportion, than surely it must produce the most ideal display type size.

Knowing that the golden ratio rounds to about \( \frac{2}{3} \), it was theorized that the most
preferred display type size would be one that allowed the text to span across \( \frac{2}{3} \) of the
package’s primary display panel. If correct, this would mean that the proper size would
not be a specific point size or range, but would be dependent on each package’s shape
and size. The proper point size for each package would be whatever point size allowed
the text to span across \( \frac{2}{3} \) of the package’s width.

Due to display type’s ability to act as a graphic element, the implementation of a
grid was the best method for enacting this \( \frac{2}{3} \) proportion within a package design. A
vertical grid lends itself the most to this endeavor. The vertical lines of the grid will make
sizing the display type to the appropriate portion of the package simple. A vertical grid is
used instead of a modular grid because the horizontal lines of the modular grid are
unnecessary for this specific application. If a modular grid had been employed, the
display text would be expected to fill each module completely. This would more than
likely require the typeface in use to be stretched vertically in order to reach the top of the
module. This would produce a distorted typeface that is no longer in accordance with its
natural proportions. This could ultimately affect the participant’s preference choices, thus
skewing the data gathered.

Though one’s first guess may be to simply employ a grid consisting of vertical
lines placed at the \( \frac{1}{3} \) and \( \frac{2}{3} \) marks of the package’s PDP, this would not provide an
adequate amount of variation to properly test this theory. If the only three variants of display text size were examples set to $\frac{1}{3}$, $\frac{2}{3}$, and $\frac{3}{3}$ of the package, $\frac{2}{3}$ of the package would most likely be the preferred choice. Considering text that only uses $\frac{1}{3}$ of the package would be relatively small and text that uses the full $\frac{3}{3}$ is very large, the future participants of the study would most definitely choose the $\frac{2}{3}$ text option. Because this would produce a very biased experiment, another method of testing must be employed.

Instead of simply using thirds to divide the PDP, it was decided to further subdivide the grid into twelfths. This would provide a grid with many more text size variations, thus presenting a much more appropriate situation for testing. Using twelfths instead of thirds translated to an ideal proportion of $\frac{8}{12}$ths, thus $\frac{2}{3}$rds.

In order to ensure that $\frac{8}{12}$ths is indeed the ideal proportion for a package, it must be tested against display types set at other proportions. Normally, this would be done by varying the proportions of the display type size by a specified number of degrees on either side of the hypothesized value. But in this case, that would lead to variants that only covered $\frac{5}{12}$ths of the package. Considering this value is not even half the width of the package, this would more than likely produce unsatisfactory results. Type that only used about half of the primary display panel of the package may not be observed by consumers when in a retail environment, and may even be unreadable when viewed from the distance of a store shelf. Because of this, variations were on either side of $\frac{10}{12}$ths. This would ensure that no test variances would be utilized that may not be applicable to packaging in a real shopping situation.
In order to provide the participants with an adequate number of display type size variations, three variations were used on either side of $^{10/12}$ths. This equated to a total of seven variations. Because humans perceive over three options within a comparison as large (Lidwell, et al. 2010), it seemed that having the participants view all seven variations at once may be overwhelming, causing the experiment to be uncomfortable. The researcher believed that if the participant was forced to choose between seven seemingly identical packages, they may begin to feel that the task is too difficult, and in turn become agitated. So, it was instead decided to divide up the seven variations by having the participant view each package twice. The first viewing displayed packages with three varied display type sizes, one utilizing $^{8/12}$ths of the package, another utilizing $^{10/12}$ths of the package, and the third utilizing $^{12/12}$ths of the package. The second viewing would be dependent upon which of the first three packaging variations the participant chose. Once the participant chose from the first three options, they were then brought to a new slide that once again displayed the same package with three different display type size variations.

It was thought that after viewing the first three options ($^{8/12}$ths, $^{10/12}$ths, and $^{12/12}$ths), the participants would want to choose their ultimately preferred package from within a group of packages that were similar to the first package they had chosen. For instance, if the participant chose $^{8/12}$ths as their preferred package in the first viewing, it was assumed that they would find their ultimately preferred package on a slide displaying the three smallest display type sizes ($^{7/12}$ths, $^{8/12}$ths, and $^{9/12}$ths). If they instead chose the middle display type size of $^{10/12}$ths, then they were brought to a slide containing package images
of three medium sized display type variations (\(\frac{9}{12}\text{ths}\), \(\frac{10}{12}\text{ths}\), and \(\frac{11}{12}\text{ths}\)). Finally, if the participant chose \(\frac{12}{12}\text{ths}\), the largest display type option from the first viewing, then they were ushered to a slide displaying the three largest type options. These largest options consisted of display type spanning \(\frac{11}{12}\text{ths}\), another spanning \(\frac{12}{12}\text{ths}\), and a third that spans the full \(\frac{12}{12}\text{ths}\) of the package and also has an additional height increase of 10%. The largest option, which we will call EL \(\frac{12}{12}\text{ths}\), was created by also increasing the letterform height because it would not be possible to include a type variation that \(\frac{13}{12}\text{ths}\) of the package. Utilizing a \(\frac{13}{12}\text{ths}\) proportion would have caused the display text to wrap around to the next panel, making the text illegible. By instead increasing the display type height by 10%, the text still appeared to be larger than the \(\frac{12}{12}\text{ths}\) option, but was able to remain entirely on the PDP. By only increasing the verticality of the letterforms by 10%, the natural proportions of the typeface were not greatly disturbed. This process is further discussed in the Stimuli Creation section and is displayed in Figures 9, 10, and 11.

It was decided to use packaging images displayed in a slideshow format for this experiment. This method provided the experiment with many benefits. Using a slideshow of images opposed to a display of real packages allowed the experiment to run at a much faster pace. Instead of having to rearrange packages on shelves between each viewing, the participants could simply click through the presentation to display the next portion of the experiment. Additionally, using images of packages instead of real prototypes saved on both time and cost of package production. If prototypes had been used instead of images, a total of 210 packages would have needed to be created (seven variations of each of the thirty products). This would have been very hard to transport, arrange, and
organize, all problems not encountered through the use of a slideshow. Additionally, by utilizing two-dimensional images, the angle with which the participant viewed the package was able to be held constant.

Stimuli

The stimuli for this experiment consisted of slides containing images of different packaging design variations, as shown in Figures 6 and 7. Each package variation only varied in the size of its product name or brand name, both elements of display type. These elements were chosen because they are the two most important typographic elements on the package due to their role of explaining the contents of the package to the consumer. Each package was evaluated to determine which element, either the brand name or product name, received the highest placement within the package’s typographic hierarchy. This can be determined by the element’s size and weight. The more prominent element was then used as the display type variant for the package. If a package utilized a brand name that was displayed in a logo format, it was not used for the type variation. Instead, the product name of the package was utilized for the experiment. Because logos often incorporate other imagery or graphic elements that can detract from the typography, they were excluded from this experiment.
Figure 7. Slide One of the Day 1 Experiment Displaying the $\frac{12}{12}$ths, $\frac{8}{12}$ths and $\frac{10}{12}$ths Options Respectively (ID #1627749, 2011)

Figure 8. Slide 7 of the Day 1 Experiment Displaying the $\frac{8}{12}$ths, $\frac{9}{12}$ths, and $\frac{7}{12}$ths Options Respectively (ID #1630385, 2011)
The package images chosen for this experiment were found on the Mintel database, a database containing product packaging images and information from all over the world. It was important for the success of the experiment that the participants were not familiar with the packaging being displayed. If the participants had already been familiar with the packages, then they may be persuaded to choose the size variation closest to the product or brand name size on the original packaging. It was also important that the text on the package be written in English so that the participants could read and understand the packaging elements in the same manner as they would in a normal retail environment. Because of these two constraints, packages from other English speaking countries were used in order to reduce the likelihood of participant familiarity, while still providing the proper language for the participants involved.

Various packaging structures were also chosen to ensure that the results of the final experiment could be applied to all packaging in general. Images of cartons, cans, jars, bottles, pouches, pillow pouches and tubes were all utilized throughout the experiment.

The typeface used for the product or brand name of each package within the experiment was different. Each typeface was selected based on its similarities to the original display text of the package in order to ensure that the display text looked natural and as though it was part of the original design. However, legibility was still a major factor in determining the proper typeface. Any typefaces that were overly decorative or distorted were not employed within this experiment. Using different typefaces attempted
to produce findings that could be applied to all typefaces in general, and not only to a specific typeface or typeface classification.

The creation of each packaging variation was completed in Adobe Photoshop. After the original images were downloaded from the Mintel database, they were opened within Photoshop. Here, the original display text was erased from the package using a combination of the Clone Stamp tool, Healing Brush tool, and Spot Healing Brush tool. Once the original display text was removed to reveal an uninterrupted packaging surface, a 12-module vertical grid system was placed over the PDP of the package through the use of Photoshop guide lines. This grid was then used to determine the point size for each display type variation of the package. The product or brand name was typed in the chosen typeface and placed at the far left edge of the package. The point size of this text was increased until the text reached the desired guide line, ensuring that the text now consumed a specified proportion of the package’s width. Then the text was moved a short distance away from the left edge and placed near the top of the package. This top left placement was chosen based on the Gutenberg Diagram that states that this area is the portion of the package first viewed by an observer. By placing the varying product or brand names in this region, it can be guaranteed that the participants will view this text when making their packaging preference choice during the experiment.

To begin this process, the point size was increased until it reached the eighth grid line, causing the text to span $\frac{7}{12}$ths of the package’s PDP. After positioning the text according to the Gutenberg Diagram, the image of the product was saved as a jpg. Next, the text was moved back to the far left side of the package. Then the text was extended
until it reached the ninth grid line, causing it to take up $\frac{8}{12}$ths of the package. This process was repeated in order to create variances with type that extended $\frac{9}{12}$ths, $\frac{10}{12}$ths, $\frac{11}{12}$ths, and $\frac{12}{12}$ths of the package. For the final variance, EL $\frac{12}{12}$ths, the text from the $\frac{12}{12}$ths variance was then extended vertically by 10% through the use of the Vertical Scale tool. This entire process was completed for the 30 products used within the experiment and is demonstrated in Figures 8 and 9 seen on the following two pages.
Figure 9. Stimuli Creation Process
The next step in designing the experiment stimuli involved combining the packaging images into slides. To begin, the 30 packages were divided into three groups of ten in order to create three separate slideshows consisting of ten packages each to be
used on one of the three days of the experiment. This was done in order to keep the tests short. Because the experiment was to take place at PackExpo, longer experiments wouldn’t be feasible for many of the attendees. By offering only short, ten-package experiments, more participants would be willing to participate.

The packages were grouped so that the different packaging structures were dispersed relatively evenly among the three days. Additionally, the packages were ordered within the slideshow so that two packages of the same structure were never viewed back to back. No other considerations were taken into account when grouping the products or ordering them within the slideshows.

Each package necessitated four slide designs. The first slide, which would be viewed by all of the participants of that day’s experiment, consisted of images with type spanning $\frac{8}{12}$, $\frac{10}{12}$, and $\frac{12}{12}$ of the package. The images were ordered randomly so as not to create a trend that could interfere with the participant’s preference choice. For example, the $\frac{8}{12}$ image was not always placed on the left side of the slide for fear that the participant may simply always choose the far left image, thus providing false results that could skew the final data. The images were aligned horizontally across the center of the slide. Each image was assigned a random letter that would later be used to record the participant’s preference choice during testing.

Three other slides were created in this manner. One slide consisted of smaller type variances, $\frac{7}{12}$, $\frac{8}{12}$, and $\frac{9}{12}$, another with the middle type sizes, $\frac{9}{12}$, $\frac{10}{12}$, and $\frac{11}{12}$, and finally one with the largest type variances, $\frac{11}{12}$, $\frac{12}{12}$, and EL $\frac{12}{12}$. As with the first slide, the three images were placed in a random order and assigned a
random letter to be used for data recording during testing. This process was conducted for each of the ten packages within the first day’s experiment.

The next step was to link the images on each of the first slides of a package so that they would bring the participant to the correct slide after their initial packaging preference choice was made. This process is demonstrated in Figure 11. This was done by creating a link within PowerPoint that would bridge together each image with the slide that should follow it if it were chosen by the participant. For example, the image containing the $\frac{8}{12}$ variance was linked to slide two, or the slide containing the smaller type sizes of $\frac{7}{12}$, $\frac{8}{12}$, and $\frac{9}{12}$. Similarly, the $\frac{10}{12}$ image was linked to the third slide, which contained the medium size variations. Lastly, the $\frac{12}{12}$ image was linked to the fourth slide that contained all of the largest type size variations. In order to create one continuous slide show for the experiment, all the images of the second, third, and fourth slides of a package were linked to the first slide of the next package to be viewed in the experiment. So regardless of which packaging image was chosen as the ultimately preferred variation, any choice on which the participant clicked would lead to the slide of a new package containing the $\frac{8}{12}$, $\frac{10}{12}$, and $\frac{12}{12}$ variations. This linking process was repeated for all ten packaging options within the first day’s experiment. The entire procedure for slide creation and linking was then duplicated to create the slideshows for the second and third day’s experiments.
Figure 11. Slide Linking Diagram
Experimental Procedure

The experiment was conducted at PackExpo in Las Vegas. This is a large packaging conference that took place on September 26th through the 28th and received over 46,000 attendees.

Each of the three slideshow experiments were implemented on one of the three days of the exposition. Experiment one was conducted on day one, experiment two on day two, and experiment three on day three. For each day, a total of 51 participants were tested, though some of this data had to be discarded due to improper recording.

To begin, each participant was presented with a laptop displaying the Survey Monkey website. They were asked to complete the basic demographic information at the beginning of the survey. This included information on age, gender, and education level.

Once completed, the participants were given a laptop equipped with that day’s experiment’s slideshow. The proctor of the test, who had been familiarized with the test procedure, then explained to the participant that they were taking part in a packaging design preference test. The proctor told the participant that they would see a total of ten packages and would view each package two times in a row. The participants were told to start by choosing whichever of the packaging variations they most preferred. To make this selection, they were to click on the image of the preferred package and say its corresponding letter aloud to the proctor. At this time the experiment would begin.

As the participant made their preference choices by clicking on it’s image and saying its corresponding letter, they were linked to the next appropriate slide according to
their preference choices. Simultaneously, their answers, or the letters they were voicing, were being recorded on the Survey Monkey website by the proctor of the experiment.

After all ten packages had been viewed twice and the slideshow was completed, the participants were presented with the laptop displaying the Survey Monkey website. They were then asked to complete the follow up questions about their experience and personal design beliefs. Then they were thanked for their time and participation and the experiment was concluded.

**Statistical Analysis**

After all tests were complete, the data recorded on the Survey Monkey website was then input into an Excel spreadsheet. Using R, a statistical computation program, the Excel data was then statistically analyzed. The only metric tested for this experiment was the preference for type proportion across a package. The hypothesis of this experiment is that there is a significant difference in the preference choices caused by the proportion of the package encompassed by the display type. Therefore, the null hypothesis for this metric is that each display type size proportion had an equal number of selections by the participants. The metric was analyzed through the use of Pearson’s Chi Squared test for independence. To analyze the factors of age, gender, and package type, a three-way between-subjects ANOVA test was conducted in R. ANOVA tests are utilized to provide p-values, which are representative of the probability that the results of the study could occur by chance. A p-value was found to be statistically significant, therefore leading to the rejection of the null hypothesis, if it was less than or equal to a significance level, or
alpha, of .05. Finally, pairwise t-tests were conducted to evaluate where the differences between packaging structures lay in relation to display type preference.
CHAPTER FOUR
RESULTS AND DISCUSSION

The study included a total of 150 participants, 103 males (68.6%) and 47 females (31.4%). Unfortunately, some of the participant data had to be removed from the study due to misrecording. It was apparent that the information had been improperly recorded if answers on Survey Monkey were left blank or included a letter that was not part of that question’s possible answers. Once all unusable data was removed from the study, preference test data from 121 participants remained. This consisted of 79 males (65.3%) and 42 females (34.7%). The age ranges of these participants are displayed in Figure 12 below. Based on the remaining data, there was a statistically significant preference favoring the display type that extended \( \frac{10}{12} \) of the package. No other sizes were found to be significantly different from the mean.

Figure 12. Age Ranges of Participants
Preference Test Results and Statistics

The only metric tested within this experiment was participants’ preference for display type proportion in relation to the package. Once the data was recorded, the statistical computation program R was used to analyze the data. Appendix B displays the input code used for the analysis in R, while Appendix C displays the output from R.

To evaluate the effect of the display type size in relation to the package, a Pearson’s chi squared test for independence was conducted between the “observed” and “expected” columns, as seen below in Table 1.

<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12ths</td>
<td>139</td>
<td>173</td>
<td>-34</td>
<td>-0.245</td>
</tr>
<tr>
<td>8/12ths</td>
<td>162</td>
<td>173</td>
<td>-11</td>
<td>-0.079</td>
</tr>
<tr>
<td>9/12ths</td>
<td>206</td>
<td>173</td>
<td>33</td>
<td>0.024</td>
</tr>
<tr>
<td>10/12ths</td>
<td>454</td>
<td>173</td>
<td>281</td>
<td>2.034</td>
</tr>
<tr>
<td>11/12ths</td>
<td>160</td>
<td>173</td>
<td>-13</td>
<td>-0.093</td>
</tr>
<tr>
<td>12/12ths</td>
<td>37</td>
<td>173</td>
<td>-136</td>
<td>-0.983</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>52</td>
<td>173</td>
<td>-121</td>
<td>-0.0870</td>
</tr>
<tr>
<td>Total:</td>
<td>1,210</td>
<td>1,211</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Tallied Data Choices for Each Display Type Proportion

The observed column contains the number of times each type size was selected, while the expected column contains the number of times each type size was expected to be chosen. The expected column represents the null hypothesis that all type sizes would be equally preferred, therefore expecting each type size to be chosen 173 times. The expected value of 173 is derived by dividing the total number of selections made by all participants, or 1,211, by the total number of type size variations, 7. The chi squared test
for independence determines how far one distribution lies from another. The chi squared test computed for this study found that the distribution of selections varied significantly ($p < 0.01$) between the observed selections found in the study and the expected number of selections for all display type variations receiving equal preference. Based on the statistical findings, the decision was made to reject the null hypothesis. Though this test found a significant difference in the preferences for display type size on the packages, it was unable to determine where this significant difference lies. To determine this information, the residuals were computed and converted to z-scores. The residuals of the sample are the differences between the samples and the estimated function value. The z-scores, also known as standard scores, display how many standard deviations from the mean a sample lies. It was found that that the $\frac{10}{12}$ths proportion has a z-score of 2.03, as shown in Table 1. Because the z-score of 2.03 is greater than the score of two standard deviations on a normal distribution, or 1.96, we find significance ($p < 0.05$). Therefore, the $\frac{10}{12}$ths proportion was preferred significantly more than the rest.
To examine the effect of gender, age, and packaging structure, a three-way between-subjects ANOVA was employed. The results are displayed in Table 2 below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Degrees of Freedom</th>
<th>Sum Sq</th>
<th>Mean Sq</th>
<th>F Value</th>
<th>Pr(&gt;F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>20.78</td>
<td>20.781</td>
<td>7.855</td>
<td>0.005</td>
</tr>
<tr>
<td>Package Structure</td>
<td>7</td>
<td>104.11</td>
<td>14.873</td>
<td>5.622</td>
<td>2.170e-06</td>
</tr>
<tr>
<td>Age</td>
<td>5</td>
<td>11.14</td>
<td>2.229</td>
<td>0.843</td>
<td>0.512</td>
</tr>
<tr>
<td>Gender:Package</td>
<td>7</td>
<td>11.07</td>
<td>1.582</td>
<td>0.598</td>
<td>0.758</td>
</tr>
<tr>
<td>Gender:Age</td>
<td>5</td>
<td>28.03</td>
<td>5.607</td>
<td>2.120</td>
<td>0.061</td>
</tr>
<tr>
<td>Package:Age</td>
<td>35</td>
<td>84.81</td>
<td>2.423</td>
<td>0.916</td>
<td>0.610</td>
</tr>
<tr>
<td>Gender:Package:Age</td>
<td>34</td>
<td>67.22</td>
<td>1.977</td>
<td>0.747</td>
<td>0.854</td>
</tr>
<tr>
<td>Residuals</td>
<td>1115</td>
<td>2949.69</td>
<td>2.646</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Results of ANOVA test

As Table 2 shows, both the gender ($p < 0.01$) of the participant and the packaging structure ($p < 0.01$) had a significant affect on the p-value. So both the gender of the participant and the packaging structure in use will affect the observed preferences for display type size. Oppositely, there was no significant effect caused by the age of the participant or any interaction effects. This is evident by the p-values of Age and the interaction effects listed in table 2 that all exceed the p-value of 0.05, thus denoting a lack of significance.
<table>
<thead>
<tr>
<th>Gender</th>
<th>Mean</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>9.410</td>
<td>0.083</td>
</tr>
<tr>
<td>Male</td>
<td>9.685</td>
<td>0.057</td>
</tr>
</tbody>
</table>

Table 3. Table of Gender Preference Means and Standard Error

![Mean Selection by Gender with Standard Error Chart](image)

Figure 13. Mean Selection by Gender with Standard Error Chart

As previously discussed, the gender of the participant did have a significant effect on participants’ preferences of display type size proportion. This can be observed through the use of the error bars in Figure 13. Because the error bars do not encompass the same area of the chart, the significant difference between the two is easily detected. In Table 3, the larger mean value associated with males establishes that men are more likely to prefer larger display type proportions, while women are likely to prefer smaller display type proportions, as seen by the lower mean value of females. It may seem a bit odd that the mean preference values for both genders are below $\frac{10}{12}$ths, the value found to be the most significantly preferred. This is due to the fact that $\frac{10}{12}$ths is the mode of the preference
data, meaning that it was chosen the most. Oppositely, these means are averages of all of
the selections made. So while \( \frac{10}{12} \) was the most preferred choice, the other commonly
selected values, \( \frac{7}{12} \), \( \frac{8}{12} \), and \( \frac{9}{12} \), brought down the averages of the overall data.
Additionally, these mean values do not represent the most preferred proportions for each
gender, but only indicate that males may prefer larger display type sizes than females.
Further research on the most preferred proportions of each gender must therefore be
conducted.
Table 4. Table of Age Preference Means and Standard Error

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>9.584</td>
<td>0.089</td>
</tr>
<tr>
<td>30-39</td>
<td>9.625</td>
<td>0.106</td>
</tr>
<tr>
<td>40-49</td>
<td>9.510</td>
<td>0.078</td>
</tr>
<tr>
<td>50-59</td>
<td>9.589</td>
<td>0.118</td>
</tr>
<tr>
<td>60+</td>
<td>9.84</td>
<td>0.176</td>
</tr>
</tbody>
</table>

As can be observed by the intersecting error bars in Figure 14, the age of the participant has no significant effect on the preference for the display type size of a package. Though the error bars of the 40-49 and 60+ age categories do not intersect, this
does not necessarily denote a significant difference. Table 5 below displays the results of the pairwise t-tests that were conducted on the participant age data. This test gives us numerical proof that no significance is present. The p-value of 0.081 that was found between the 40-49 and 60+ age categories exceeds 0.05, confirming that no significance exists.

<table>
<thead>
<tr>
<th></th>
<th>20-29</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>0.591</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>40-49</td>
<td>0.784</td>
<td>0.396</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>50-59</td>
<td>0.777</td>
<td>0.797</td>
<td>0.563</td>
<td>----</td>
</tr>
<tr>
<td>60+</td>
<td>0.134</td>
<td>0.263</td>
<td>0.081</td>
<td>0.193</td>
</tr>
</tbody>
</table>

Table 5. Pairwise T-Tests of Participant Age Data
Table 6. Table of Packaging Structure Means and Standard Error

<table>
<thead>
<tr>
<th>Package Type</th>
<th>Mean</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottle</td>
<td>9.541</td>
<td>0.091</td>
</tr>
<tr>
<td>Box</td>
<td>9.517</td>
<td>0.138</td>
</tr>
<tr>
<td>Can</td>
<td>9.727</td>
<td>0.146</td>
</tr>
<tr>
<td>Jar</td>
<td>9.975</td>
<td>0.121</td>
</tr>
<tr>
<td>Jug</td>
<td>10.156</td>
<td>0.178</td>
</tr>
<tr>
<td>Pillow Pouch</td>
<td>9.575</td>
<td>0.110</td>
</tr>
<tr>
<td>Pouch</td>
<td>9.676</td>
<td>0.170</td>
</tr>
<tr>
<td>Tube</td>
<td>8.901</td>
<td>0.171</td>
</tr>
</tbody>
</table>

As is demonstrated by the lack of intersections of some of the error bars in Figure 15, the packaging structure did have a statistical effect on the preference of display type proportions.
To find out exactly where these significant differences lie, a pairwise t-test was conducted on the packaging structure data. Significant differences were detected between the bottle and jar structures \((p < 0.05)\), the carton and jar structures \((p < 0.05)\), the bottle and jug structures \((p < 0.01)\), the carton and jug structures \((p < 0.01)\), the jug and pillow pouch structures \((p < 0.01)\), the jar and pillow pouch structures \((p < 0.05)\), and all structures with respect to tube structures \((p < 0.01)\). These findings suggest that the display type of certain structures are processed differently from that of other packaging structures but does not determine the appropriate display type proportion for each packaging structure.

In order to determine the most preferred display type proportion for each of the packaging structures tested, a Pearson’s chi squared test for independence was conducted for each structure. As with the chi squared test conducted for all packaging structures, this test compared the distributions of the observed display type selections and the expected number of selections if all proportions were to be preferred equally. If significance was found with the chi squared test, then the residuals were computed and

<table>
<thead>
<tr>
<th></th>
<th>Bottle</th>
<th>Carton</th>
<th>Can</th>
<th>Jar</th>
<th>Jug</th>
<th>Pillow Pouch</th>
<th>Pouch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carton</td>
<td>0.880</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Can</td>
<td>0.280</td>
<td>0.288</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Jar</td>
<td>0.012</td>
<td>0.021</td>
<td>0.235</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Jug</td>
<td>0.003</td>
<td>0.005</td>
<td>0.071</td>
<td>0.446</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Pillow Pouch</td>
<td>0.807</td>
<td>0.733</td>
<td>0.412</td>
<td>0.031</td>
<td>0.007</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Pouch</td>
<td>0.516</td>
<td>0.490</td>
<td>0.830</td>
<td>0.212</td>
<td>0.070</td>
<td>0.648</td>
<td>----</td>
</tr>
<tr>
<td>Tube</td>
<td>0.001</td>
<td>0.002</td>
<td>8.0e-05</td>
<td>3.1e-07</td>
<td>1.4e-07</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Table 7. Pairwise T-Tests of Packaging Structure Data**
converted to z-scores to determine where the significance lies.

<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12ths</td>
<td>30</td>
<td>21.571</td>
<td>8.429</td>
<td>1.925</td>
</tr>
<tr>
<td>8/12ths</td>
<td>13</td>
<td>21.571</td>
<td>-8.571</td>
<td>0.834</td>
</tr>
<tr>
<td>9/12ths</td>
<td>19</td>
<td>21.570</td>
<td>-2.570</td>
<td>1.212</td>
</tr>
<tr>
<td>10/12ths</td>
<td>50</td>
<td>21.570</td>
<td>28.430</td>
<td>3.207</td>
</tr>
<tr>
<td>11/12ths</td>
<td>26</td>
<td>21.570</td>
<td>4.430</td>
<td>1.668</td>
</tr>
<tr>
<td>12/12ths</td>
<td>3</td>
<td>21.570</td>
<td>-18.570</td>
<td>0.192</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>10</td>
<td>21.570</td>
<td>-11.570</td>
<td>0.641</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>151</strong></td>
<td><strong>151</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Chi Squared Test for Display Type Size Preferences on Cartons

Figure 16. Observed Display Type Size Preferences for Cartons

The chi squared test for the display type preference on cartons did find a significant difference ($p < 0.01$) among the preferences for display type sizes. Because
this test only determines that there is significance, and does not determine where that significance lies, the residuals were then computed and converted to z-scores, as shown in Table 8. Because the z-score of $\frac{10}{12}$, 3.207, exceeds 2.576, or the score of three standard deviations on a normal distribution, significance is discovered ($p < 0.01$). This means that the $\frac{10}{12}$ proportion is significantly preferred more than any other display type proportion on a carton.
Table 9. Chi Squared Test for Display Type Size Preferences on Cans

<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12ths</td>
<td>7</td>
<td>17.143</td>
<td>-10.143</td>
<td>0.436</td>
</tr>
<tr>
<td>8/12ths</td>
<td>14</td>
<td>17.140</td>
<td>-3.140</td>
<td>0.873</td>
</tr>
<tr>
<td>9/12ths</td>
<td>29</td>
<td>17.140</td>
<td>11.860</td>
<td>1.808</td>
</tr>
<tr>
<td>10/12ths</td>
<td>48</td>
<td>17.140</td>
<td>30.860</td>
<td>2.993</td>
</tr>
<tr>
<td>11/12ths</td>
<td>13</td>
<td>17.140</td>
<td>-4.140</td>
<td>0.811</td>
</tr>
<tr>
<td>12/12ths</td>
<td>5</td>
<td>17.140</td>
<td>-12.140</td>
<td>0.312</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>4</td>
<td>17.140</td>
<td>-13.140</td>
<td>0.249</td>
</tr>
<tr>
<td>Total:</td>
<td>120</td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 17. Observed Display Type Size Preferences for Cans

The chi squared test for display type size preferences on cans also found a significant difference among the preference for the display type proportions. Once the residuals were computed and translated into z-scores, as seen in Table 9, it was found once again that 10/12ths was the most significantly ($p < 0.01$) preferred proportion. This significance was determined through 10/12ths’ z-score of 2.993 which exceeds the score of 2.576, or the score of three standard deviations on a normal distribution.
<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12ths</td>
<td>19</td>
<td>30.143</td>
<td>-11.143</td>
<td>0.747</td>
</tr>
<tr>
<td>8/12ths</td>
<td>33</td>
<td>30.140</td>
<td>2.860</td>
<td>1.297</td>
</tr>
<tr>
<td>9/12ths</td>
<td>41</td>
<td>30.140</td>
<td>10.860</td>
<td>1.612</td>
</tr>
<tr>
<td>10/12ths</td>
<td>81</td>
<td>30.140</td>
<td>50.860</td>
<td>3.185</td>
</tr>
<tr>
<td>11/12ths</td>
<td>20</td>
<td>30.140</td>
<td>-10.140</td>
<td>0.786</td>
</tr>
<tr>
<td>12/12ths</td>
<td>7</td>
<td>30.140</td>
<td>-23.140</td>
<td>0.275</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>10</td>
<td>30.140</td>
<td>-20.140</td>
<td>0.393</td>
</tr>
<tr>
<td>Total:</td>
<td>211</td>
<td>211</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10. Chi Squared Test for Display Type Size Preferences on Pillow Pouches

Figure 18. Observed Display Type Size Preferences for Pillow Pouches

The chi squared test for the display type size preference on pillow pouches also found a significant difference ($p < 0.01$) among the preference selections. The $z$-scores seen in Table 10 that were computed to find the location of the significance showed that $10/12$ths is the most significantly ($p < 0.01$) preferred proportion. The $10/12$ths $z$-score was 3.185, which exceeds the score of three standard deviations on a normal distribution, or 2.576, demonstrating that it is significantly more preferred.
<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12ths</td>
<td>6</td>
<td>10.571</td>
<td>-4.571</td>
<td>0.618</td>
</tr>
<tr>
<td>8/12ths</td>
<td>10</td>
<td>10.570</td>
<td>-0.570</td>
<td>1.030</td>
</tr>
<tr>
<td>9/12ths</td>
<td>12</td>
<td>10.570</td>
<td>1.430</td>
<td>1.236</td>
</tr>
<tr>
<td>10/12ths</td>
<td>31</td>
<td>10.570</td>
<td>20.430</td>
<td>3.192</td>
</tr>
<tr>
<td>11/12ths</td>
<td>9</td>
<td>10.570</td>
<td>-1.570</td>
<td>0.927</td>
</tr>
<tr>
<td>12/12ths</td>
<td>1</td>
<td>10.570</td>
<td>-9.570</td>
<td>0.103</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>5</td>
<td>10.570</td>
<td>-5.570</td>
<td>0.515</td>
</tr>
<tr>
<td>Total:</td>
<td>74</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11. Chi Squared Test for Display Type Size Preferences on Tubes

Figure 19. Observed Display Type Size Preferences for Tubes

Additionally, the chi squared test for the display type size preferences on tubes discovered a significant difference ($p < 0.01$) among the preferences. Thus, the z-scores, seen in Table 11 were translated from the computed residuals to determine where this significance lies. Once again, the z-score of $10/12$ths, 3.192, exceeded the score of three standard deviations on a normal distribution, or 2.576, therefore finding $10/12$ths to be significantly ($p < 0.01$) more preferred.
Table 12. Chi Squared Test for Display Type Size Preferences on Bottles

<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12th</td>
<td>34</td>
<td>47.143</td>
<td>-13.143</td>
<td>0.780</td>
</tr>
<tr>
<td>8/12th</td>
<td>52</td>
<td>47.140</td>
<td>4.860</td>
<td>1.193</td>
</tr>
<tr>
<td>9/12th</td>
<td>51</td>
<td>47.140</td>
<td>3.860</td>
<td>1.170</td>
</tr>
<tr>
<td>10/12th</td>
<td>135</td>
<td>47.140</td>
<td>87.860</td>
<td>3.097</td>
</tr>
<tr>
<td>11/12th</td>
<td>47</td>
<td>47.140</td>
<td>-0.140</td>
<td>1.078</td>
</tr>
<tr>
<td>12/12th</td>
<td>6</td>
<td>47.140</td>
<td>-41.140</td>
<td>0.138</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>5</td>
<td>47.140</td>
<td>-42.140</td>
<td>0.115</td>
</tr>
<tr>
<td>Total</td>
<td>330</td>
<td>330</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 20. Observed Display Type Size Preferences for Bottles

When the chi squared test for the display type size preferences on bottles was calculated, a significant difference ($p < 0.01$) for the preferences was yet again discovered. The $z$-scores in Table 12 that were then translated from the residuals demonstrated that $10/12$ths was significantly ($p < 0.01$) more preferred. This was made evident by $10/12$ths' $z$-score of 3.097 that exceeded 2.576.
<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12ths</td>
<td>8</td>
<td>17.286</td>
<td>-9.286</td>
<td>0.480</td>
</tr>
<tr>
<td>8/12ths</td>
<td>5</td>
<td>17.280</td>
<td>-12.280</td>
<td>0.300</td>
</tr>
<tr>
<td>9/12ths</td>
<td>22</td>
<td>17.280</td>
<td>4.720</td>
<td>1.321</td>
</tr>
<tr>
<td>10/12ths</td>
<td>49</td>
<td>17.280</td>
<td>31.720</td>
<td>2.942</td>
</tr>
<tr>
<td>11/12ths</td>
<td>27</td>
<td>17.280</td>
<td>9.720</td>
<td>1.621</td>
</tr>
<tr>
<td>12/12ths</td>
<td>4</td>
<td>17.280</td>
<td>-13.280</td>
<td>0.240</td>
</tr>
<tr>
<td>EL 12/12ths</td>
<td>6</td>
<td>17.280</td>
<td>-11.280</td>
<td>0.360</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>121</strong></td>
<td><strong>121</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 13. Chi Squared Test for Display Type Size Preferences on Jars

![Bar Chart](image)

Figure 21. Observed Display Type Size Preferences for Jars

The chi squared test for the display type size preference on jars also found that the preferences for the proportions were significantly different ($p < 0.01$). The resulting $z$-scores shown in Table 13 demonstrated that $10/12$ths, with a $z$-score of 2.942, was the most significantly ($p < 0.01$) preferred preference.
Table 14. Chi Squared Test for Display Type Size Preferences on Pouches

<table>
<thead>
<tr>
<th>Type Size</th>
<th>Observed</th>
<th>Expected</th>
<th>Residual</th>
<th>Z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{7}{12}$ths</td>
<td>6</td>
<td>10.571</td>
<td>-4.571</td>
<td>0.618</td>
</tr>
<tr>
<td>$\frac{8}{12}$ths</td>
<td>10</td>
<td>10.570</td>
<td>-0.570</td>
<td>1.030</td>
</tr>
<tr>
<td>$\frac{9}{12}$ths</td>
<td>12</td>
<td>10.570</td>
<td>1.430</td>
<td>1.235</td>
</tr>
<tr>
<td>$\frac{10}{12}$ths</td>
<td>31</td>
<td>10.570</td>
<td>20.430</td>
<td>3.192</td>
</tr>
<tr>
<td>$\frac{11}{12}$ths</td>
<td>9</td>
<td>10.570</td>
<td>-1.570</td>
<td>0.927</td>
</tr>
<tr>
<td>$\frac{12}{12}$ths</td>
<td>1</td>
<td>10.570</td>
<td>-9.570</td>
<td>0.103</td>
</tr>
<tr>
<td>EL $\frac{12}{12}$ths</td>
<td>5</td>
<td>10.570</td>
<td>-5.570</td>
<td>0.515</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>74</strong></td>
<td><strong>74</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Finally, a chi squared test for the preference of display type size on pouches was computed. This test also found a significant difference ($p < 0.01$) among the preferences for display type. The $z$-scores were once again translated and are displayed in Table 14. A significant difference ($p < 0.01$) for the preference for $\frac{10}{12}$ths was determined through
\( \frac{10}{12} \) ths z-score of 3.192, which exceeded the score of three standard deviations on a normal distribution, or 2.576.

While the pairwise t-tests computed between the different packaging structures did find that there were significant differences between the preferences for display type size on certain packages, these different preferences were not the most significantly preferred. Though the package does have an effect on the display type sizes chosen by participants, \( \frac{10}{12} \) ths was still the most significantly (\( p < 0.01 \)) preferred display type size for all packaging structures. So while \( \frac{10}{12} \) ths is always preferred significantly more than the other display type sizes regardless of the package structure, the other type sizes selected that are not the most significantly preferred are dependent on the packaging structure.

Finally, tests were run on each package to assess whether there were any significant outliers among the packages tested. There were a total of seven packages that had modes significantly different from the dominant \( \frac{10}{12} \) ths preference. These were the bottle of chocolate sauce (\( \frac{9}{12} \) ths), the pillow pouch of chips (\( \frac{9}{12} \) ths), the tube of hand cream (\( \frac{8}{12} \) ths), the bottle of shampoo (\( \frac{8}{12} \) ths), the box of pasta (\( \frac{7}{12} \) ths), the tube of toothpaste (\( \frac{7}{12} \) ths), and the box of cracker thins (\( \frac{7}{12} \) ths). These products, all with preferences below \( \frac{10}{12} \) ths, may explain why the mean preferences of each gender (9.69 for males and 9.41 for females) is so much lower than the overall preferred display type size of \( \frac{10}{12} \) ths.

Out of these seven packages, it was found that three packages, the box of pasta, the tube of toothpaste, and the box of cracker thins, were all significant (\( p < 0.01 \)) outliers
with a mean more than two standard deviations from the mean of means. This was found through the creation of a t-test for the original seven packages with significantly different modes from the mean with these seven products excluded. For all three significant outliers, \( \frac{7}{12} \) th was the significantly \((p < 0.01)\) preferred display type size. These outliers could have resulted from specific design issues, such as the image in the background of the cracker box that may have competed with the display type being tested, or from the proportions of the package, such as the vary narrow widths of the pasta box and toothpaste tube. Images of these packages, as well as all other packaging images, are included in Appendix A.
Survey Results

In order to better understand the preferences of participants, a post-survey was provided. These survey questions sought to discover the participant’s opinions of the experiment in which they had just been involved, as well as their personal design beliefs.

Figure 23. Participants Opinions of the Importance of Legibility verses Aesthetics

The participants were asked whether they believed that the legibility or the aesthetics of the typeface were more valuable. Figure 23, displayed above, shows the results of this question. The question was asked in the form of a ten-point scale, with 1 representing legibility and 10 representing aesthetics. As the chart displays, the answers to this question were pretty evenly distributed. This shows that neither legibility nor aesthetics was seen as being definitely more important than the other by the participants polled.
Figure 24 displays the results of asking participants to rate the difficulty in determining the differences among the options viewed on each slide. This question was evaluated on a ten-point scale, with 1 representative of being easily distinguishable and 10 being very hard to distinguish. Most participants viewed the differences between the packaging variations as easily discernable. This shows that participants did indeed notice the changes in the size of the product or brand name and were therefore making their preference choices based on this element of the design.
The question displayed in Figure 25 was used to evaluate the participant’s opinion of the difficulty of choosing their preferred package. The question was asked in the form of a ten-point scale, with 1 representing “very easy” and 10 representing “very hard.” As you can see, a majority of the participants thought that the task was relatively easy. This question demonstrates that choosing their most preferred package variation was fairly simple, possibly due to the fact that the variations produce very discernable emotions among viewers.
The survey also required the participants to rate how well they understood the task they were just asked to complete. The question was framed on a ten-point scale, with one representing “very clearly understanding the task” and ten representing “not understanding the task”. Out of 143 participants that answered the question, 103, or 73.5%, responded by recording a 1, 2, or 3, corresponding to clearly understanding the task. Fifteen participants, or 10.5%, recorded a 4, 5, 6, or 7, indicating that they sort of understood the task. The remaining 23 participants, or 16%, recorded an 8, 9, or 10, showing that they did not feel that they understood the task. The 73.5% of participants that clearly understood the task helps to validate the results of this experiment by proving that the participants were in fact choosing their most preferred package and were not making choices based on any other factors.
A common problem encountered by many packaging designers involves determining the appropriate size for display type elements. While there are many typographic rules used to establish the proper text type size, there are currently no established methods for applying the appropriate display type size on a package. Because the text of a package is a very direct way of communicating the product’s message to the consumer, it is very important for the success of the package to employ proper typography. Due to display type’s role of grabbing consumer attention, imparting product emotions, and expressing the most basic product information to consumers, it becomes even more imperative to properly set display type. Specifically, size becomes an extremely important factor due to its ability to show importance within a hierarchy and its influence on the element’s ability to be both noticeable and legible.

The purpose of this study was to determine the proper size for the display type of a package. The display type elements specifically evaluated were the product name or brand name of the package due to their level of importance within the typographic hierarchy. Because not all display type should be equally weighted within the hierarchy, this experiment only determined the proper display type size for the most important information within the hierarchy. Based on the design principle of the golden ratio, it was hypothesized that display type set to extend $\frac{8}{12}$ths, or $\frac{2}{3}$rd of the package’s width would produce the most ideal display type size. This hypothesis was rejected upon evaluation of
the experiment’s final results. This was due to the fact that there were significant results that showed the $\frac{10}{12}$ display type proportion as being the most preferred.

It was additionally hypothesized that the most preferred display type proportion would be the same for all packaging structures. This hypothesis was confirmed. While the results of the study did show that the packaging structure had a significant effect on the display type preference, the $\frac{10}{12}$ proportion was still the significantly preferred proportion for each packaging structure.

The age and gender of participants were additionally analyzed to observe any effects they may have on the display type size preference. It was initially hypothesized that neither of these factors would influence the preference of the display type proportion. Contrary to this, gender was found to significantly influence the preferred display type size, with males generally preferring larger display type sizes than females. Exactly which proportions are preferred for each gender were not determined through this study. Age, however, did not have a significant effect on the preference of the display type size, as originally hypothesized.

Though it was found that other factors, such as packaging structure and the gender of the consumer, can affect the preference for display type size, the proportion of $\frac{10}{12}$ was determined to be the proper display type size proportion. This information provides the designer with a ratio between the size of the primary display panel and the amount of area the display type should encompass, therefore creating an easy method for determining the proper display type size when applying text to a package.
This experiment also provided a method for creating display type that is set to a specific proportion of the package. Through the implementation of a twelve-column grid, typographic elements can be easily sized to a specific packaging ratio. The experiment provided a different way of expressing an ideal type size that did not involve a specific point size or point size range, making it applicable to a package of any shape and size. The methods of this experiment can be used as the basis for future experiments involving the preference for the size of other typographic elements.

Though this experiment produced results that will be very helpful for designer, there were some limitations that must be addressed. The first limitation involves the direction in which the text tested was oriented. In this experiment, only horizontally oriented text was tested. Very commonly, especially in more modern designs, packaging will utilize text that is vertically oriented. Because text of this kind was not tested, the results of this experiment are not applicable to such text.

Another concern involving this experiment is its implementation at PackExpo. PackExpo is a packaging conference, therefore attracting attendees from within the packaging industry. Thus, these attendees, and in turn the participants of the experiment, were all familiar with packaging design. This could have influenced the preferences of these participants who are likely to be more in tune with graphic design and packaging typography. Though it was realized that the participants may be more knowledgeable about packaging than the average person, PackExpo still seemed to be a good testing environment due to the large amount of people that would be present at the event and available to participate in the experiment.
Another possible limitation of the experiment is the fact that more conservative display types were used. These typefaces are considered conservative due to the fact that they are not excessively detailed or distorted. While the typefaces used are still ones that would not normally be used for text type, they may not be as ornamental as some of the display typefaces seen on packaging. The fact that these typefaces are not as expressive may have had an effect on the preferences for the display type size.

It is also important to note that while the post survey found that roughly 75% of participants clearly understood the directions of the experiment, almost 25% did not fully understand the task. The lack of complete understanding could have caused these participants to make preference selections based on other factors than their overall preference for the packaging image. There is no way to know this for certain, but it is a point for possible concern.

Another limitation of this experiment was the fact that it only tested packages that were unfamiliar to participants. While this was done to ensure that the original display type sizes had no influence on the preferences of the participants, this does limit the results of the experiment to products that are more unfamiliar to consumers. Therefore, well-known brands may not necessarily benefit from the results found.

Finally, it is important to note that this is only a contribution to a much larger overall body of work. While determining the proper display type is very valuable, it is not the sole factor that determines a successful design. Simply having the correct display type size will not ensure that an attractive and user-friendly packaging design has been
created. There are many other factors that all contribute to the overall ability of a design to communicate with consumers, thus opening the doors for many other areas of research.

Though the display type size is only one small aspect of a successful package, it still has an influence in the package’s ability to express the brand. Because of this, the use of the proper display type to package ratio of \(\frac{10}{12}\)ths should be employed. Through the use of this proportion, display type will be created that is more appealing to consumers than display type set to other sizes. This more ideal display type will help to better connect the packaging message with consumers, making the package both easier to understand and more attractive to consumers.
CHAPTER SIX
RECOMMENDATIONS

This experiment has provided many areas for future study within the field of packaging typography. First, it seems very important to evaluate the preferred sizes of other elements within the typographic hierarchy. This study established the ideal proportion of the primary display type, the product name or brand name. It would be very helpful in future studies to determine the proper display type size for secondary and tertiary display type information. This would make creating a hierarchy through type size very easy for designers and would produce very effective designs.

Because brand names can also commonly be displayed in a logo format, it would be very interesting and helpful to examine if the proportion of $\frac{10}{12}$ths is just as effective with logos. This would evaluate whether or not added graphic elements displayed with the brand name have an effect on the text’s ideal proportions.

Additionally, it seems that it would be very helpful to further evaluate the preferred display type sizes for each gender. Though we are aware that males prefer larger type sizes and females prefer smaller sizes, knowing exactly how much these preferences vary from $\frac{10}{12}$ths would be very helpful to designers.

Furthermore, these research findings could be tested in conjunction with eye tracking technology. Eye tracking could be used to evaluate if the product name or brand name set to the $\frac{10}{12}$ths proportion will be able to better catch the attention of browsing
consumers. This experiment could be used to further validate the findings of the current study.

Another possible area of research involves the use of vertical display text on packaging. It could be very beneficial to evaluate the type of proportion this type of text should form with the package. Because this type of text is used commonly in newer, edgier designs, it would be a very relevant study within packaging design.

Conducting a similar experiment within a more neutral environment may also be a promising idea for future study. Because of the possible implications of testing people that are more knowledgeable about packaging, as was the case at PackExpo, it would be very helpful to see if such knowledge had an effect on the preference for display type size. By simply implementing the same test in a grocery store, an environment more likely to contain participants with only general packaging knowledge, it could be evaluated whether or not the same preferences are found.

In addition to this work, it would also be beneficial to test the effects of using more decorative display typefaces. Because the display types used within this experiment are considered more conservative, it is quite possible that more novelty-based typefaces may acquire different preferences. This research would also evaluate whether the ornamentation level of the typeface has an effect on the preference for its size.

The testing of the display type sizes of well-known brands may also be a valuable area of research. Because only unfamiliar brands were tested, the results of this experiment may not be applicable to larger brands. By implementing this experiment on well-known brands, the ideal display type size may become useful to all brand types.
Additionally, the display type sizes current packaging of well-known brands could be measured to see if they coincided with the findings of this research. If it was found that successful, large brands already adhere to the $\frac{10}{12}$ display type proportion, the findings of this paper could be further validated.

Finally, more research on the affects of age on the preference of display type size should be conducted. Though it was found that there was not a significant effect on the display type size preference on account of the participant’s age, one of the t-test results between the 40-49 and 60+ age categories was very close to the level of significance. These age categories had a value of .081, a value that may indicate that there may be some influence of age on the preference for display type size. Because of this possible indication of an effect, it would be very advantageous to conduct further research on the affects of age on display type size preferences.
APPENDICES
Appendix A

Stimuli Images

Figure A-1. Package 1 of Day 1 Experiment (ID #1627749, 2011)
Figure A-2: Package 2 of Day 1 Experiment (ID #1630385, 2011)

Figure A-3: Package 3 of Day 1 Experiment (ID #1611202, 2011)
Figure A-4: Package 4 of Day 1 Experiment (ID #1618261, 2011)

Figure A-5: Package 5 of Day 1 Experiment (ID #1290236, 2010)
Figure A-6: Package 6 of Day 1 Experiment (ID #1615766, 2011)

Figure A-7: Package 7 of Day 1 Experiment (ID #629106, 2006)
Figure A-8: Package 8 of Day 1 Experiment (ID #1601093, 2011)

Figure A-9: Package 9 of Day 1 Experiment (ID #1625759, 2011)
Figure A-10: Package 10 of Day 1 Experiment (ID #1595789, 2011)

Figure A-11: Package 1 of Day 2 Experiment (ID #1583364, 2011)
Figure A-12: Package 2 of Day 2 Experiment (ID #1506859, 2011)

Figure A-13: Package 3 of Day 2 Experiment (ID #1597148, 2011)
Figure A-14: Package 4 of Day 2 Experiment (ID # 1496880, 2011)

Figure A-15: Package 5 of Day 2 Experiment (ID # 1601359, 2011)
Figure A-16: Package 6 of Day 2 Experiment (ID #1620771, 2011)

Figure A-17: Package 7 of Day 2 Experiment (ID #1596463, 2011)
Figure A-18: Package 8 of Day 2 Experiment (ID #1574516, 2011)

Figure A-19: Package 9 of Day 2 Experiment (ID #911378, 2008)
Figure A-20: Package 10 of Day 2 Experiment (ID #1616690, 2011)

Figure A-21: Package 1 of Day 3 Experiment (ID #1579136, 2011)
Figure A-22: Package 2 of Day 3 Experiment (ID #1631417, 2011)

Figure A-23: Package 3 of Day 3 Experiment (ID # 1584333, 2011)
Figure A-24: Package 4 of Day 3 Experiment (ID #1617761, 2011)

Figure A-25: Package 5 of Day 3 Experiment (ID #1574444, 2011)
Figure A-26: Package 6 of Day 3 Experiment (ID # 1593372, 2011)

Figure A-27: Package 7 of Day 3 Experiment (ID #1617196, 2011)
Figure A-28: Package 8 of Day 3 Experiment (ID #1614876, 2011)

Figure A-29: Package 9 of Day 3 Experiment (ID #1517933, 2011)
Figure A-10: Package 10 of Day 3 Experiment (ID #1399629, 2010)
Appendix B

Input Code for Statistical Analysis in “R”

# subj,gender,package,fixduration
data = read.table("revised.csv",sep="",header=TRUE)
data$subj <- factor(data$subj)
data$gender <- factor(data$gender)
data$age <- factor(data$age)
data$package <- factor(data$package)
attach(data)

# see: http://www.personality-project.org/R/
# 3 way ANOVA, between subjects
summary(aov(choice ~ gender*package*age,data))
print(model.tables(aov(choice ~ gender*package*age,data),"means"),digits=3)

pairwise.t.test(choice, package, p.adjust="none")
pairwise.t.test(choice, age, p.adjust="none")
#pairwise.t.test(fixduration, package, p.adjust="bonf")
#pairwise.t.test(fixduration, img, p.adjust="bonf")

#generate an output of means and SEs
out <- file("packages.out","w")
mn <- array(1:length(levels(data$package)))   # note [1:n] index
se <- array(1:length(levels(data$package)))   # note [1:n] index
for (i in 1:length(levels(data$package))) {
  arr = data$choice[which(package == levels(data$package)[i])]
  mn[i] = mean(arr)                     # mean
  se[i] = sd(arr)/sqrt(length(arr))     # SE = SD/sqrt(n)
cat(i,"",file=out)        # col 1
cat(mn[i],se[i],"n",file=out)        # col 2 3
}
close(out)

# generate an output of means and SEs
out <- file("gender.out","w")
mn <- array(1:length(levels(data$gender)))   # note [1:n] index
se <- array(1:length(levels(data$gender)))   # note [1:n] index
for (i in 1:length(levels(data$gender))) {
  arr = data$choice[which(gender == levels(data$gender)[i])]
  mn[i] = mean(arr)                     # mean
se[i] = sd(arr)/sqrt(length(arr))  # SE = SD/sqrt(n)
cat(i,"",file=out)  # col 1
cat(mn[i],se[i],"n",file=out)  # col 2 3
}

close(out)

# generate an output of means and SEs
out <- file("age.out","w")
mn <- array(1:length(levels(data$age)))  # note [1:n] index
se <- array(1:length(levels(data$age)))  # note [1:n] index
for (i in 1:length(levels(data$age))) {
  arr = data$choice[which(age == levels(data$age)[i])]
mn[i] = mean(arr)  # mean
se[i] = sd(arr)/sqrt(length(arr))  # SE = SD/sqrt(n)
cat(i,"",file=out)  # col 1
cat(mn[i],se[i],"n",file=out)  # col 2 3
}

close(out)
detach(data)

Figure B-1: Statistics code for display type size preference test metric
Appendix C

Output from Statistical Analysis in “R”

R version 2.10.1 (2009-12-14)
Copyright (C) 2009 The R Foundation for Statistical Computing
ISBN 3-900051-07-0

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and 'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or 'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> # subj,gender,package,fixduration
> data = read.table("revised.csv",sep="",header=TRUE)
> data$subj  <- factor(data$subj)
> data$gender  <- factor(data$gender)
> data$age  <- factor(data$age)
> data$package  <- factor(data$package)
> attach(data)
>
> # see: http://www.personality-project.org/R/
> # 2 way ANOVA: 1 repeated measures (gender), 1 between subjects (package)
> # resulting in unbalanced design, since we don't have a full 2x6=12
> # number of trials for each subject, instead only 2x3=6 trials per
> # subject (the canvas and laptop conditions each only get half the
> # number of packages)
> summary(aov(choice ~ gender*package*age,data))

             Df Sum Sq Mean Sq  F value    Pr(>F)
gender        1 20.780   20.780  7.91280  0.004994 **
package       7 104.111  14.8726  5.66313 1.913e-06 ***
age           4  10.410   2.6026  0.99142  0.411145
gender:package 7 10.974   1.5670  0.59652  0.759205
gender:age   4   26.56  6.6395  2.5282  0.039157 *
package:age  28   73.15  2.6127  0.9948  0.473330
gender:package:age  28   63.25  2.2589  0.8601  0.676042
Residuals   1130 2967.63  2.6262
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> print(model.tables(aov(choice ~ gender*package*age,data),"means"),digits=3)
Tables of means
Grand mean

9.589256

gender
  F   M
  9.41 9.68
rep 420.00 790.00

package
  Bottle   Box   Can   Jar   Jug   Pillow Pouch Tube
    9.54  9.52  9.73  9.98 10.1  9.58  9.68   8.9
rep 333.00 151.00 121.00 121.00  77.0 212.00 74.00 121.0

age
  20-29 30-39 40-49 50-59 60
    9.56  9.62  9.5  9.57  9.86
rep 250.00 280.00 310.0 270.00 100.00

gender:package
  package
    gender Bottle Box Can Jar Jug Pillow Pouch Tube
      F   9.5  9.3  9.5  9.7 10.2  9.2   9.4  8.7
    rep 116.0  52.0 42.0 42.0 25.0  74.0  27.0 42.0
    M   9.6  9.6  9.9 10.1 10.1  9.8   9.8  9.0
    rep 217.0  99.0 79.0 79.0 52.0 138.0  47.0 79.0

gender:age
  age
gender  20-29 30-39 40-49 50-59 60
      F   9.5  9.3  9.2  9.3  10.2
    rep 100.0 100.0 100.0  80.0  40.0
      M   9.6  9.8  9.6  9.7  9.6
    rep 150.0 180.0 210.0 190.0  60.0

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<td>9.9</td>
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<th>Box</th>
<th>Can</th>
<th>Jar</th>
<th>Jug</th>
<th>Pillow</th>
<th>Pouch</th>
<th>Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>9.4</td>
<td>8.9</td>
<td>9.9</td>
<td>9.9</td>
<td>9.5</td>
<td>8.5</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>rep</td>
<td>26.0</td>
<td>14.0</td>
<td>10.0</td>
<td>10.0</td>
<td>6.0</td>
<td>16.0</td>
<td>8.0</td>
<td></td>
</tr>
</tbody>
</table>


M  9.5  9.7  9.9 10.0 10.2  9.5  10.1  8.9
rep 60.0 24.0 21.0 21.0 13.0 39.0  11.0  21.0

,  age = 50-59

package
gender Bottle Box  Can  Jar  Jug  Pillow  Pouch  Tube
F  8.8  9.2  9.3  9.6  11.2  9.9  10.3  8.3
rep 24.0  8.0  8.0  8.0  5.0  16.0  3.0  8.0
M  9.8  9.5  9.6  9.9  10.1 10.1  9.2  8.9
rep 50.0 26.0 19.0 19.0 14.0 31.0  12.0  19.0

,  age = 60

package
gender Bottle Box  Can  Jar  Jug  Pillow  Pouch  Tube
F 10.3  10.4 10.3 11.5 13.0  9.1  9.8  9.5
rep 11.0  5.0  4.0  4.0  1.0  7.0  4.0  4.0
M  9.3  9.6 10.3 10.5 10.0  8.8  9.8  9.8
rep 15.0  9.0  6.0  6.0  3.0  9.0  6.0  6.0

> pairwise.t.test(choice, package, p.adjust="none")

Pairwise comparisons using t tests with pooled SD
data:  choice and package

Bottle  Box   Can  Jar  Jug  Pillow  Pouch
Box  0.88041  -  -  -  -  -  -
Can  0.27909  0.28796  -  -  -  -  -
Jar  0.01184  0.02084  0.23543  -  -  -  -
Jug  0.00280  0.00503  0.07060  0.44576  -  -  -
Pillow 0.80671  0.73349  0.41231  0.03100  0.00735  -  -
Pouch 0.51759  0.49017  0.82963  0.21176  0.06967  0.64788  -
Tube  0.00022  0.00194  8.0e-05  3.1e-07 1.4e-07  0.00028  0.00126

P value adjustment method: none
> pairwise.t.test(choice, age, p.adjust="none")

Pairwise comparisons using t tests with pooled SD
data:  choice and age
P value adjustment method: none
> # pairwise.t.test(fixduration, package, p.adjust="bonf")
> # pairwise.t.test(fixduration, img, p.adjust="bonf")
>
> # generate an output of means and SEs
> out <- file("packages.out","w")
> mn <- array(1:length(levels(data$package))) # note [1:n] index
> se <- array(1:length(levels(data$package))) # note [1:n] index
> for (i in 1:length(levels(data$package))) {
+ arr = data$choice[which(package == levels(data$package)[i])]
+ mn[i] = mean(arr)  # mean
+ se[i] = sd(arr)/sqrt(length(arr))  # SE = SD/sqrt(n)
+ cat(i,"",file=out)  # col 1
+ cat(mn[i],se[i],"\n",file=out)  # col 2 3
+ }
> close(out)
>
> # generate an output of means and SEs
> out <- file("gender.out","w")
> mn <- array(1:length(levels(data$gender))) # note [1:n] index
> se <- array(1:length(levels(data$gender))) # note [1:n] index
> for (i in 1:length(levels(data$gender))) {
+ arr = data$choice[which(gender == levels(data$gender)[i])]
+ mn[i] = mean(arr)  # mean
+ se[i] = sd(arr)/sqrt(length(arr))  # SE = SD/sqrt(n)
+ cat(i,"",file=out)  # col 1
+ cat(mn[i],se[i],"\n",file=out)  # col 2 3
+ }
> close(out)
>
> # generate an output of means and SEs
> out <- file("age.out","w")
> mn <- array(1:length(levels(data$age)))  # note [1:n] index
> se <- array(1:length(levels(data$age)))  # note [1:n] index
> for (i in 1:length(levels(data$age))) {
+ arr = data$choice[which(age == levels(data$age)[i])]
+ mn[i] = mean(arr)  # mean
+ se[i] = sd(arr)/sqrt(length(arr))  # SE = SD/sqrt(n)
Figure C-1: Statistics output
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