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## The Effectiveness of Multimedia Digital Graphics in the Context of a Simulated Content Environment

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THE EFFECTIVENESS OF MULTIMEDIA DIGITAL GRAPHICS IN THE  
CONTEXT OF A SIMULATED CONTENT ENVIRONMENT

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A Thesis  
Presented to  
the Graduate School of  
Clemson University

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science  
Graphic Communications

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by  
Christopher J. Knox  
August 2019

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Accepted by:  
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## ABSTRACT

The overall purpose of this thesis was to evaluate the effectiveness and potential benefits or shortcomings of digital motion graphics when utilized in the context of a real-world marketing effort. It is vital to evaluate whether or not the understanding we currently have of motion graphics as a tool for effective communication still remains consistent when principles of visual noise, attention capacity limits, pairing with physical materials, and coordination across mediums are taken into consideration. Participants in this study were asked to interact with prepared content within the framing of a simulated social media feed viewed on a computer or mobile device, while also being exposed to paired print campaign materials either in a physical or non-physical format in order to evaluate the overall retention, recall, and message effectiveness of brand information.

Data collected from this study was both quantitative and qualitative in nature, skewing more heavily in the direction of quantitative data. The former consists of evaluation of ability to recall information presented to the viewer through prepared marketing materials in print format along with a simulated social media campaign, while the latter applies to questions regarding personal evaluation of the materials and content provided to the viewer during testing and the effectiveness of particular forms of graphics.

This study encompassed a total of 253 final responses from participants grouped across a total of four possible combinations of variables between two categories: the form of content with which they were presented in the simulated social media feed, in either

multimedia motion format or static graphic format, and the form of medium with which they were presented the magazine marketing materials, either physical print or non-physical. This testing procedure was followed by a questionnaire segment meant to evaluate recall of various elements from the marketing materials, followed by an exit survey.

The resulting data suggests a number of specific differences in the assessment and recall of certain forms of content information, including more accurate recall of primary information for a specific form of content as well as a demonstrable relationship between the selected form of content and the medium it was presented in as it relates to the participant's ability to recall information. Additional observations were also made in regards to the perception of advertisement frequency between medium formats.

This study's results could potentially inform processes of decision-making for coordination of advertising materials across differing formats and mediums, as well as provide insight into the purposes and value that differing forms of content might provide from a communicative or informative aspect. Those attempting to create or promote content across physical, digital, and social channels may find this study's findings beneficial towards their own efforts in content creation, as well as use it to inform priorities in advertising or communication efforts that go beyond a single format or medium.

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## INTRODUCTION

### **The Emergence of Multimedia in Social Media**

Technology is something that is ever-changing, and the internet serves as a perfect embodiment of that volatile form of progression. Formats and mediums change almost constantly, whether it is the type of file compression used as the standard for motion graphics or the devices or sites those graphics are viewed on in the first place. What is seen as an industry standard today may not have existed ten years ago, and may easily be replaced ten years down the line.

Too often, though, we fall victim to associating this form of constant iteration and progression with the idea that investing in today's technology will become a wasted investment as soon as that technology falls out of date. We may be talking about Facebook, Twitter, Instagram, and YouTube as content delivery platforms today, but who's to say whether or not those platforms will hold even a fraction of their current market presence years from now? The important distinction to make here, then, is that the platform itself should not be the focus when discussing the various forms that digital media content can take. To fixate specifically on the medium itself rather than the forms of content being delivered on it is to plan solely for the current form that the internet takes rather than its future potential. It is also important to distinguish between the two, as being able to focus on the content itself (independent of its platform) means that the principles that are discerned from this content can be applied no matter the means of delivery.

**Confusing the Medium with the Message.** The reason for this distinction is a simple one; motion and multimedia graphic content have existed well before the internet. As early as the mid-1800's, technologies such as the zoetrope, phenakistoscope, and praxinoscope paired with easily produced products like the flip book made motion graphics and animated sequences available and visible to the wider public (Espiritu 2014).



Fig. (1). The zoetrope as a form of animation; Zoetropic.wordpress.com; Web; 2010.

The introduction and rise of hand-drawn animations and sequenced photography in the early and mid-1900's in the form of film was built entirely on developments in technology that allowed for content creators to expand what could be done with motion. In the 1950's, John Whitney pioneered digitally animated graphics with works like the animated opening title sequence of Alfred Hitchcock's *Vertigo*, and by the 1970's he was making complex animations using solely digital methods (ACM SIGGRAPH).

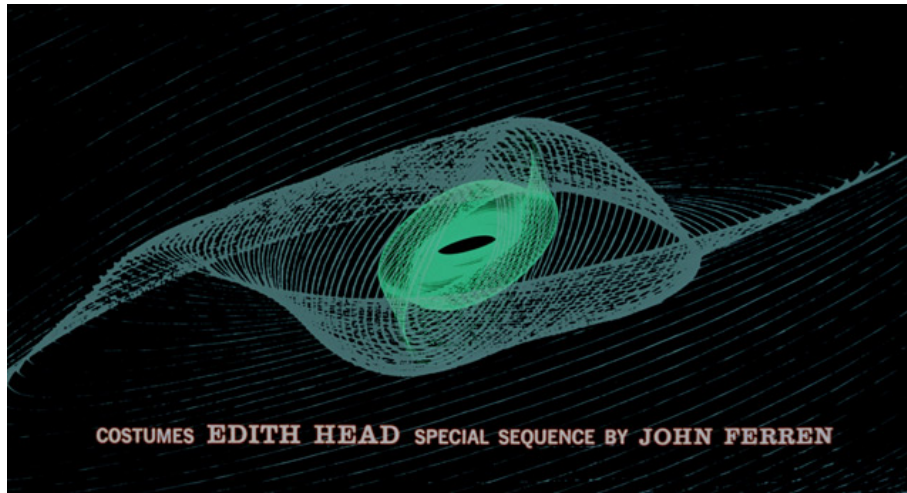


Fig. (2). Digital animated graphics as used in Vertigo; Annyas.com; Web.

Today, this motion content takes the form of animated graphics (much like a complex digital form of the classic flip book) and in fully digital video media. On services like YouTube.com, a video content platform started in 2005, users can watch complex and detailed digital renderings of videos that can easily be loaded and displayed in real time. The sheer volume of video content on this platform alone is staggering—around 300 hours of video uploaded per minute—and could easily be taken for granted if not viewing the service in the context of video content delivery over the past century (Statistic Brain). On livestreaming services like Twitch.tv, the advances in motion content delivery are even more staggering. With Twitch.tv, any individual can upload a live, real-time video of themselves or their content to be broadcasted internationally and made easily viewable to any person with a relatively decent internet connection. These videos can reach as large of resolutions as 4k, and broadcasters will often broadcast their content in full HD.

Along with this, there are any number of various social media platforms and content aggregation sites that actively utilize and integrate motion graphics as well as static graphics in their content delivery. From Facebook to Twitter to Instagram to Snapchat, images and videos have become a vital element in communication on social media. Unlike 15 or 20 years ago, where image-heavy sites were burdened with excessive loading times or extremely compressed images, advancements in technology have brought social media to a state where users can freely upload images and video for immediate viewing online. This ability to upload and download freely has resulted in a progression of the things advertisers and social media content creators can share, removing a number of limitations that once existed in the digital space.

Of course, to focus specifically on the platforms that are most actively used today rather than the content that is being shared and displayed on them is to study and make observations for the current state of the internet rather than possible future developments. If one were to focus on the top digital platforms of the early 2000's, for example, one would have come away with data specific to MySpace, LiveJournal, eBaum's World, Ask Jeeves, Napster, AIM, or any number of now-obscure or failed web platforms (Starkey 2018). The online marketplace is ever-shifting and ever-changing, and it would be tempting to think that focusing on digital content and how it is viewed would be focusing on something that is temporary at best. To make that assumption, however, would be a mistake—the sites on which we share content online, connect with one another, search for content, and share our thoughts in a social space may change, but the substance of that content itself largely has not.

This, at its core, is why the platform itself is irrelevant in studying the effectiveness of motion or static graphics in communicating a brand message or advertising piece. The platforms and their capabilities may change over time, of course, but the existence and basic functionality of static and motion content largely does not. Static graphics have existed for thousands of years, and digital motion graphics have existed for about as long as digital platforms themselves have. While motion may one day come to encompass broader categories like virtual reality, as technology continues to develop and advancements in platform features progress the distinction between a piece of graphic content that moves and one that does not is still a fundamental and core difference that we can measure and observe. Fixating on the specific platforms of today, like Twitter, rather than the content that is being displayed or contained within Twitter, is to severely limit the potential for the application of research in years to come.

**Decoding Encoding.** Similarly, the methods with which we create or encode digital content should not be the primary focus in studying the effectiveness of the content itself. Encoding itself is essential to the creation and distribution of digital content: it is what allows us to prepare and present digital content in such a way that others can easily view and display these graphics in a webspace or application. In fact, if it were not for advancements in encoding and the creation of standards throughout the digital space, we would not even be able to have the kinds of on-demand video content, playback, and streaming that we do today. However, understanding that these standards of encoding are constantly evolving and shifting as technology advances is an important component to creating content in the digital sphere: while the medium or the format may

change from animated image sequence to Flash animation to native video, it is the principle of motion content on the whole that is the most important takeaway. Still, to understand why digital content—and motion content in particular—exists in the exact forms that it does today, and why it has only risen to its current state of prominence as both an advertising tool and a communication tool in recent years, some basic understanding of encoding and how it has evolved over time is necessary.

To speak of graphics encoding standards in general that exist today, the obvious examples are that of the Joint Photographic Experts Group, or .jpeg, and the Portable Network Graphics format, or .png. These two forms of static graphic encoding have come to encapsulate the vast majority of online digital images across any number of sites or platforms. The .jpeg in particular was developed and released in 1992, and was specifically designed to allow for the compression and sharing of full photographic images in both lighting and color rather than more simple and limited pixel-based recreations (Haines & Chuang, 1992). Although the .jpeg is a lossy compression format, it allowed for individuals across any number of potential displays or devices to share photographic images over the internet with a reasonable download speed given bandwidth limitations of the time. Figure 3 illustrates the image quality degradation that is inherent to lossy compression formats.



Fig. (3). Ex. of lossy .jpeg photograph compression; Techsparks.co.in; Web.

The .png format, similarly, was developed later in 1996 to allow for similar image compression and sharing functionality but in a lossless and transparency-enabled format. Files designed for .png format over .jpeg format were typically more conscious and deliberate about their color usage, and more often than not consisted of digitally constructed graphics rather than full photographic images (World Wide Web Consortium, 2003). What this distinction meant was that while a .png-encoded file may create a much larger file for a photographic image than a .jpeg-encoded file does, a digital image such as a “screenshot” encoded in .png format would be much more detailed and precise than a .jpeg-encoded image of the same type without any larger file size. This is primarily due to the differences in how pixel data are selected and stored between the two formats, with .png images being much more precise and specifically being tailored to digital images where singular colors make up large swaths of a potential image (Adobe).

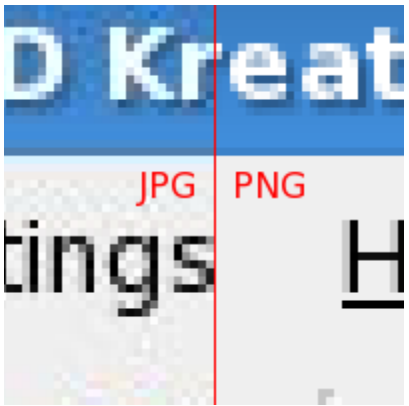


Fig. (4). Comparison of .jpeg and .png formats; TechnicallyEasy.net; Web; 10 October 2008.

These two file types, as a result, became the standards for their respective categories. Photographic static images online were commonly encoded in .jpeg format, while digital static images were encoded in .png format. The adoption of these standards meant that computers had a common language to encode and decode images for display and distribution electronically. As standards were set, this enabled static graphic content to thrive and enabled people to share content through a new medium that they would have otherwise been unable to in the past.

The same process is only now coming to fruition for complex motion graphics and multimedia video, though. In contrast to static graphic content, standards in motion content online have varied wildly over the years. When speaking more generally of motion content on the internet, one of the earliest standards in digital images in general and for moving images specifically in the .com era was the Graphics Interchange Format, or .gif. Given the severe limits to bandwidth and connection speeds in this particular period, the .gif format was ideal for its ability to compress an image in a lossless format while recording and displaying up to 256 specifically selected RGB values for the file.



This functionality and the significantly small compressed file size that resulted from it made the .gif one of the earliest color image standards in computing, replacing a number of black-and-white image encoding formats (Furht, 2008).

However, it was not until 1995 that the .gif gained an element of its functionality that has allowed it to continue as a standard file format for images shared online today, even despite the rise of the .jpeg and .png. This added functionality was the ability to display multiple animated frames in sequence and in a looping format in a way that could still be reasonably downloaded and displayed by the client. This made the .gif one of the most widely available and easily downloadable motion graphic formats of the early internet, and even today serves a similar role for its functionality in creating short looping animated images (Furht).

Video and multimedia encoding is a significantly more complex discussion, as even today standards are not entirely consistent across all platforms. One of the best examples of this volatility is in the Flash video format, once a common standard for animated videos online in the early and mid-2000's. Adobe Flash Video format, or .flv, and the Small Web Format file type, or .swf, were the initial file formats displayed through the Adobe Flash Player. Many early web animators utilized this format and web player to create animated videos that could be easily viewed and distributed on the web, although this meant that users would often have to download Flash Player as an external plugin to be able to correctly view these forms of video content.

This, along with a number of other technical limitations, resulted in the gradual move away from Flash to other forms of web video encoding, with even Steve Jobs of

Apple publicly denouncing the format (Jobs, 2010). Today, Flash Video has come to account for no more than six percent of all video content output online in 2015, a major decrease from the twenty-one percent of video output for the format in 2014 (Grivalsky). Today's more common standards center around the HTML5 web video player and file formats that are compatible with it. Google, for example, pushed for the adoption of the HTML5 platform by switching the default player for YouTube videos viewed in Google Chrome from Flash Player to HTML5 before rolling the new video player out to all users. Amazon has done something similar, transitioning Twitch.com from Flash-based to primarily HTML5-based in conjunction with the HTTP Live Streaming format (Anderson, 2015).

All of this is to say that while web video standards are very much in flux and not nearly as established as those for static graphics, the general trend has been towards greater flexibility and availability for viewers online. The frequency and volume of multimedia and video-based content has surged in recent years due to both these advancements in encoding and web standards as well as general improvements in internet upload and download speeds, and the trend will likely continue as encoding standards continue to improve.

What this also means, though, is that the introduction of new features and functionality is inevitable for future multimedia and motion content. Even long-standing file encoding types like the .gif are finding new competition in animated graphical formats like .webm and .gifv. Ultimately, the ways in which digital video content is created and encoded today may not be the same even 10 or 20 years down the line, but it

has become clear that motion content itself has been fully enabled in the digital sphere in a way that it previously was not in the early onset of the internet.

**Significance and Purpose of Thesis Topic.** The primary focus for this study is to collect workable and actionable information regarding the effectiveness of certain formats of physical and digital graphic communication.

To date, there is a significant amount of data (both in the research sphere and from corporate entities) comparing and measuring various forms of digital content. Unfortunately, most of this research and data falls into one of two categories—the first, information that compares digital motion content and digital static content directly, but only in highly isolated test settings where subjects are presented with a singular piece of content without corresponding context or potential distractors; the second, information that simply measures the performance of individual real-world posts in comparison to similar pieces of content, without measurement of corresponding and coordinated campaign efforts across other platforms or materials or mediums. Of course, in the case of the former, it is extremely uncommon if not impossible to find completely isolated graphics content on a social media platform. Instead, this type of content will almost universally be seen within the context of a “news feed” or “content feed” of some form, a page often populated by any number of potential distracting messages or pieces of content. In the case of the latter, while this kind of data may help in targeting and timing efforts when posting individual standalone pieces of content online, it may not say much about coordinating or building out these materials to pair across different formats and

mediums within the context of a larger campaign that includes non-digital advertising efforts as well.

Because of these particular gaps within the current research literature, these studies create a significant need for testing that accounts for the effectiveness and perception of digital content within a simulated real-world campaign setting. There are factors of attention capacity that may impact the effectiveness of digital content when viewed in a feed setting, of visual processing and focus when motion graphics are utilized in comparison to static graphics, and of recall that is reinforced through physical print materials rather than the exclusive testing of digital content without reinforcement. Any number of these factors could have the potential to significantly alter the outcome and actual effectiveness of this content when compared to previous findings in isolated, individual testing situations.

The main reason for the significance of this topic, though, is the sheer momentum that digital motion content currently has in regards to social media advertising. According to Karhoff (2012) and the American Marketing Association, Instagram saw a staggering 622% increase in ad impressions generated from video content in only a five-month period, from September 2015 to March 2016. There is clearly an ever-growing demand for this content, and being able to assess its effectiveness as part of a company's overall marketing efforts rather than at simply the individualistic level is vital to properly assessing the value that motion content may hold for overall advertising efforts.

## LITERATURE REVIEW

The primary principles that were meant to be tested through this study were those of visual memory and attention capacity, and of communicative effectiveness in regards to motion and static materials. These two areas of focus encapsulate the core of the testing materials and procedure.

### **Visual Processing and Attention Capacity**

The concept of visual processing is one that is central to our perception of the world; studies show that there are any number of ways that we can be affected by or even be “blind” to materials or aspects of materials based on the context that they are viewed in. This idea ties in closely with another more recently focused-on principle of attention capacity in a visual context, wherein the amount of visual information presented to us at once can have significant impacts on our ability to process that information.

**Visual Processing.** Visual processing is a term that encapsulates our ability to convert visual stimuli into cognitive information. In more simple terms, it is the ability to visually analyze the images we see and the accuracy of that analysis. Although we would like to believe that the human brain is more than capable of accurately parsing visual information and recalling that information with similar accuracy, studies show that simple contextual changes can significantly impact the effectiveness of one’s visual analysis system. One of the most time-tested elements of visual processing is that of “preattentive” processing, i.e. visual observations that one can make immediately within a 200-250 millisecond time frame. Healey and Enns (2012) list a total of 43 different studies that analyze this concept in depth, finding overall that the number of visual

distractors introduced in a particular frame can significantly impact the brain's ability to process preattentive information in any number of contexts. One of the most simple examples of this principle, as illustrated by Ware (2004) and used by Healey and Enns, is that of target detection using shapes and/or colors. When subjects were presented with a set of identical objects such as blue circles with a singular red circle among them, identification of the target in the preattentive processing stage was consistent. The same applied for a singular red circle within the context of a number of red squares. However, when the objects that made up the overall field were mixed—blue circles and red squares—identification of the target was significantly more difficult and could not be completed preattentively, despite the fact that the eye was technically receiving and sending these signals back to the brain at the same speed no matter the context. This principle has been found to apply to any number of potential variations and differentiators, including orientation, length, closure, size, curvature, density, number, hue, luminance, intersections, terminators, 3D depth, flicker, direction of motion, velocity of motion, and lighting direction (each as cited in Healey and Enns). These principles, when applied in a real-world setting, can be shown in the context of immediate processing when viewing complimentary informational material; as Ward (1992) demonstrates, the most simple graphic out of a variety of complimentary graphics—when paired with the body of a newspaper article—was the most effective in generating immediate recognition and recall, while more complex graphical representations of the same information resulted in less effective and more time-consuming visual processing. These principles and their real-world application are central to the value of testing motion

graphic effectiveness when placed in the context of a more visually stimulating setting, as in the example of a social media feed filled with a number of additional materials vying for attention. Whereas viewing a motion graphic in an isolated and controlled setting may allow for immediate visual processing and retention, doing so in a more visually complex context may not. These notions tie in centrally with the next concept, that of attention capacity.

**Attention Capacity.** The idea of attention capacity limits is that as more information is presented to the viewer and as the complexity of that information is increased, their ability to parse that information is significantly decreased. As Haroz and Whitney (2012) find, this principle applies in examples as simple as selecting a singular colored square among a grid of other colored squares and as complex as analyzing trends within stock market information or news feeds. Haroz and Whitney tested subjects with a variety of tasks, primarily centered around asking subjects to identify a target (either known or unknown) within a grid (either grouped or ungrouped, with either motion or in a static context) and within either a high-variety number of colors or a low-variety one. Their testing showed that as each element was introduced, with grouped colors, no motion, a pre-determined target, and a low variety of colors being the simplest combination, the time required to process this information and identify the target would increase while the accuracy of identification would decrease. For comparison, the most complex and least accurately perceived combination of elements was ungrouped colors, motion, an “oddball search” target, and a high variety of colors. Of course, these principles tie in heavily with those of visual processing and the concept of preattentive

processing, but in this particular set of tests preattentive processing was made impossible even in the most simple of examples, meaning that all evaluations were done based on more complex visual cognitive processing. This is most embodied in the application of these principles to informational grids, as in the case of stock market information or a news feed. As Haroz and Whitney explain, a visualization of stock market information, when grouped based on these same principles and with a priority on object size and color, is significantly easier for viewers to parse information and discern trends from even when using identical data sets. Similarly, when categorizing and grouping a visual representation of a news feed based on significance and country of origin rather than presenting a grid that contains the most information possible regardless of country of origin or other discernible categories, viewers are better able to parse information in the same amount of screen real estate. However, in the case of individual motion graphics themselves, attentive capacity becomes a more complex subject. In Barnes (2016), subjects were twice presented with the option of either viewing a complex expository motion graphic or a simplified version of the same expository motion graphic with the understanding that they would be evaluated on the information they received from these graphics. If the same principles that were outlined previously applied in this instance, it would be safe to assume that as the motion graphic was made more complex, the ability to assess and parse information from it would decrease. However, what Barnes found was that the inverse was true; the graphic that was the more complex of the two resulted in significantly better learning and memory retention among subjects, despite both motion graphics containing the same exact expository information. Barnes suggests that this may



be attributed to higher levels of focus when a subject is presented with a graphic containing more complex and “realistic” imagery, and also mentions the potential of mental modeling of motion graphics having an impact on recall. It is this peculiarity in regards to motion graphics that will make this testing so important, as by placing motion graphics within the context of a simulated social media feed and surrounded by additional competing information and graphics, both elements will be tested. Will the increased focus normally afforded to the information contained within a motion graphic be impacted in any way by the visual noise and attention capacity principles that have been demonstrated in static examples?

### **Communicative Effectiveness of Graphics**

“Graphics” can be somewhat of a vague term when taken at face value, but within the context of this particular study it will be used to refer to expressly created materials that are meant to communicate a message or information through visual stimuli. When used as a communicative tool, graphics as a whole can have a significant impact both on how we perceive messages and on how we remember them. Nevarez (2013), for example, finds that when evaluating and comparing the narrative and message comprehension of a message presented in either graphic, video, or text-only format, that graphic narratives appear to be the most effective of each format in regards to overall narrative comprehension as well as message persuasion, attitudes toward the communication, and intention to adopt healthier lifestyle behaviors, even while message comprehension, narrative transportation, and affective response to the narrative remain consistent across

all formats. March (2012), similarly concludes through his work that graphic design work can serve as an effective mnemonic device in a way that other methods do not, even when applied to a large variety of potential formats.

More importantly to this study, although the lines between forms of content are blurred more and more as technology continues to evolve, we will define our two primary categories for evaluation as “physical” graphic materials and “digital” graphic materials. Additionally, we will divide the “digital” category into two sub-categories, “static” and “multimedia motion” graphics. The former refers to graphics that contain no motion elements whatsoever; these are commonly digital images formatted in .jpeg, .png, or .tiff formats. The later refers to graphics that contain motion elements; these are commonly digital images formatted in .gif, .webm, Flash, or video codec formats. Overall, these two types of graphics have been the primary means for visual graphic communications in digital mediums in the 21<sup>st</sup> century, with the latter gaining significant traction as internet speeds and availability continue to increase worldwide. As Skjulstad (2007) explains, dynamic content and ‘new’ media have served as the core to current trends in web design and digital content as a communicative tool. Furthermore, he concludes that this steering towards motion content in digital media has greatly expanded the communicative tools available to designers and companies in regards to graphic content.

**Physical.** Physical graphic content has been a cornerstone of human interaction, predating civilization itself in the form of ancient cave paintings. Of course, the means, methods, and materials used to create physical graphic content today have evolved to an immense degree as technology and society have evolved, but the use of graphics as a

communicative tool is an idea that is foundational to humanity itself. In the modern context, graphics permeate throughout every facet of society, but there is nowhere where they are more prevalent than in marketing and branding efforts. As companies seek to directly communicate and share messages with their consumers, they utilize any number of platforms to make this connection possible. In everything from print mail pieces, advertisements, and packaging design to billboard campaigns and physical interactives, companies have the opportunity to broadcast their message to consumers throughout their everyday lives by using physical materials. Elaborating on March's (2012) findings, the experience of physical interaction or observation of graphics content expressed through a physical medium can serve as a strong mnemonic device, establishing concepts of "place" within an observer's memory system that other mediums or forms of interaction may not be able to. Unfortunately, as we'll explore later in this literature review, modern technology has not yet reached a current state where physical printed graphic content can contain significant motion elements to the degree that digital graphics can. This places a comparative limitation that this study will attempt to account for when evaluating message effectiveness across forms of content.

**Digital: Static.** Static digital graphics were some of the first to exist in data form in modern computing, and exist in some ways as a direct 1:1 translation of physical advertisement methods transferred to digital mediums. In example, the concept of the "banner" ad (one of the oldest forms of static digital graphic advertisements) is literally that of displaying a long, banner-like advertisement across the top, bottom, or sides of a webpage. Another example of the translation from physical to digital advertisement is the

infamous “pop-up” ad, in which the equivalent to a flier or pushy salesperson is presented to the viewer in a new browser window or message prompt. These kinds of 1:1 advertisement forms have been a central piece to communication in digital platforms for decades, both for their effectiveness and for their ease of application. Hoey (1998) outlines the transition period in which companies began to explore some unique web-based methods of communication outside of these more traditional advertising and storefront models, but even then the digital graphic remains an effective form of digital communication even as the contexts in which it is presented change. As Rzemieniak (2015) explores in an evaluation of internet marketing campaigns for entrepreneurial companies, various forms of static digital graphics and advertisements are utilized by companies to this day even as banner and pop-up ads continue to fade away in overall usage. This includes the active use of social media as an ever-growing medium for sharing this advertising content, along with the more traditional models of placing ads on popular webpages or search engines. The findings of Rzemieniak’s study indicate that even as the platforms for this kind of content evolve and change with the progression of digital platforms, the fundamental aspects of graphic communication through static digital graphics remain prominent. As for the effectiveness of these graphics, the statistics speak for themselves; Sears (2012) explored this topic in depth, analyzing in a direct comparison the overall effectiveness of multimedia motion graphics to convey information by testing subjects with either a static text, static informational graphic, animated informational graphic, or multimedia informational graphic. The results surprisingly showed that static digital graphics were actually the most effective medium

overall, beating out multimedia graphics, animated graphics, and static text with a rate of 77.5% effectiveness in information retention in comparison to the overall average of 68% effectiveness.

**Digital: Motion.** Motion graphics are a newer presence in digital advertisement on the other hand, but already are seeing astronomical growth in regards to usage in social media and digital advertising. As Cisco projects and as Karhoff (2016) of the American Marketing Association cites, video and motion content will be the driving factor behind 85% of search traffic in the US by the year 2019. Similarly, Karhoff explains that between September of 2015 and March of 2016, total ad impressions from video content on the popular social media site Instagram grew from only 9% to 65%, marking a major shift of 56% of total ad impressions in only a five-month period. The reasons for this kind of shift are many, but core to them are the ideas of motion graphics as more effective in creating memory recall as well as their effectiveness in drawing attention and focus. Sears (2012) found as an additional observation in the multimedia motion graphic study that although multimedia graphics did not generate the most significant levels of information retention (falling behind static digital graphics), these graphics *did* create significantly higher secondary recall than any other format, at a rate of 77.4% correct answers compared to the overall average of 61.3%. Along with this comes user preferences; although subjects in this study performed better overall when being presented information in a static graphic, they overwhelmingly indicated that they preferred multimedia and animated graphics as their ideal medium for learning and recommended both mediums at a significantly higher rate than either static graphics or

static text. Subjects who were presented with the multimedia or animated graphics also believed that they were significantly more likely to retain more information, with 77% of participants believing they would have average or above quiz results if they viewed an animated graphic and 91% believing they would have average or above results if they viewed a multimedia graphic. Furthermore, when looking at overall breakdowns based on demographic or lifestyle information, trends become apparent that can easily allow for more acutely targeted messages. An example from Sears' study is that although static graphics were shown to be the most effective when looking at the overall sample population, they were actually significantly outperformed by multimedia graphics among the 18-25 age range and tied with multimedia graphics among the 56-65 age range. Further findings on digital motion graphics from Barnes (2016) suggest that the depth and complexity of a motion graphic serve to increase overall information retention when compared to a simplified version of the same motion graphic. As in Sears' findings, Barnes finds that participants were significantly more likely to select the more complex graphic when given the option and significantly overestimated their overall ability to recall information from these graphics. However, after their initial intuition, participants in Barnes' study were quick to more accurately predict their information retention upon assessing their final intuition.

In looking back over the presented literature, the core question to be evaluated here is that of the effectiveness of motion graphics and static graphics when presented in the context of a larger marketing campaign in which these materials are vying for attention with other messages in multiple formats. Although these findings from prior

literature may each apply in isolated settings, including principles of attention capacity, visual processing, and the effectiveness of various graphic formats, when these principles are made to interact with one another do these findings still hold true?

## RESEARCH DESIGN

The following categories encompass the overall testing design, measurement, and materials used for this study.

### **Construction**

The primary component for presentation in this study was the replication of a typical social media content feed in the current year. This replication was originally modeled off of the early 2018 web version of Twitter.com, including relevant element scaling and media queries. The creation of an entirely contained experimental environment meant to model existing social media sites ensures that any algorithm-based factors typically inherent to these sites will not be able to potentially influence the selective visibility or frequency of appearance of the testing materials for any one individual. Based on current web design standards, the site scales to correctly display elements on a number of potential display resolutions through the use of media queries, and for this study in particular was designed to properly scale and display in laptop, tablet, and mobile formats. The smallest required media query width applied to the replica's CSS coding to properly account for this scaling method was 744 pixels wide. There are additional media queries for 920 pixels and 1078 pixels in width. These media queries were designed with responsive elements to properly account for a number of potential devices and displays in which the site might be viewed, including accurate scaling for mobile devices and tablets.

The mock social media feed itself was created using a combination of HTML, CSS, and JavaScript coding. The HTML page, named "index.html," was formatted



primarily using a combination of <div>'s (divisions), <a>'s (hyperlinks), <img>'s (images), <p>'s (paragraphs), and <ul>'s and <li>'s (list elements). The division of content into an overall list format, with the <ul> tag containing each and every potential <li> element, and the <li>'s being used to organize more complex <div> elements that contained each potential social media post, allowed for the simulated social media feed to populate in a reasonable top-down format easily and without added complication. Along with this, by making each simulated social media piece be contained within an <li> tag, the set of list elements could later be categorized and ordered within the full parent <ul> as needed to organize a cohesive testing environment. This overall organizational procedure made the creation of new social media posts to populate the simulated social media feed an easy task, as each post remained consistent no matter the type of content it contained. This applies to all three potential post types: text-only, static graphic, and motion graphic. Figure 5 illustrates how this simulated social media feed may appear to a viewer on a desktop or laptop computer during testing.

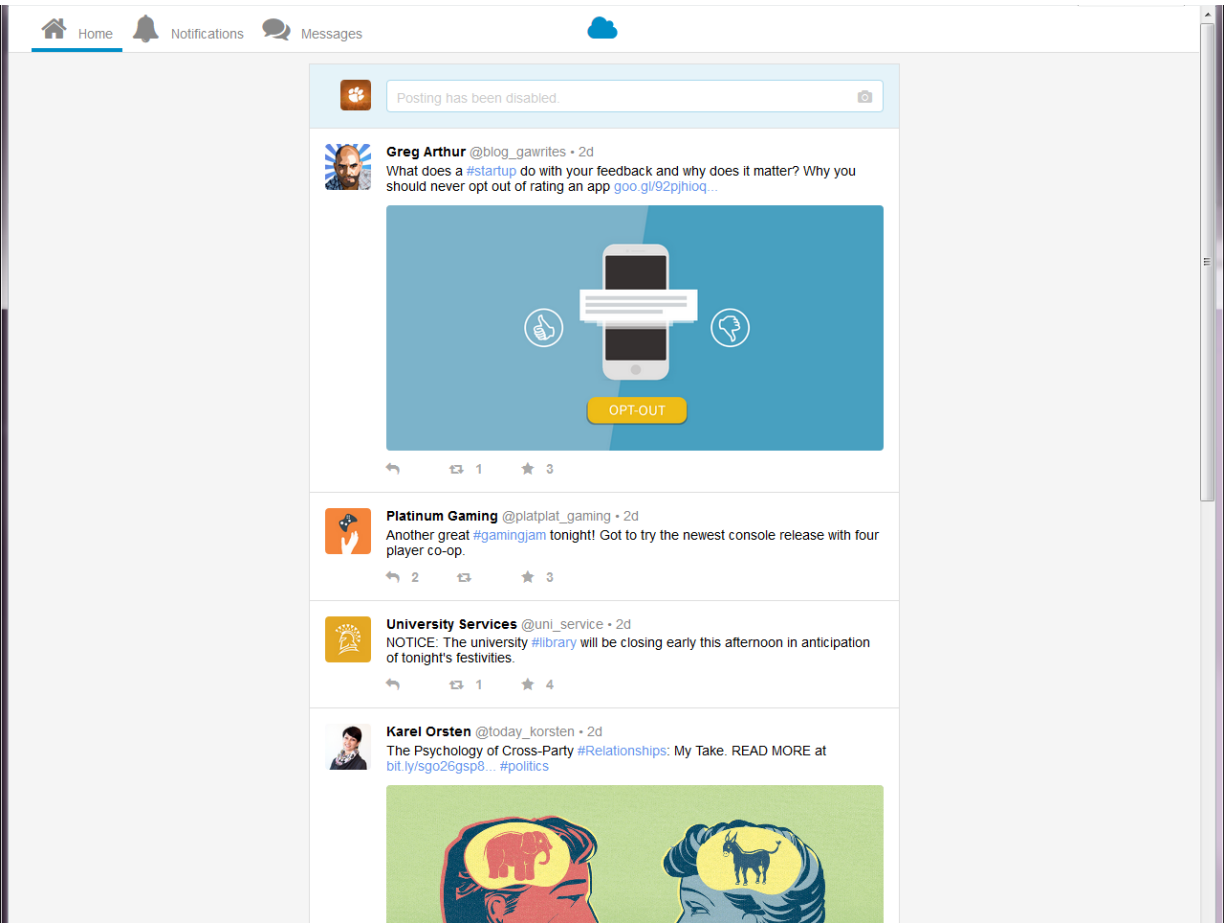


Fig. (5). Appearance of simulated social media feed when populated with content.

To elaborate, the content populating this replica social media feed was an evenly balanced mix of text-only, static graphic, and motion graphic content. This content varied in potential subject matter, from a number of simulated casual social media posts to mock advertising content. This content was created specifically for this testing environment and does not use any real or previously existing brands, branding elements, or persons. This was done in order to present a believable potential social media feed while still being able to actively control for potential variables in content that could not reasonably be accounted for in a live social media feed setting. Similarly, the active choice to use no

pre-existing brands, brand content, or persons was done to remove the potential for biases or pre-existing knowledge from previous exposure to these brands.

The CSS styling for the page, contained within “index.css,” was designed specifically to simulate a basic social media website without any additional clutter or intruding elements that could potentially distract from the intended goals of this study. Styling was done using a mix of overall page styling as well as more specified styling for element IDs and classes. IDs and classes allow for specific elements of the page to be styled in specific ways, allowing for the simulated social media feed to be designed to contain both common elements across the entire page, like a shared typeface, as well as more specific elements like different font colors and styles between a username, display name, and social media post body text.

The primary font for the page was Helvetica, a standard typeface among graphic designers across a number of mediums and, similarly, an extremely popular web font. This typeface is sans-serif in nature, and in a digital format for brief sentences (as would typically populate a social media feed like Twitter.com), it allows for easy and clear legibility on a number of potential displays. Furthermore, the defined font size for the site is .9em, or 14.4px, further allowing for clear display and easy readability for the average viewer.

The page itself was styled in such a way as to have a subtle and unobtrusive palette, using various shades of white, gray, and light blue in background and div elements paired with black and gray text elements. These colors helped to avoid any potential distraction and to ensure that the content of the simulated social media posts

themselves was the focus for potential viewers. This styling incorporated both simulated links and “hashtags” as are currently common in today’s social media sites so as to best resemble a typical social media feed.

Images were set to display within the social media feed at a base maximum resolution of 256px in height and 512px in width for rectangular images, or 512x512px in width and height for square images, much as they would in a real social media feed. If viewers chose to do so, they would be able to click on and expand any potential post of their choice; this subsequently rendered the selected image at a larger overall resolution depending on the size of the viewport (an overall maximum 920px width for both rectangular and square images without media queries). This distinction, one that exists in many common social media sites today, allowed for the feed to remain relatively compressed and organized while still allowing the viewer to focus in on any potential media of their choice and see it in its full original resolution. As a result, content tailored for this format was be designed to scale well and be legible both in a smaller and larger format.

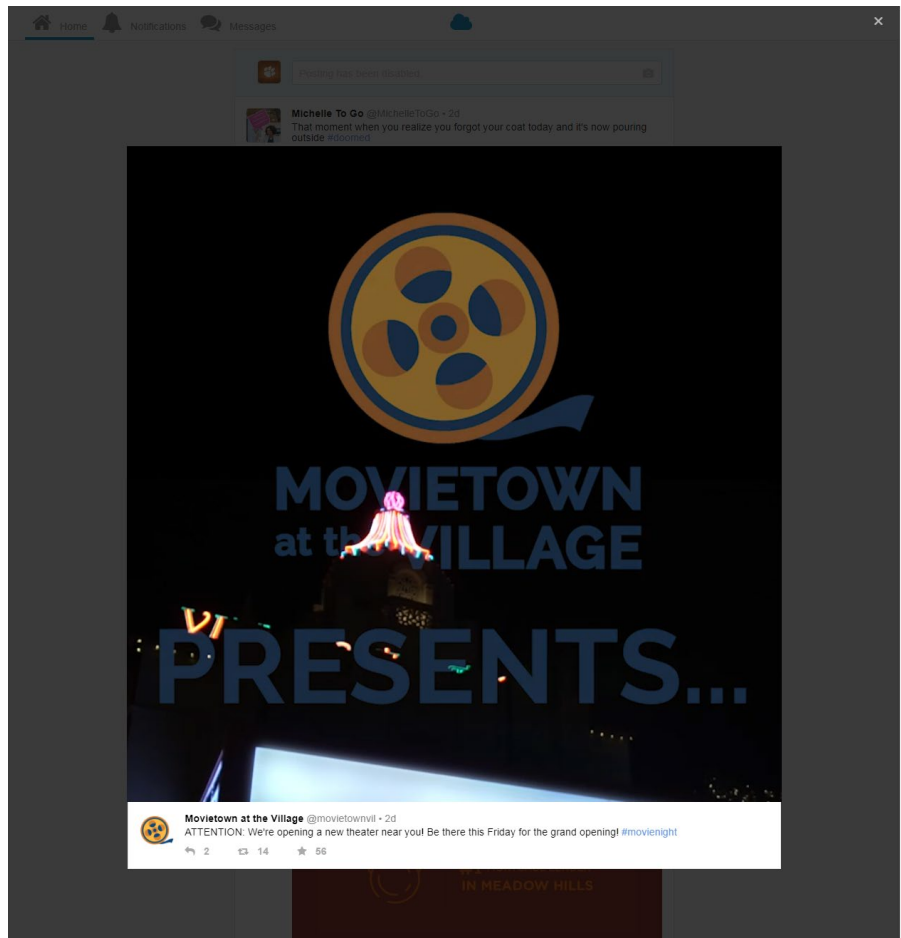


Fig. (6). Ex. of an expanded social media post following user interaction.

The CSS styling for this simulated social media feed was filled with a number of contextual and instructional formatting tools that are common to websites both within and outside of social media-focused areas. This included changing colors or styles upon mouse hover or click for interactive elements like links, hashtags, and replies/favorites/shares. More importantly, this included a background color change and mouse cursor change for any individual social media post when hovering over it in the feed, suggesting to the viewer that it could be clicked on and expanded in the same way that it might be on a site like Twitter.com. These kinds of elements are commonly

referred to as an extension of “skeuomorphism,” or the design of elements that represent their real-world counterparts (Judah, 2013). By making a post on the simulated social media feed appear to be a button of some sort through styling changes and changing the cursor to a pointing finger, the viewer understood through context that this particular element could be clicked and that they might do so if prompted.

The previously-mentioned media queries used in the overall styling for the site were created to properly align and position elements depending on the overall resolution the site was being viewed in. For example, when the maximum width of the page falls at or below 1078px, the padding is reduced for the “#image-container” ID when applied to an expanded image in this viewing resolution. At the next media query, a maximum width of 920px, elements in the page’s upper navigation bar were removed to account for the lesser display space. Along with this, expanded images only scaled to a maximum width of 744px, again to account for the limitations of the viewport resolution. When hitting the last media query, a maximum width of 744px, the positioning of the elements in the navigation bar was again modified to account for the new overall page width. These media queries were functionally and visually nearly identical to Twitter.com’s present web display format, and allowed for correct display of the simulated social media feed in the context of the testing environment.

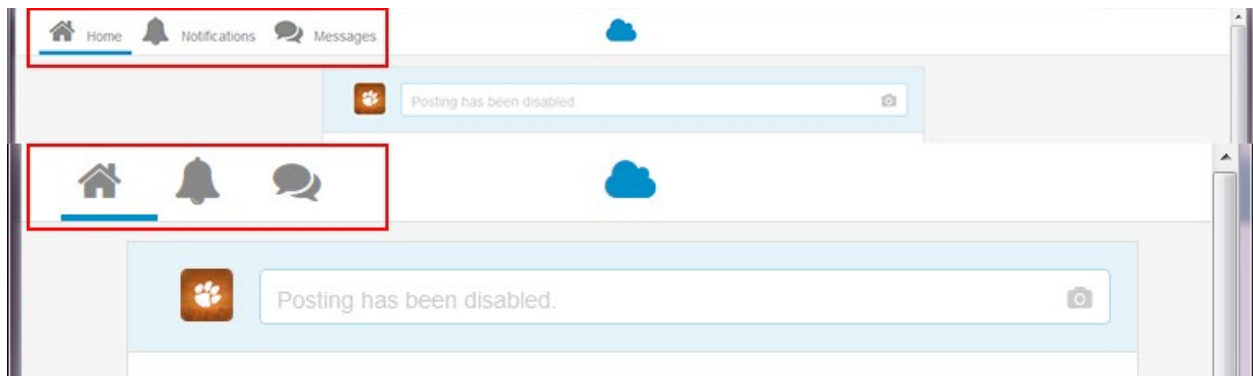


Fig. (7). Ex. of elements modified through media queries.

The JavaScript for the site, contained within the document “index.js,” created the overall functionality for both the tracking of interactivity and testing metrics within the social media and for the “pop-out” mechanic of clicking on a post to expand the content and graphic it contains. These elements of functionality were created using jQuery and AJAX within the JavaScript language.

The second segment of the JavaScript document specifically utilized the jQuery and AJAX framework in order to create a functional in-window pop-out functionality for any individual post in the simulated social media feed. This was done through the use and specific tailoring of the Magnific Popup script created by Dmitry Semenov with collaborator Danny Hearnah and released publicly under the MIT web script license. This script functions in such a way that an external HTML document is loaded within the original “index.html” simulated social media feed to display the expanded content relevant to the specific social media piece that was clicked on.

Finally, additional JavaScript functionality to track and record vital information for testing behavior, such as the total amount of time that the social media feed was

viewed, whether or not the user clicked through on the testing variable content, and whether they were viewing on a mobile/handheld device or a traditional desktop or laptop environment are utilized and prepared for proper data ingestion into Qualtrics during the testing procedure. These features all allowed for additional tracking of more traditional metrics regarding interaction and engagement with content that exists in the simulated social media feed.

These individual HTML, CSS, and JS documents all came together to create the single functional simulated social media feed in everything from display and appearance to functionality. In using these three distinct and unique coding languages, the overall scope and scale of the site as a tool for replicating a full social media experience was not hindered or diminished as a result of technical limitations; every single aspect of the simulated social media feed functions as intended for the purposes of testing. This of course means that the ability to visit individual pages beyond the simulated social media feed or for a viewer to post content of their own is not an available functionality, but as those behaviors exist outside the intended purpose for this study there was no attempt or need to replicate them through coding.

As for the content displayed within the simulated social media feed itself, the constants of the study consisted of a total of 20 different mock social media posts created to populate the feed and to encapsulate the variable test graphic. These 20 posts were divided up into three different distinct categories with 10 posts for the first and 5 posts each for the second and third: text-only, static graphic, and motion graphic. This is to accurately and appropriately create a balanced variety of types of content that may appear



in an every-day social media feed, while still keeping the overall viewing number controlled and reasonable for testing participants. This selection of 20 posts was done in order to allow the viewer to reasonably browse the entirety of the simulated feed during the allotted time period without potentially missing out on viewing content further down the page.

These mock social media posts contained a reasonable variety of content and subject material that a typical college-aged viewer would be likely to see in their own social media feed. One such form of content could be categorized as primarily social in nature, focused on the activities or experiences of peers. An example of this is a still image post involving a photograph of a college-aged female wearing sunglasses and looking into the distance, with the user “@thisvandontstop” stating “when your sunglasses game is on point.” This user’s profile picture appears to be a college-aged female to complete the overall peer-based appearance of the post.

Another form of content would be categorized as advertising and marketing content, specifically coming from a business’ social media account while promoting products or services related to their business. One such example is a post from the user “@neighbormortgage” advertising the company’s mortgage lending offerings. This corporate message and post is clearly created and designated with precise use of hashtags and mentions to best resemble the kinds of marketing materials that are common to a social media platform like Twitter today.

The third form of potential content to populate the social media feed is that of primarily educational or informational content. This includes both news-based and

article-based posts, such as one from an apparent writer’s account linking to an article entitled “The Psychology of Cross-Party Relationships.” These kinds of content can vary in subject or topic, but are constructed in such a way as to either inform in a short and succinct social media post or to encourage the viewer to click away to an external site for a longer story. The full list of simulated social media posts for this segment is as follows:

**Text-Only:**

- From “@platplat\_gaming:” “Another great #gamingjam tonight! Got to try the newest console release with four player co-op.”
- From “@DaveWins:” “Good lord this game lol #knightsvsblues”
- From “@ADK\_93:” “My wife is the best. This is not a debate. Thanks.”
- From “@MichelleToGo:” “That moment when you realize you forgot your coat today and it’s now pouring outside #doomed”
- From “@AlyssaReed4:” “Professor: (breathes) Girl in the back row: Can you please slow down how do you possibly expect us to take notes at this pace”
- From “@pbandmsa:” “Spread the awareness! Change your profile pic for the cause #WeCanDoIt”
- From “@uni\_service:” “The university #library will be closing early this afternoon in anticipation of tonight's event.”
- From “@ab\_sports:” “Per @SportsNews, 2018 4\* Safety Dan Smith has flipped his commitment to @UniversityFB #Lions #recruiting”

- From “@knight\_eventcenter:” “Now hiring: we’re looking to add a new member to our talented entertainment team! If you have experience with operating light equipment, apply now at [bit.ly/46hao9ga...](http://bit.ly/46hao9ga...)”
- From “@jones84:” “Just can’t put down this book! love everything about it”

### **Static Graphic:**

- From “@blog\_gawrites:” “What does a #startup do with your feedback and why does it matter? Why you should never opt out of rating an app [goo.gl/92pjhioq...](http://goo.gl/92pjhioq...)” with an image depicting a mobile phone with thumbs-up and thumbs-down icons and the text “opt out.”
  - Note: This tweet is replaced with the static graphic testing variable when a testing subject is selected by the random number generator.
- From “@louisthehue:” “Last episode of the season... don't know what I'll do without this show #InitialRide” with an image depicting a man sitting on a bus with television network identifiers in the bottom left corner.
- From “@robtheexplorer:” “Counting down the days until I’m there again” with an image depicting a man standing in front of a waterfall.
- From “@thisvandontstop:” “when your sunglasses game is on point” with an image depicting a woman wearing sunglasses.
- From “@neighbormortgage:” “We're there for @MeadowHills: More #mortgages provided than anybody else in town. Come visit us to learn more.” with an image

depicting an abstract medal paired with the text “Neighbors: #1 mortgage lender in Meadow Hills.”

- Note: This tweet is considered a product advertisement for testing purposes.

### **Motion Graphic:**

- From “@today\_korsten:” “The Psychology of Cross-Party #Relationships: My Take. READ MORE at [bit.ly/sgo26gsp8...](http://bit.ly/sgo26gsp8...) #politics” with an image depicting a man and woman looking at one another with an elephant and donkey over their brains with animated hearts flowing between them.
  - Note: This tweet is replaced with the motion graphic testing variable when a testing subject is selected by the random number generator.
- From “@WNN\_Social:” “Where the world's largest urban growth is occurring today: Read now [url.sh/039shjb7a...](http://url.sh/039shjb7a...)” with an image depicting an animated loop of a busy city intersection.
- From “@History4U:” “#oldschooltech In case you didn't know... We were doing GIFs way before the internet was here!” with an image depicting an animated spinning phenakistoscope.
- From “@WeatherOnDemant\_GSP:” “We will keep an eye on this storm as it develops. Be careful and exercise caution, #Greensburg residents.” with an image depicting an animated weather radar reading.

- From “@jacobsreststop:” “Our new #rewards program will help fill your tank. Download the app now and never fret over the pump again.” with an image depicting a gas prices sign, animated to have the numbers roll through until each reads “Nope.” Text at the bottom reads “Never worry about gas prices again” and includes the company’s logo.
  - Note: This tweet is considered a product advertisement for testing purposes.

The piece of social media content to be specifically used for testing reasonably fell under the category of advertising and marketing materials. This advertisement in particular was presented in one of two potential forms: static graphic or multimedia motion graphic. This, of course, was done in conjunction with the static print magazine advertisement that was also involved in the testing procedure. As this piece of content in particular was the focus of testing, it was important that messaging and overall content of the two variants of the piece were both consistent and equally relevant.

The topic for the advertisement graphic used as the testing variable was the promotion of a newly-opening local movie theater. The photographs and promotional materials for the movie theater were based entirely on a movie theater location in the North Texas metropolitan area so as to remove any potential for recognition or subsequent bias among the largely South Carolina-based testing group. These promotional materials were created entirely from scratch without any pre-existing branding elements or listed locales for the same reason.

The static variant depicted the front entrance and exterior of a brand-new movie theater location, complete with bright and vivid lights and a front marquee reading “Grand Opening.” The primary text featured in the graphic reads “A New Local Theater Opening This Friday!” with a brief set of secondary text indicating that the first 50 guests will receive free popcorn. This static graphic included additional branding elements for the movie theater, including the company name, company logo, and brand color palette.



Fig. (8). The static digital graphic as it appears in context for subjects.

The multimedia variant of this graphic opened with the company logo and text reading “Movietown at the Village PRESENTS...” to immediately catch the attention of a potential scrolling viewer while also overtly including core brand elements. This introduction cut to a shot carrying forward and tilting upward towards the front entrance of the movie theater with text reading “A New Local Theater.” This was followed by a subsequent shot of the open seats of a theater interior with the superimposed text reading “Opening This Friday.” The video then cut to another panning shot over popcorn with transitionary text reading “Free popcorn for the first 50 guests.” Finally, the video cut back to the same exterior shot that the static graphic contained with the re-introduction of the theater name and logo via a gradual fade-in. The video, in total, lasted approximately 18 seconds in length, with the shots containing text being the longest portions overall.



Fig. (9). A still image of the multimedia motion graphic as it appears in context for subjects.

The corresponding magazine advertisement functionally and visually resembled the appearance of the static social media piece identically, containing the same front entrance image and “A New Local Theater Opening This Friday!” text as well as the secondary text and branding elements. The printed magazine component, both in its physical and non-physical format, was eight pages in length including front and back cover, and featured generic headlines and titles as well as photographic and



advertisement-based content. More general text content throughout the testing magazine was blurred in order to keep the subject's focus on the visual elements of the testing environment that they were being presented with during the study. The imagery included in the eight-page spread featured a variety of photographs of individuals and general landscape/nature shots. This spread also included two non-testing pieces of advertisement content meant to compete for visual attention in a similar manner to the additional advertising content in the simulated social media feed. These two ads were for two distinct products; the first, a brand of alcoholic beverage entitled "Red Brand" featuring imagery of a chilled glass of alcohol and the tagline "Next Time... Try Something with a Bite," and the second an advertisement for a piece of software and corresponding website entitled "AlterOffice.net," featuring a primarily blue color scheme and a banner-shaped graphic.

The physical print materials that were used for testing were printed using supplies and processes meant to best replicate those used in a medium-circulation magazine spread. This meant choosing the correct paper stock and weight for a professional-feeling magazine print product appropriate for quality digital printing. The magazines were therefore printed on a total of 100 sheets of Tango Digital Cover C2S 18x12 paper, printed with two pages per side front-and-back for a total of 50 physical copies of the magazine excerpt. This paper was chosen specifically for its medium weight, best replicating the overall weight and feel of a magazine that is not of mass circulation and dense page count but rather a higher quality, lower circulation or lower page count magazine.

These pages were printed digitally, folded, and stapled via a Ricoh digital printer using a .pdf file designed to print in the CMYK colorspace. This .pdf file was originally exported from Adobe InDesign, a program meant to specialize in the creation of publication materials. Each piece of 18x12 paper carried four printed pages, two front and two back, aligned and matched to properly follow the printing style of a typical magazine spread. These pages were then physically cut and trimmed to remove excess bleed portions of the magazine using the POLAR 78 ES high-speed cutter from POLAR Mohr, resulting in a nice, clean 8"x11" final dimension for the magazine.



Fig. (10). The physical printed magazine component as used for testing.

This printed magazine advertisement was also presented non-physically for all digital-only participants, but done in a simulated magazine environment complete with manual page-flipping in order to simulate the same form of engagement involved with

viewing a physical magazine. Of course, differences still existed between these two formats in terms of tangibility and the addition of a display and touchscreen controls compared to physical interaction with the magazine itself, but in terms of overall format and content the digital-exclusive magazine spread was identical to that of the physical printed magazine.

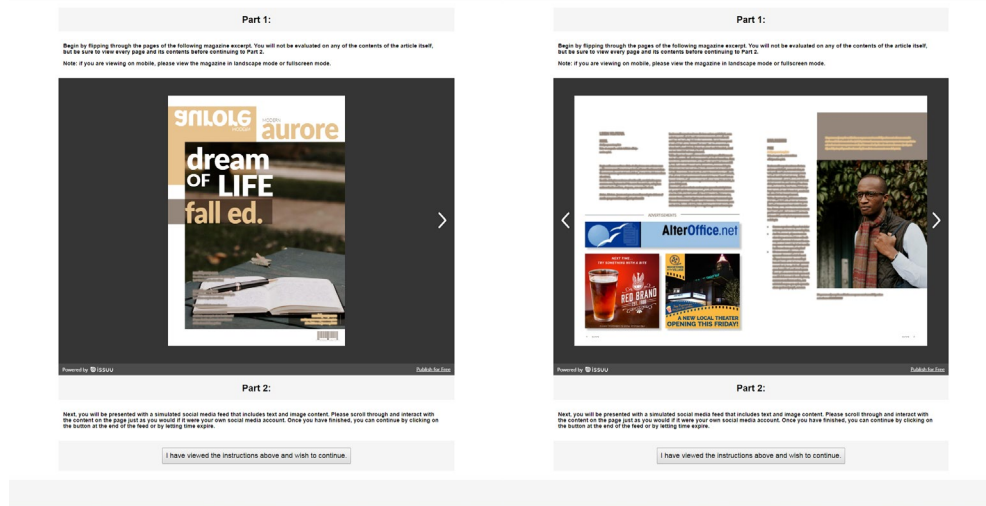


Fig. (11). The interactive print magazine component as it appears for digital-only participants.

## Measurement

Participants were tested on their ability to recall information pertinent to the test variable branding elements across both the magazine and digital advertising pieces. The ability to correctly recollect and recall information both in regards to the advertisement itself and the branding elements of the company presenting the advertisement could be accurately quantified and measured using a questionnaire-style format (Sears). It is for this reason that the large majority of evaluative measures were centered on quantitative data rather than qualitative; while the latter was centered more on opinion or analysis of

the marketing materials, the former was more concerned with whether or not they were given more focus, attention, and subsequent recall by the viewer in the first place, which was the overall purpose of this study.

Measurement was done via the Qualtrics system. This particular platform for surveying and data collection was chosen both due to Qualtrics' robust data collection and export features as well as the principal investigator's previous experience working with the system.

### **Mechanics**

The primary testing population consisted of individuals between two general testing populations, screened and filtered to resemble one another as accurately as possible. The first of these populations was used for in-person testing, and included individuals currently residing in the region surrounding Clemson, South Carolina. This limitation meant that demographic information in regards to age, income, and educational background was primarily uniform across the wider study population, but various other aspects including gender, area of study, personal technological use and/or affinity, and others allowed for more specific and informative analysis of this particular target age range. The second testing population consisted of online respondents selected via Amazon's MTurk platform, screened across metrics of education level (requiring at least high school graduation), age (no older than 40 years of age) and location (requiring that the participant be a resident of the United States) to better match the existing in-person testing population for this study. These testing populations, as a result, generally came to resemble one another in key metrics that allowed for consistent measurement across and

between groups. Both of these testing populations were incentivized with a chance to win a \$200 Amazon gift card for their participation with a valid survey submission, and online MTurk participants were also provided with an \$0.80 completion bonus for participation.

Basic testing procedure for in-person testing began once the participant had been instructed to view the testing web portal via desktop, laptop, or mobile device and agree to the terms of informed consent testing based upon Clemson University standards. After this had been completed, they were handed a physical copy of the magazine excerpt to browse at their own leisure, which on average took an estimated five minutes per participant. Once this step had been completed and the subject was ready to move on, they were instructed to return their magazine to the front of the room and/or testing custodian and return to their digital device to view the simulated social media feed. Alternatively, viewers of the digital-only version of this study were instructed to follow a similar procedure with their digital magazine, moving on to the next web page for the simulated social media feed and thereby removing access to their magazine content. The simulated social media feed was completed by reaching the bottom of the page and clicking on a button to continue, or alternatively being automatically redirected upon reaching a maximum viewing time of 180 seconds, or three minutes.

Following both stages of testing, participants continued testing on their device, which they used to fill out the ending questionnaire, exit survey, and provide their demographics information. As this is typically the lengthiest step of the overall testing process, this particular segment is not timed.

The contents of the ending questionnaire were as follows:

**Initial Survey Questions- Page 1:**

- How well do you believe you can recall the visual content (i.e. advertisements and photographs) from the magazine spread? Likert scale: Not at all, A little, Somewhat, Mostly, Completely
- How well do you believe you can recall the visual content (i.e. advertisements and photographs) from the social media feed? Likert scale: Not at all, A little, Somewhat, Mostly, Completely
- Between the magazine spread and social media feed, how many advertisements for products/services do you believe you viewed? Dropdown menu: 0-10+
- How many companies appeared in both the magazine spread and the social media feed? Multiple choice: 0-4+

**Recollection-Based Survey Questions- Page 2:**

- What was the name of the company that was featured in both the social media feed and magazine page? Multiple choice: Movietown at the Village, Movie Paradise, Movieville U.S.A, Movietime on the Square, Movieland in the Plaza

- What elements appeared in the company's logo? Multiple choice: A roll of film, a movie camera, a movie clapping board, a projection screen, a box of popcorn
- What colors were used in the company's logo? Multiple choice: Green and yellow, blue and red, blue and yellow, green and red, blue and green
- What was the company advertising? Multiple choice: The opening of a new theater, the premiere of a new film, the remodeling of a previous theater, the addition of a new concessions area
- When was this promotion going to take place? Multiple choice: This Monday, this Friday, next week, next month, this year
- Where was this movie theater located? Multiple choice: Locally, regionally, nationally, internationally
- What was being offered for free to a certain number of guests? Multiple choice: Popcorn, tickets, drinks, season passes, candy
- How many guests were to receive the free item(s)? Multiple choice: The first 5, the first 10, the first 25, the first 50, the first 100
- Which of the following were features on the building's exterior (check all that apply) Multiple choice: Neon lights, a marquee, a spire, a ticket-shaped sign, columns, bushes

**Exit Survey & Demographics Questions- Page 3:**

- How many hours a day, on average, do you spend browsing social media?

Likert scale: Not at all, 0-1 hours, 1-2 hours, 2-4 hours, 4-6 hours, 6-8 hours, 8+ hours

- On a scale of 1-7, please indicate to what degree you agree with the following statements:

- “Whenever I’m using social media, I frequently make new posts on my own page.” Likert scale: Completely disagree, mostly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, mostly agree, completely agree

- "Whenever I'm using social media, I am constantly liking, commenting, sharing, reacting, etc. on others' posts." Likert scale: Completely disagree, mostly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, mostly agree, completely agree

- "When I start watching a 5-10 second video in my news feed on social media, I always watch it all the way through." Likert scale: Completely disagree, mostly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, mostly agree, completely agree

- "When I start watching a 15-30 second video in my news feed on social media, I always watch it all the way through." Likert scale: Completely disagree, mostly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, mostly agree, completely agree



- "When I start watching a 30+ second video in my news feed on social media, I always watch it all the way through." Likert scale: Completely disagree, mostly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, mostly agree, completely agree
- How frequently, on average, do you make purchases online in a given month? Multiple choice: Less than once a month, once a month, once every couple of weeks, once a week, multiple times a week
- Please indicate your gender Multiple choice: Male, Female, Other
- Please indicate your age (in years) Multiple choice: <18, 18-20, 21-23, 24-27, 28-32, 33-40, 41-50, 51-60, >61
- Please indicate your ethnicity Multiple choice: African-American, Hispanic/Latino, Native American, Asian/Pacific Islander, Caucasian
- Please indicate your highest level of education Multiple choice: No schooling or elementary, middle school, high school, some college, undergraduate degree, some post graduate work, postgraduate degree
- To be eligible to win the \$200 Amazon gift card, please provide your email address! (your email will not be used for any purposes other than to contact you upon winning) Free response, optional

## RESEARCH QUESTIONS

### **Can the recall of branding elements and advertising content across multiple formats be accurately measured?**

Using Sears' research into the effectiveness of informational graphics as a foundational model for this study, the primary concern of testing is the objective measurement of recollection, recognition, and subsequent recall of brand elements in advertising content depending on the format and context in which they are presented to the participant. Although some qualitative data will be collected and analyzed, the primary purpose and focus of this particular study is the assessment of the measurable quantitative values. The first of these values is a measure of the recall of what is considered primary information: the company's name, logo, branding colors, and the good or service being advertised. In the instance of this study, these values are "Movietown at the Village," a roll of film, blue and gold, and a new local theater opening, respectively. The second set of values to be measured is what is considered secondary information: the supplemental promotional aspect, the day or time of the promotion, the quantity of individuals who can take part in the promotion, and the location of the promotion. For this study, these values are free popcorn, "this Friday," the first 50 guests, and a locally-located theater. If previous studies are to be used as a basis, if a testing subject is to view the digital motion graphic rather than the digital static graphic, then they will be significantly more likely to recall secondary information but significantly less likely to recall primary information when compared to those who viewed the digital static graphic.

**Does the use of digital motion graphics in a social media context have a significant impact on attention and recall?**

One of the primary independent variables in testing is whether a participant was exposed to a digital motion graphic or a digital static graphic in the simulated social media feed segment. Their ability to recall information will be evaluated within their observance in this simulated social media feed rather than in an isolated environment, which may impact their overall perception or level of attention during viewing. As no previous study has attempted to evaluate these measures of attention and recall in a simulated social media environment, the potential impact of this setting on a subject's overall recollection is currently unknown, but based on prior studies that evaluate these measures in terms of distractors or context it may be possible that this environment may have a significant impact on the amount of attention provided between a static or motion digital graphic.

**Does the introduction of tangible print materials compared to strictly non-physical materials have a significant impact on attention and recall?**

The second independent variable tested in this study involves the introduction of more traditional print advertising materials, presented either in a tangible physical format or in a digital simulation of that format. This component, while identical in the content it contains and the format in which it is presented, does vary in the ways in which the testing subject can potentially interact with the piece and may therefore impact their ability to recall the information included in these formats. Based on previous studies in regards to the impact of tangible materials and the associations they can create when

compared to digital materials, it may be possible that the physical print materials could result in overall better recall in both primary and secondary information categories.

**Does prior exposure to traditional marketing materials in either a physical print or non-physical format impact the focus or recall of information depending on the form of digital content viewed?**

The additional component introduced in this study is the inclusion of previous exposure to the target advertising content in a more traditional advertising medium. Although all subjects will be presented with the print magazine excerpt at the onset of testing in one of its two forms, approximately one-half of testing subjects between each group will be presented with the multimedia motion materials when viewing the simulated social media feed, while the other half will be presented with the digital static materials when viewing the social media feed. In measuring any potential differences between recollection and recognition of branding elements between the two groups, this study will attempt to discern whether or not the similarities in presentation between the physical and digital components of the mock advertising campaign has any overall impact on the participant's overall recall or afforded attention to either piece. Based on prior studies, it may be possible that if the digital graphic is identical to the static print graphic, the repetition of elements will result in a greater level of attention and therefore overall recall.

**In what ways can the findings from this study be applied?**

Primarily, this study aims to better inform companies that engage in traditional marketing campaigns like printing and mail piece advertising as to where they should

invest in terms of digital and social media advertising. Similarly, the findings of this study will be beneficial to companies that already engage in creating promotional content for social media marketing efforts by presenting data and measurement on the effectiveness of these materials in creating brand recognition and recall. Additionally, this study will attempt to inform both groups on the coordination of materials between multiple platforms for their consumers if engaging in both print and digital advertising efforts to achieve the most tangible and effective end results. Finally, this study may speak to the potential value that designers who can create content across both physical print mediums as well as tailored digital mediums could potentially provide for a corporation or team.

## AGGREGATION OF DATA

### Sample Profile

Overall, this study encompassed a total of 253 participants who completed the testing portion and online survey as well as provided valid data submissions. These 253 participants were divided between a total of four different categories based on the two independent variables introduced in testing. These categories are as follows: participants who viewed *physical* print materials and *static* content (referred to from this point forward as  $P+S$ ), participants who viewed *physical* print materials and motion multimedia *video* content (referred to from this point forward as  $P+V$ ), participants who viewed non-physical magazine materials—*digital-exclusive* participants—and *static* content (referred to from this point forward as  $D+S$ ), and participants who viewed non-physical magazine materials and motion multimedia *video* content (referred to from this point forward as  $D+V$ ).

Participants who viewed physical magazine were students on the Clemson University campus across multiple testing sessions done in regular classroom environments with their personal digital devices for the digital portion of the testing procedure. Participants who viewed the non-physical magazine were recruited from a larger online MTurk sample screened from a larger pool of 176 participants for a minimum of a completed high school graduation, residency in the United States, an age range matching that of the in-person testing pool, and for a valid completion of the testing procedure; these participants completed the entire process in the digital testing

environment. Both populations were presented by random assignment with either static or motion multimedia content in the digital testing environment.

Demographically-speaking, the overall population sample used for testing had an average age of roughly ~25 years, with overall ages ranging from 18 to 40. In breaking down the provided age groups, a total of 103 (40.7%) participants indicated that they were in the “18-20” age range, 34 (13.4%) in the “21-23” age range, 36 (14.2%) in the “24-27” age range, 32 (12.6%) in the “28-32” age range, and 48 (18.9%) in the “33-40” age range. In regards to ethnicity, the population sample included 198 (78.3%) Caucasian respondents, with the second-largest ethnic group being African-American respondents with a total of 31 (12.3%) participants. Other ethnic groups included Hispanic/Latino (6 participants, 2.4%), Asian/Pacific Islander (12 participants, 4.7%), and other ethnicities (6 participants, 2.4%). Gender breakdown of the overall population sample consisted of 118 male participants (46.6%) and 135 female participants (53.3%). Educational background in the population sample used for this study consisted predominantly of individuals who indicated that they had completed “Some College” work with a total of 151 participants (59.7%). The next most common level of education was “Undergraduate Degree” with a total of 65 participants (25.7%), followed by “High School” with 22 participants (8.7%), “Postgraduate Degree” with 13 participants (5.1%), and finally “Some Postgraduate Work” with 2 participants (0.8%).

A total of 129 participants were assigned to the first testing group (physical print materials), while 124 participants were assigned to the second testing group (non-physical print materials). These groups further break down following random assignment

into groups of 69 participants for the  $P+S$  testing group, 60 participants for the  $P+V$  testing group, 64 participants for the  $D+S$  testing group, and finally 60 participants for the  $D+V$  testing group. Therefore, a total of 133 participants in this study were presented with static content while 120 participants were presented with motion multimedia content to make up the combined total of 253 participants between all groups.

Overall, the population breakdown of the 253 total participants is presented in Table 1 below.



TABLE 1  
Sample Profile

Demographics (N=253)	Frequency	Percentages
<b>Gender</b>		
Male	118	46.6
Female	135	53.3
<b>Ethnicity</b>		
Caucasian	198	78.3
African-American	31	12.3
Asian/Pacific Islander	12	4.7
Hispanic/Latino	6	2.4
Other	6	2.4
<b>Age Group</b>		
18-20	103	40.7
21-23	34	13.4
24-27	36	14.2
28-32	32	12.6
33-40	48	18.9
<b>Education</b>		
High School	22	8.7
Some College	151	59.7
Undergraduate Degree	65	25.7
Some Postgraduate Work	2	0.8
Postgraduate Degree	13	5.1

TABLE 2

Cell Means and Standard Deviations for Primary Content Information (N=253)

Variable	Treatment	Mean (% Correct)	Std. Deviation
Overall recollection of 'Primary' information	Physical+Static (P+S)	67.4	.295
	Physical+Video (P+V)	55.0	.305
	Digital+Static (D+S)	62.5	.292
	Digital+Video (D+V)	50.4	.296
Company Name (Primary)	Physical+Static (P+S)	58.0	.497
	Physical+Video (P+V)	48.3	.504
	Digital+Static (D+S)	70.3	.460
	Digital+Video (D+V)	50.0	.504
Brand/logo elements (Primary)	Physical+Static (P+S)	59.4	.495
	Physical+Video (P+V)	61.7	.490
	Digital+Static (D+S)	45.3	.502
	Digital+Video (D+V)	41.7	.500
Brand/logo colors (Primary)	Physical+Static (P+S)	69.6	.464
	Physical+Video (P+V)	43.3	.500
	Digital+Static (D+S)	50.0	.504
	Digital+Video (D+V)	40.0	.494
Product being advertised (Primary)	Physical+Static (P+S)	82.6	.382
	Physical+Video (P+V)	66.7	.475
	Digital+Static (D+S)	84.4	.396
	Digital+Video (D+V)	70.0	.462

TABLE 3

Cell Means and Standard Deviations for Secondary Content Information (N=253)

Variable	Treatment	Mean (% Correct)	Std. Deviation
Overall recollection of 'Secondary' information	Physical+Static (P+S)	61.9	.270
	Physical+Video (P+V)	68.3	.256
	Digital+Static (D+S)	69.9	.282
	Digital+Video (D+V)	62.0	.289
Additional promotion being advertised (Secondary)	Physical+Static (P+S)	84.1	.369
	Physical+Video (P+V)	83.3	.376
	Digital+Static (D+S)	78.1	.417
	Digital+Video (D+V)	65.0	.481
Additional promotion quantity (Secondary)	Physical+Static (P+S)	37.7	.488
	Physical+Video (P+V)	48.3	.504
	Digital+Static (D+S)	39.1	.492
	Digital+Video (D+V)	38.3	.490
Additional promotion timing (Secondary)	Physical+Static (P+S)	56.5	.499
	Physical+Video (P+V)	66.7	.475
	Digital+Static (D+S)	76.6	.427
	Digital+Video (D+V)	65.0	.481
Company locality (Secondary)	Physical+Static (P+S)	69.6	.464
	Physical+Video (P+V)	75.0	.437
	Digital+Static (D+S)	85.9	.350
	Digital+Video (D+V)	80.0	.403

TABLE 4

Cell Means and Standard Deviations for Other Assessments (N=253)

Variable	Treatment	Mean	Std. Deviation
Recall of building exterior elements (0-3 score range)	Physical+Static (P+S)	1.04	.605
	Physical+Video (P+V)	1.03	.736
	Digital+Static (D+S)	1.25	.735
	Digital+Video (D+V)	1.23	.831
Belief in ability to recall information from “print” testing materials (1-5 scale)	Physical+Static (P+S)	2.99	.795
	Physical+Video (P+V)	2.95	.852
	Digital+Static (D+S)	3.06	.852
	Digital+Video (D+V)	3.03	.780
Belief in ability to recall information from “social media” testing materials (1-5 scale)	Physical+Static (P+S)	3.03	.785
	Physical+Video (P+V)	3.15	.659
	Digital+Static (D+S)	2.91	.791
	Digital+Video (D+V)	3.00	.803
# of advertisements respondent believed they viewed (1-10 scale)	Physical+Static (P+S)	7.10	2.33
	Physical+Video (P+V)	6.93	2.33
	Digital+Static (D+S)	6.59	2.32
	Digital+Video (D+V)	6.10	2.31
Number of advertisers respondent believed appeared on both platforms (1-4 scale)	Physical+Static (P+S)	2.83	1.21
	Physical+Video (P+V)	3.12	1.11
	Digital+Static (D+S)	2.55	1.37
	Digital+Video (D+V)	3.07	1.09

## HYPOTHESES TESTING

### **Null Hypothesis 1(a)**

$H_0$  postulates that no significant difference will be observable in the subject's ability to recall 'primary' content information when presented with motion multimedia content as compared to static content. This hypothesis is representative of the measurable differences in response between two testing groups, participants who viewed static (P+S & D+S) content and participants who viewed motion multimedia (P+V & D+V) content: therefore, the independent variable for testing of this hypothesis is that of the form of content being presented, while the dependent variable is the number of correct responses for primary content information. A general linear model analysis of variance (ANOVA) compared mean averages in correct responses both between individual measures of primary information as well as for the overall average value of primary information recall.

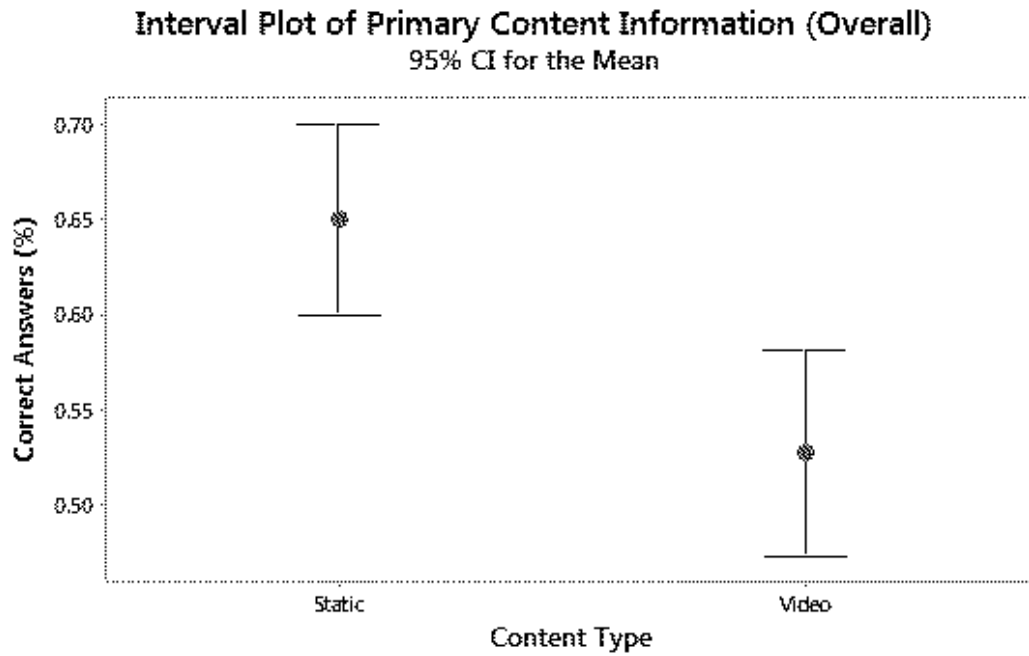
The ANOVA results for overall recall of primary content information indicate a statistically significant difference in recall between static content and multimedia content ( $F=10.71$ ,  $p=0.001$ ), thereby disproving the null hypothesis. The form of content that the testing participant was presented with in the simulated social media format had a significant effect on the participant's overall ability to recall primary information, with those who were presented with static graphic content providing correct responses to questions measuring primary content information recall at a significantly higher rate than participants who were presented with motion multimedia content.

The statistical mean of overall correct responses for participants who were presented with static information was higher both in the case of those who were presented with physical print content as well as those who were presented with non-physical print content ( $M_{Static} = 64.9\%$  :  $M_{P+S} = 67.4\%$ ,  $M_{D+S} = 62.5\%$ ) when compared with participants who had viewed motion multimedia content ( $M_{Video} = 52.7\%$  :  $M_{P+V} = 55.0\%$ ,  $M_{D+V} = 50.4\%$ ); see Figure 12.

Furthermore, in measuring individual metrics of primary content information recall, three of the potential four categories assessed in testing showed differences of statistical significance between participants who viewed static content and those who viewed motion multimedia content; see Figure 13. In the assessment of the question “What was the name of the company that was featured in both the social media feed and magazine page?” the statistical mean of correct responses was significantly higher for static content viewers ( $M_{Static} = 64.1\%$ ) than for motion multimedia viewers ( $M_{Video} = 49.2\%$ ) and reached statistical significance ( $F = 5.85$ ,  $p = 0.016$ ). The same was also true for the questions “What colors were used in the company's logo?” ( $M_{Static} = 59.8\%$ ,  $M_{Video} = 41.7\%$ ) and “What was the company advertising?” ( $M_{Static} = 83.5\%$ ,  $M_{Video} = 68.3\%$ ), both of which showed statistically significant differences in the overall mean of correct responses ( $F = 8.62$ ,  $p = 0.004$  &  $F = 8.14$ ,  $p = 0.005$ , respectively). The one question meant to assess for primary content recall for which there was no statistically significant difference was “What elements appeared in the company's logo?” for which the statistical mean of correct responses for static content participants ( $M_{Static} = 52.6\%$ ) did not significantly vary from that of motion multimedia participants ( $M_{Video} = 51.7\%$ ).

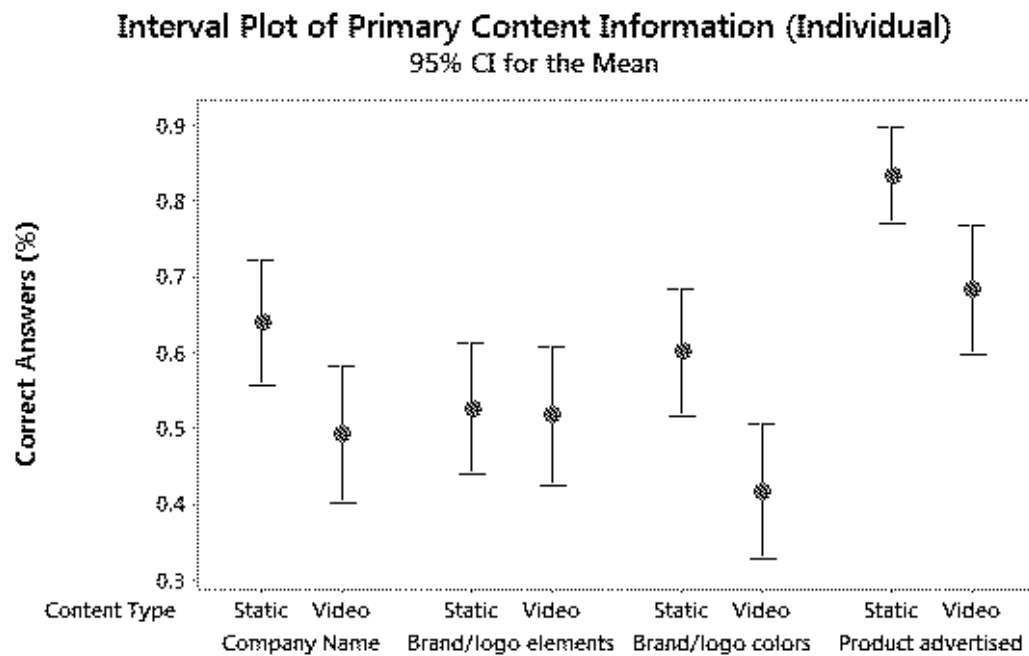
Overall, these results suggest that there is a notable correlation between the viewing of static content and the ability to recall primary information from that content when compared with viewing motion multimedia content. For the purposes of this study, this information encompassed the primary product offering, primary brand color identity and company name.

Figure 12



Individual standard deviations are used to calculate the intervals.

Figure 13



Individual standard deviations are used to calculate the intervals.



### **Null Hypothesis 1(b)**

$H_0$  postulates that no significant difference will be observable in the subject's ability to recall 'secondary' content information when presented with motion multimedia content as compared to static content. As with the assessment of null hypothesis 1(a), a general linear model analysis of variance (ANOVA) compared mean averages in correct responses both between individual measures of secondary information as well as for the overall average value of primary information recall. In this instance, while the independent variables remain the same as 1(a), the dependent variable measured is now an assessment of correct responses to questions evaluating the overall recall of secondary information.

The ANOVA results for overall recall of primary content information indicate that there is no statistically significant difference in recall between participants who viewed static content versus those who viewed multimedia content ( $F=0.04$ ,  $p=0.833$ ), thereby failing to disprove the null hypothesis. The form of content that the participant was presented with within the simulated social media feed therefore did not have a statistically significant impact on their overall ability to recall the secondary content information with which they were presented.

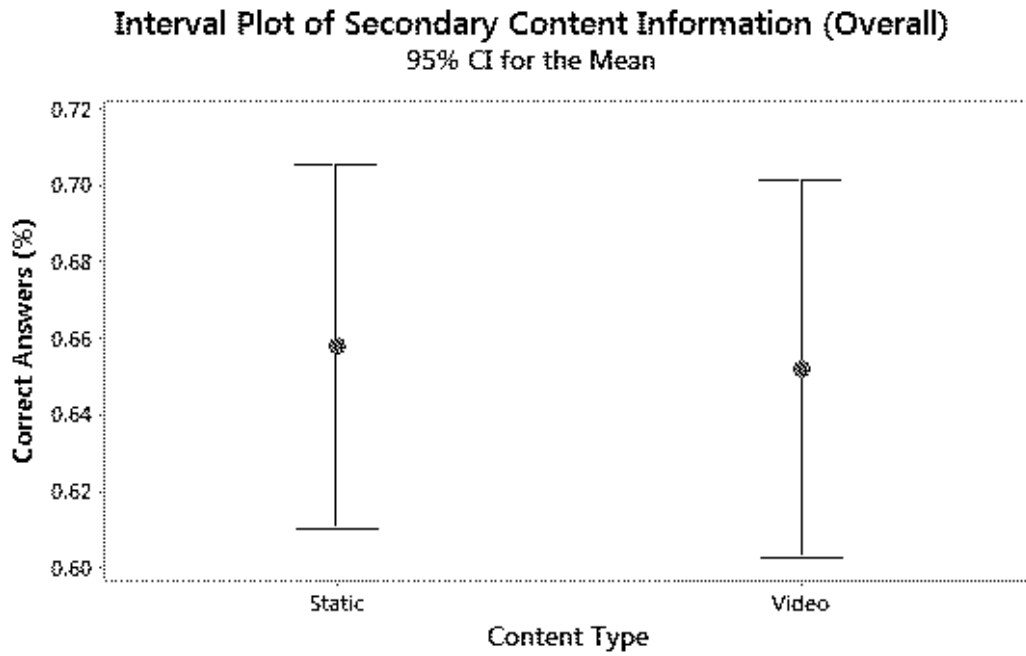
The statistical means between these two groups for the overall percentage of correct responses fell within a single percentage point overall ( $M_{Static} = 65.8\%$ ,  $M_{Video} = 65.2$  while results between the smaller segmented testing populations varied slightly more depending on the presence of the physical print materials or non-physical print materials but still did not arrive at levels indicating statistical significance in regards to the

relationship between static and motion multimedia content ( $M_{P+S} = 62.0\%$ ,  $M_{D+S} = 69.9\%$ ,  $M_{P+V} = 68.3\%$ ,  $M_{D+V} = 62.1\%$ ); see Figure 14.

Measurements for individual questions did not present a single instance in which there was a statistically significant difference between static content participants and motion multimedia content participants in recall of secondary information. This was true for the questions “What was being offered for free to a certain number of guests?” ( $M_{Static} = 81.2\%$ ,  $M_{Video} = 74.2\%$ ,  $F = 1.79$ ,  $p = 0.183$ ), “How many guests were to receive the free item(s)?” ( $M_{Static} = 38.3\%$ ,  $M_{Video} = 43.3\%$ ,  $F = 0.64$ ,  $p = 0.425$ ), “When was this promotion going to take place?” ( $M_{Static} = 66.2\%$ ,  $M_{Video} = 65.8\%$ ,  $F = 0.01$ ,  $p = 0.905$ ), and “Where was this movie theater located?” ( $M_{Static} = 77.4\%$ ,  $M_{Video} = 77.5\%$ ,  $F = 0.00$ ,  $p = 0.962$ ). Although these responses did vary slightly in the overall degree of separation between the means of the two respondent groups, not one approached an adequate level of statistical significance and therefore cannot be attributed to a difference in ability to recall secondary information between these two testing groups.

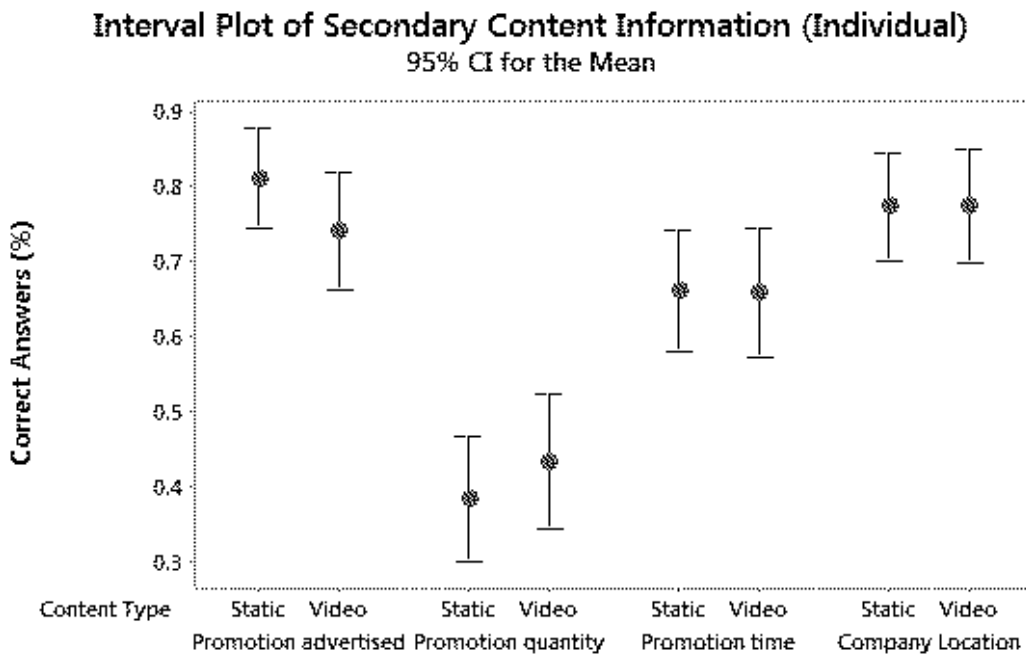
These results suggest that there is no notable correlation between the ability to recall secondary information and the form of digital content that was viewed, whether the viewer was presented with static graphic content or motion multimedia content. For the purposes of this study, this was reflected in a lack of statistically significant differences for any single question meant to evaluate secondary information recall. This result stands in contrast to the difference displayed between these two testing groups for primary information, indicating that one category of information was demonstrably affected by this difference in content format, another category was not.

Figure 14



Individual standard deviations are used to calculate the intervals.

Figure 15



Individual standard deviations are used to calculate the intervals.

### **Null Hypothesis 2(a)**

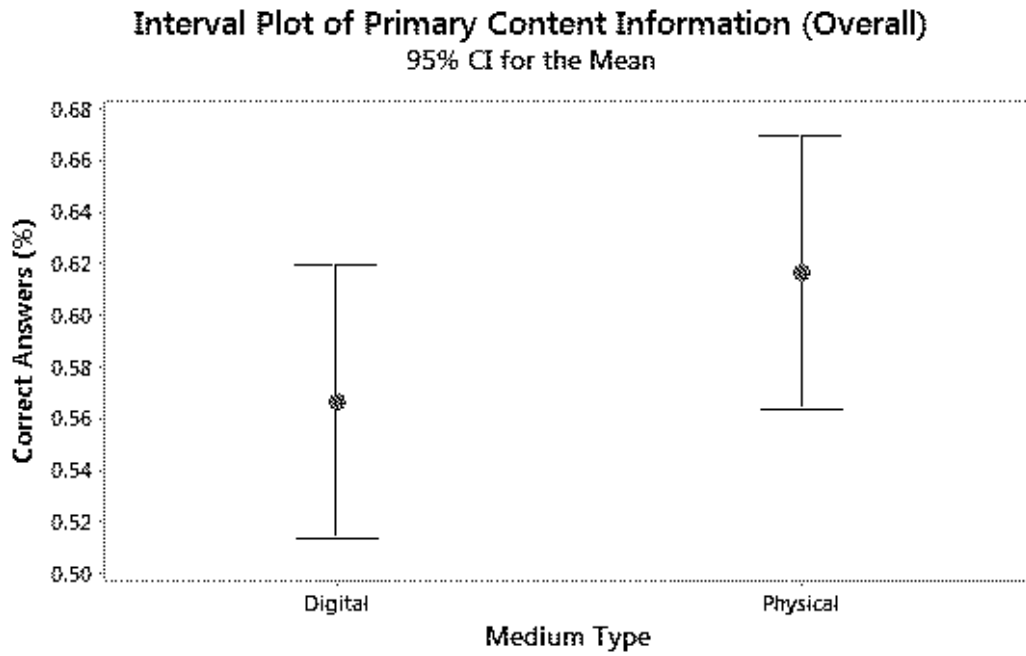
$H_0$  postulates that no significant difference will be observable in the subject's ability to recall primary content information when presented with a combination of tangible print and digital mediums as compared to digital-only mediums. Again, a general linear model analysis of variance (ANOVA) was used to assess mean averages in correct responses both at the level of overall evaluation as well as for individual questions for measures of primary content recall. For this particular assessment, performance was assessed with a dependent variable of correct responses to questions assessing primary content recall and an independent variable of the form of print content that the participant was presented with in testing.

The ANOVA results for overall recall of primary content information indicate that there is no statistically significant difference in recall between participants who were presented with physical print materials and digital content and those who were presented with exclusively non-physical materials ( $F=1.60$ ,  $p=0.206$ ), thereby failing to disprove the null hypothesis. The medium in which the print materials were viewed by the participant therefore did not have a statistically significant impact on their ability to recall the primary content information with which they were presented.

As shown in Figures 16 and 17, the statistical means for these two segments of the testing population did vary, but not to a statistically significant degree between physical ( $M_{Physical} = 61.6\%$  :  $M_{P+S} = 67.4\%$ ,  $M_{P+V} = 55.0\%$ ) and digital ( $M_{Digital} = 56.7\%$  :  $M_{D+S} = 62.5\%$ ,  $M_{D+V} = 50.4\%$ ) mediums.

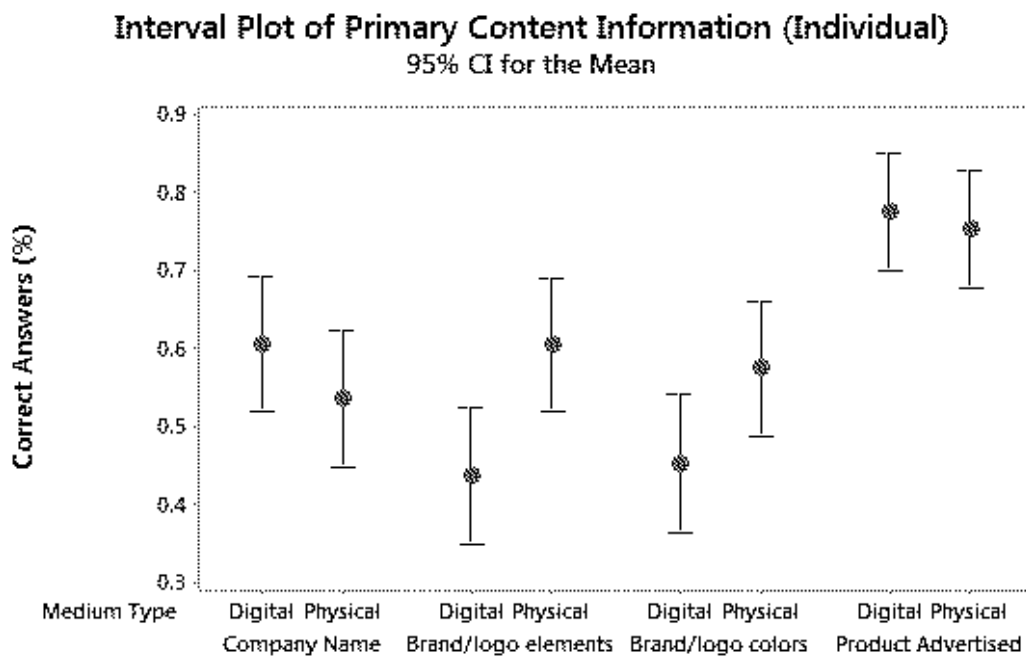
When further breaking down this assessment on a question-by-question basis, most of the evaluative questions lined up with this overall assessment. This included the statistical means for the questions “What was the name of the company that was featured in both the social media feed and magazine page?” ( $M_{Physical} = 53.5\%$ ,  $M_{Digital} = 60.5\%$ ), which failed to meet a level of statistical significance ( $F = 1.28$ ,  $p = 0.259$ ), “What colors were used in the company's logo?” ( $M_{Physical} = 57.4\%$ ,  $M_{Digital} = 45.2\%$ ), which also failed to reach statistical significance ( $F = 3.44$ ,  $p = 0.065$ ), and “What was the company advertising?” ( $M_{Static} = 75.2\%$ ,  $M_{Video} = 77.4\%$ ), which once again failed to meet the threshold for statistical significance ( $F = 0.23$ ,  $p = 0.632$ ). However, for one specific question that was assessed—the question for primary content that is meant to evaluate an element of core branding, “What elements appeared in the company's logo?”—there was indeed a statistically significant difference between the means ( $M_{Static} = 60.4\%$ ,  $M_{Digital} = 43.5\%$ ) for responses between those who had been presented with physical print materials in testing and those who had been presented with non-physical materials, reaching a p-value lower than any of the other questions evaluated in this hypothesis ( $F = 7.45$ ,  $p = 0.007$ ). However, this individual statistically significant result does not suggest a larger trend of statistical significance in regards to the relationship between primary content information and the medium in which participants were presented with this information, as shown by the values for the overall metric. Therefore, with one exception the null hypothesis could not be disproved.

Figure 16



Individual standard deviations are used to calculate the intervals.

Figure 17



Individual standard deviations are used to calculate the intervals.

## **Null Hypothesis 2(b)**

$H_0$  postulates that no significant difference will be observable in the subject's ability to recall 'secondary' content information when presented with a combination of tangible print and digital mediums as compared to exclusively non-physical mediums. As with the other hypotheses assessed in this study, a general linear model analysis of variance (ANOVA) was used to compare mean averages in correct responses for both the overall category of secondary content information as well on a question-by-question basis as a measure of recall. While the independent variables being tested here remain consistent with hypothesis 2(a), the dependent variable being evaluated is now the recall and assessment of secondary content information rather than primary content information.

The ANOVA results for overall recall of secondary content information indicate that there is no statistically significant difference in recall between participants who were presented with physical print materials and digital content and those who were presented with solely non-physical materials ( $F=0.06$ ,  $p=0.804$ ), thereby failing to disprove the null hypothesis. This indicates that the medium of materials between participants did not have a statistically significant impact on their ability to recall the secondary content information they were presented in the study.

This held true both for the statistical means of the overall assessment of correct responses for secondary content information between groups ( $M_{Physical} = 64.9\%$ ,  $M_{Digital} = 66.1\%$ ) as well as those for two of the individual question-by-question assessments. These means, as visualized in Figures 18 and 19, showed some instances of statistically

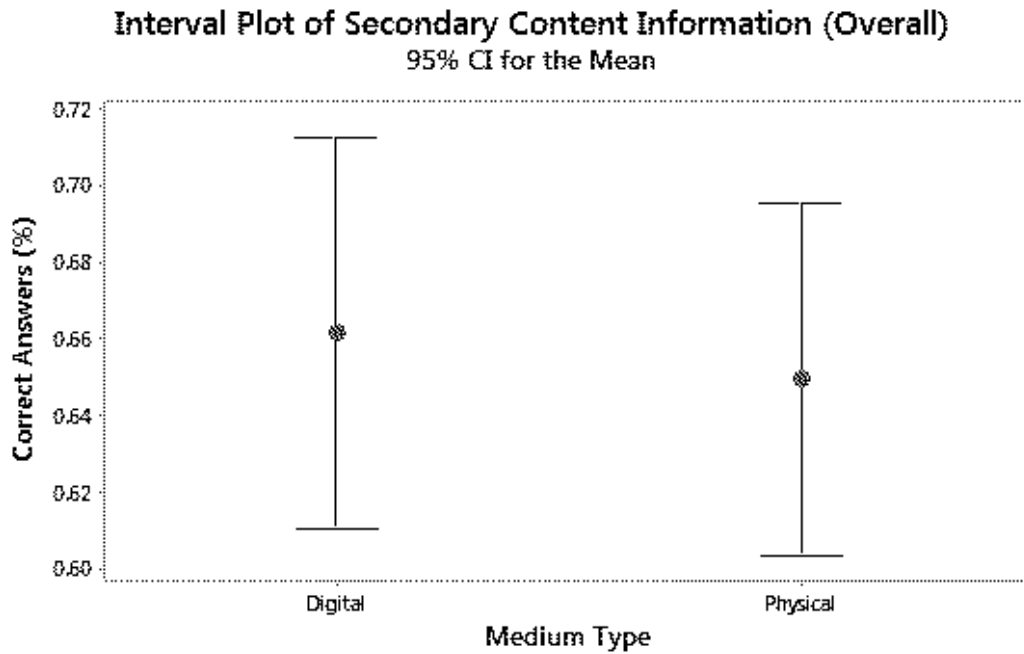
significant variance on individual questions but on the whole did not amount to an overall difference between respondent groups that was of statistical significance.

When further analyzing the individual questions that factored into the overall assessment of secondary information, two of the questions did not show differences of statistical significance between the two testing groups while the other two questions did show differences of statistical significance. The two questions that fell under the former category were “How many guests were to receive the free item(s)?” ( $M_{Physical} = 42.6\%$ ,  $M_{Digital} = 38.7\%$ ,  $F = 0.48$ ,  $p = 0.489$ ) and “When was this promotion going to take place?” ( $M_{Physical} = 61.2\%$ ,  $M_{Digital} = 71.0\%$ ,  $F = 2.39$ ,  $p = 0.123$ ), while the two questions that fell under the latter category were “What was being offered for free to a certain number of guests?” ( $M_{Physical} = 83.7\%$ ,  $M_{Digital} = 71.8\%$ ,  $F = 5.48$ ,  $p = 0.020$ ) and “Where was this movie theater located?” ( $M_{Physical} = 72.1\%$ ,  $M_{Digital} = 83.1\%$ ,  $F = 4.15$ ,  $p = 0.043$ ). What was most interesting overall in the evaluation of these individual questions was that for one question in each of the two categories—the questions regarding the number of guests and what promotional item was being offered—the physical print materials outperformed the strictly non-physical materials, while for the other question in each category—the questions regarding the promotion’s timing and the location of the theater—the non-physical exclusive materials outperformed the physical print materials. This means that between these various forms of secondary information, one question resulted in a statistically significant difference that suggests a positive correlation between physical print materials and recall of secondary information regarding the subject of the promotional offer, another question resulted in a statistically significant



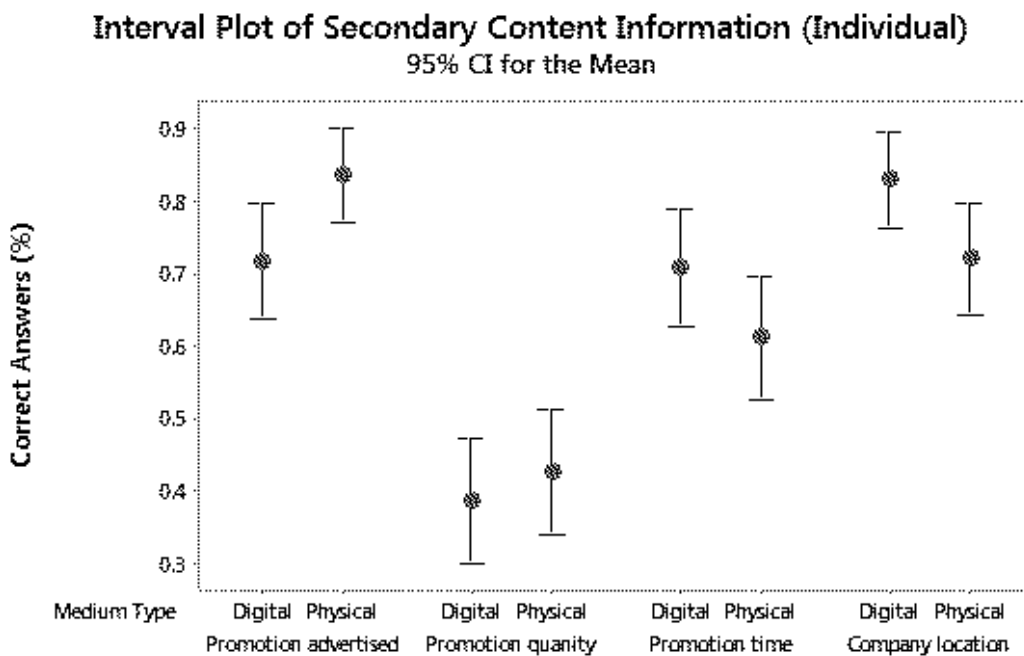
difference that suggests a negative correlation between physical print materials and recall of secondary information about the promotion's location, and the two remaining questions resulted in responses that did not suggest a correlation of statistical significance.

Figure 18



*Individual standard deviations are used to calculate the intervals.*

Figure 19



*Individual standard deviations are used to calculate the intervals.*

### **Null Hypothesis 3(a)**

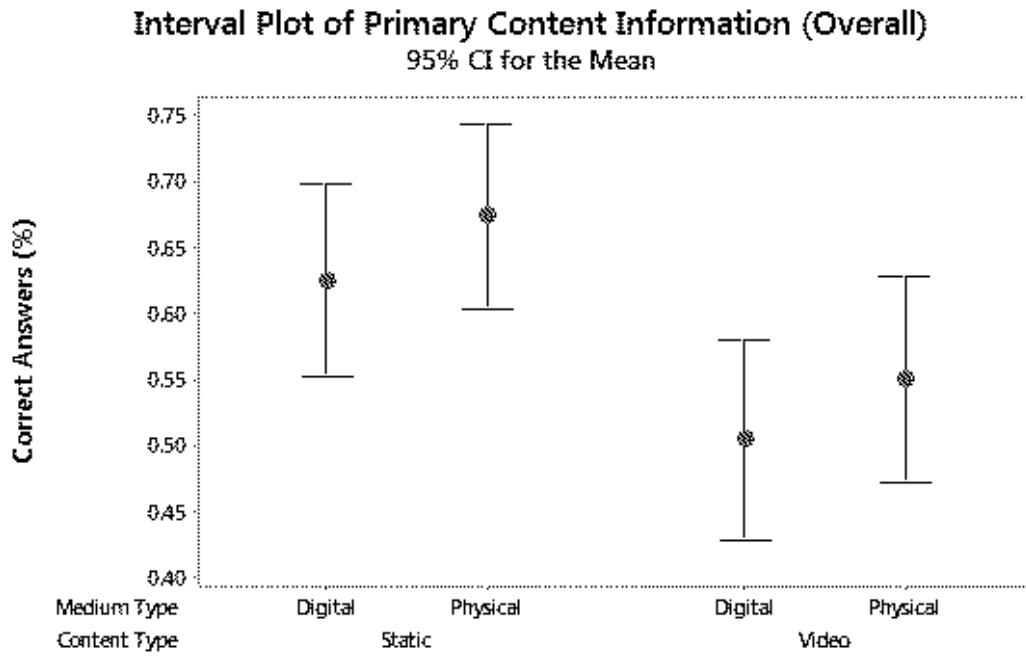
$H_0$  postulates that there is no relationship between the form of digital content that was presented during testing and the medium in which the print content was presented during testing on the overall ability to recall primary information. As with all previously stated hypotheses, a general linear model analysis of variance (ANOVA) was used to compare mean averages in correct responses, this time evaluated across metrics for every potential combination of testing category;  $P+S$ ,  $P+V$ ,  $D+S$ , and  $D+V$ . These measurements include an assessment of primary content information and question-by-question evaluation of these metrics. For this hypothesis, the independent variables are now both the medium in which the print materials were presented to the participant and the form of digital content that was presented to the participant, with the dependent variable being the assessment of correct responses to questions meant to assess overall primary content information recall.

The first of these metrics, the measurement of primary information, presented ANOVA results that indicate there is no statistically significant difference in recall for primary information between participants who were presented with various combinations of print materials and digital materials between the two content sections of testing ( $F=0.00$ ,  $p=0.967$ ), thereby failing to disprove the null hypothesis under these conditions. This suggests that there was no discernable overall relationship between the medium used for print materials and the form of content viewed in a purely non-physical context on the ability to recall primary content information.

Figure 20 visualizes the statistical means of these four categories in the overall assessment of primary content information recall, assessing overall correct responses. These means differed somewhat between category, in part reflecting some of the previously-mentioned statistically significant relationships for singular independent variables, but in regards to a direct relationship between the two tested independent variables these averages did not lead to values of statistical significance ( $M_{P+S} = 67.4\%$ ,  $M_{P+V} = 55.0\%$ ,  $M_{D+S} = 62.5\%$ ,  $M_{D+V} = 50.4\%$ ).

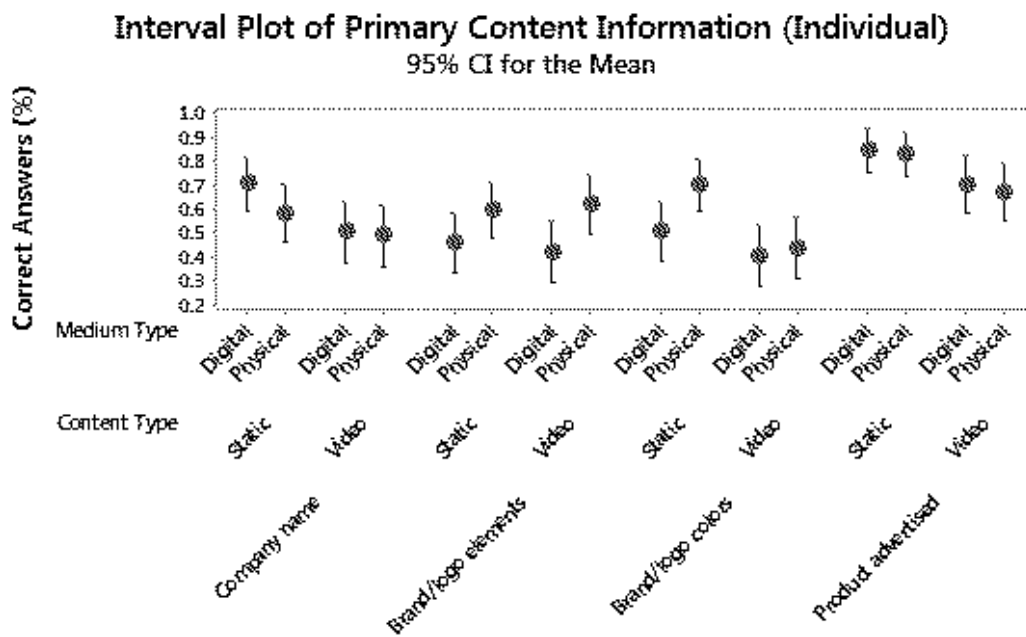
This also held true for each of the individual questions assessed in regards to primary content information, with all four also failing to disprove the null hypothesis. In the case of the four questions—“What was the name of the company that was featured in both the social media feed and magazine page?” ( $M_{P+S} = 58.0\%$ ,  $M_{P+V} = 48.3\%$ ,  $M_{D+S} = 70.3\%$ ,  $M_{D+V} = 50.0\%$ ), which failed to meet a level of statistical significance ( $F = 0.74$ ,  $p = 0.389$ ), “What was the company advertising?” ( $M_{P+S} = 82.6\%$ ,  $M_{P+V} = 66.7\%$ ,  $M_{D+S} = 84.4\%$ ,  $M_{D+V} = 70.0\%$ ), which failed to meet the threshold for statistical significance ( $F = 0.02$ ,  $p = 0.883$ ), “What elements appeared in the company's logo?” ( $M_{P+S} = 59.4\%$ ,  $M_{P+V} = 61.7\%$ ,  $M_{D+S} = 45.3\%$ ,  $M_{D+V} = 41.7\%$ ), which failed to reach statistical significance ( $F = 0.22$ ,  $p = 0.638$ ), and “What colors were used in the company's logo?” ( $M_{P+S} = 69.6\%$ ,  $M_{P+V} = 43.3\%$ ,  $M_{D+S} = 50.0\%$ ,  $M_{D+V} = 40.0\%$ ), which also failed to reach statistical significance ( $F = 1.73$ ,  $p = 0.190$ )—not a single question reached levels of statistical significance to suggest that there was a relationship between the two independent variables being tested.

Figure 20



*Individual standard deviations are used to calculate the intervals.*

Figure 21



*Individual standard deviations are used to calculate the intervals.*

### **Null Hypothesis 3(b)**

$H_0$  postulates that there is no relationship between the form of digital content that was presented during testing and the medium in which the print content was presented during testing on the overall ability to recall secondary information. Once more, a general linear model analysis of variance (ANOVA) was used to compare mean averages in correct responses, and like for null hypothesis 3(a), each potential combination of testing category was evaluated;  $P+S$ ,  $P+V$ ,  $D+S$ , and  $D+V$ . For each of these categories, there was an assessment of secondary content information recall both in an all-encompassing scale and on a question-by-question basis. Like for the previous hypothesis, the independent variables are both the medium in which the print materials were presented to the participant and the form of digital content that was presented to the participant, with the dependent variable now being the assessment of correct responses to questions meant to assess overall secondary content information recall rather than primary.

This evaluation metric resulted in ANOVA results that indicate a statistically significant relationship between the medium utilized in the print segment and the form of content shown in the digital segment in the overall ability to recall secondary information ( $F=4.23$ ,  $p=0.041$ ), thereby disproving the null hypothesis. This suggests that there is a notable relationship between the two independent variables on the ability to recall secondary content information.

As shown in Figure 22, the differences in means for correct responses to secondary content information varied significantly between categories for the various testing groups, being shown most clearly in the difference in recall accuracy between the

*P+V* and *D+S* groups and the *P+S* and *D+V* groups ( $M_{P+V} = 68.3\%$ ,  $M_{D+S} = 69.9\%$ ,  $M_{P+S} = 62.0\%$ ,  $M_{D+V} = 62.1\%$ ). In this instance, rather than showing a correlation involving any individual testing group or component, such as an increase in recall accuracy between physical and digital mediums or between static and video content, there was instead a correlation between recall accuracy and distinct and opposite pairings of testing components.

This trend, while one that is clearly observable when taking all secondary evaluation responses into account, does not necessarily indicate statistically significant outcomes for each individual question, however. In fact, in the metrics for accuracy in each question asked for secondary information content, there were not any results of individual statistical significance in regards to the relationship between medium for print materials and the form of digital content viewed. This included “What was being offered for free to a certain number of guests?” ( $M_{P+V} = 83.3\%$ ,  $M_{D+S} = 78.1\%$ ,  $M_{P+S} = 84.1\%$ ,  $M_{D+V} = 65.0\%$ ,  $F = 1.43$ ,  $p = 0.233$ ), “How many guests were to receive the free item(s)?” ( $M_{P+V} = 48.3\%$ ,  $M_{D+S} = 39.1\%$ ,  $M_{P+S} = 37.7\%$ ,  $M_{D+V} = 38.3\%$ ,  $F = 0.84$ ,  $p = 0.361$ ), “When was this promotion going to take place?” ( $M_{P+V} = 66.7\%$ ,  $M_{D+S} = 76.6\%$ ,  $M_{P+S} = 56.5\%$ ,  $M_{D+V} = 65.0\%$ ,  $F = 3.34$ ,  $p = 0.069$ ), and “Where was this movie theater located?” ( $M_{P+V} = 75.0\%$ ,  $M_{D+S} = 85.9\%$ ,  $M_{P+S} = 69.6\%$ ,  $M_{D+V} = 80.0\%$ ,  $F = 1.18$ ,  $p = 0.279$ ). Although these four individual questions alone did not show instances of statistical significance for the relationship between the two independent variables, when combined and measured as an overall metric for recall of secondary content information they did show statistically significant differences, with the pairings of *P+V* and *D+S*

performing in secondary recall abilities at a significantly higher level than the pairings of P+S and D+V.



Figure 22

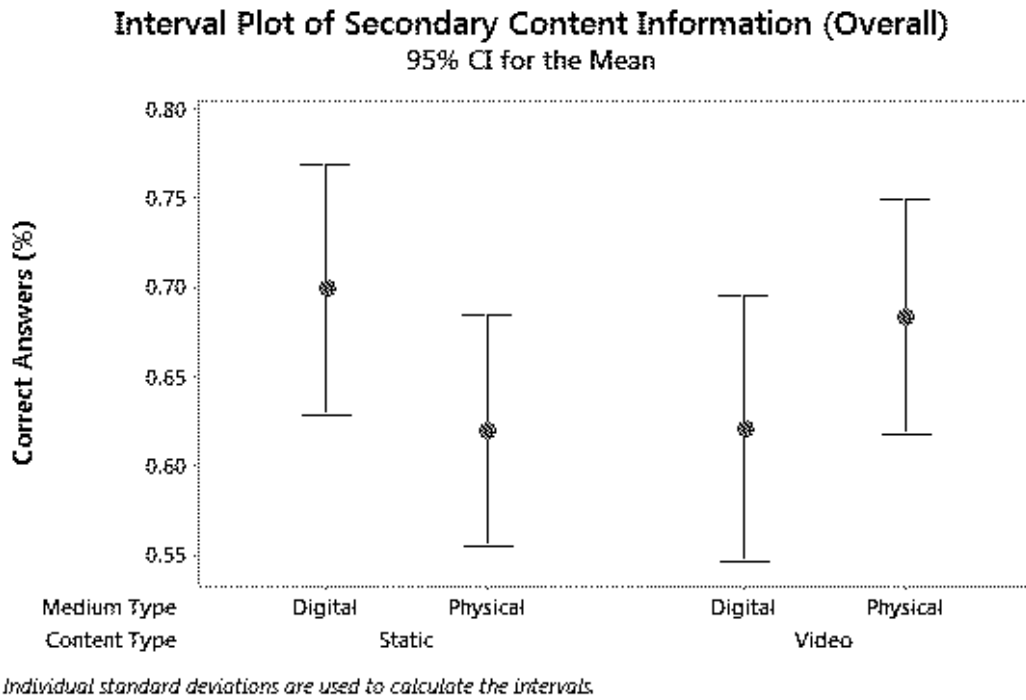
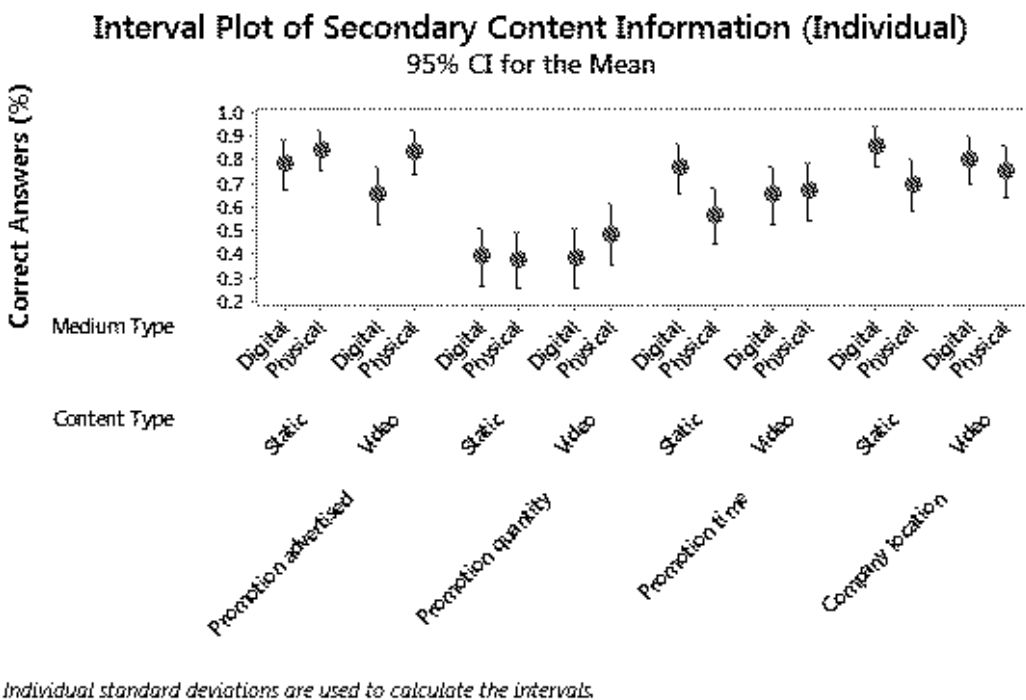


Figure 23



## **Additional Observations**

Beyond the evaluation of primary content recall and secondary content recall, some additional questions yielded results of note related to the nature of advertising across multiple real-world environments and the ways in which individuals interact with social media content on the whole.

The first of statistical significance was related to the perception of how many advertisements the testing subject had viewed between both the print materials and simulated social media feed. Overall, testing participants had a tendency to overestimate the number of advertisements they had seen during testing; while there were only six explicit advertisements between the two testing components for all testing groups, the average value for each group fell above that value with *P+S* experiencing the highest average at 7.10. More importantly, however, there was a direct and statically significant correlation between the form of print material a subject viewed and their assessment of how many advertisements they had viewed ( $F = 5.25, p = 0.023$ ). In evaluating the means for these two categories, the data shows that the average value for those who viewed the physical print materials ( $M_{Physical} = 7.02$ ) was nearly an entire point higher than the average for those who viewed exclusively non-physical content ( $M_{Digital} = 6.35$ ). This means that based on the data from the study, there is a suggested positive impact on the number of advertisements a viewer believes they have been exposed to and the presence of a physical print component.

A second observation that also yielded statistically significant results was that of the perception of how many companies had advertised both in the print material

component and the simulated social media feed. Again, in this instance, participants had a tendency to overestimate the actual number of companies that had advertised across both platforms. Unlike with the previous question, however, this result instead showed statistically significant differences based on whether the subject had viewed either multimedia motion content or static digital content in the simulated social media feed ( $F = 7.16, p = 0.008$ ). Comparing the means between these two groups, it becomes clear that those who viewed multimedia video content were even more likely to overestimate the number of companies that had advertised in both phases of testing ( $M_{Video} = 3.09$ ) than those who had viewed static digital content were ( $M_{Static} = 2.69$ ). This would suggest that there may be a positive correlation between the presence of multimedia motion content and the perceived number of advertisers who are utilizing multiple platforms to advertise. It is extremely interesting to note, however, that in all cases across both of these questions the average frequency and concentration of advertising content or corporate presence was overestimated regardless of which testing group was evaluated.

Another area of note involving both independent variables that were tested in this study was the average overall time spent in the simulated social media feed between testing groups, as tracked via JavaScript as the value “time.” The first of these observations that met a level of statistical significance was between participants who viewed multimedia motion content and digital static content ( $F = 4.34, p = 0.038$ ). On average, individuals who had been presented with motion content in the simulated social media feed actually, on average, spent less time in the simulated social media feed ( $M_{Video} = 80.2$  sec.) than their static content counterparts, to the degree of over 12 seconds less on

average ( $M_{Static} = 92.3$  sec.). This finding is absolutely fascinating given the multimedia motion graphic's overall runtime of roughly 18 seconds, suggesting that those who were presented with the video in their simulated social media feed were actually less likely to spend as long viewing it despite the addition of a theoretically more time-consuming piece of content. This suggests that there may potentially be a negative correlation between the presence of more video content in a social media feed and the time spent viewing that content.

This kind of relationship was only more pronounced when comparing physical print subjects with non-physical subjects. This relationship also resulted in differences of statistical significance ( $F = 14.54$ ,  $p = 0.000$ ), with the average time spent viewing the social media feed by those who had been presented with physical print materials ( $M_{Physical} = 97.1$  sec.) coming to an entire 21-second difference from the average of those who had been presented with non-physical print materials ( $M_{Digital} = 75.5$  sec.). This kind of difference suggests that there may be a positive correlation between the viewing of print content or mixed content and the time spent viewing that content when compared to strictly digital or single-medium content.

Elsewhere in testing, there were a few evaluative questions that did not reach differences of statistical significance, primarily meant to evaluate the respondent's belief in their ability to remember the content they had been presented with in the print materials and simulated social media feed. These questions were originally meant to parallel those of Sears' study, where data showed that individuals who had been presented with video content were more likely to believe they had accurately learned and

been able to recall information than any other testing group regardless of their actual performance. In this study, although the mean value of this metric for participants who had viewed video content was indeed higher than that of participants who had viewed static content ( $M_{Video} = 3.08$ ,  $M_{Static} = 2.97$ ), and although the video testing group did on average evaluate their perceived recall of the social media feed's contents higher ( $M_{Video} = 3.08$ ) than their perceived recall of the print materials ( $M_{Video} = 2.99$ ) while the reverse was true for participants who had viewed static content ( $M_{Static} = 2.97$ ,  $M_{Static} = 3.02$ ), none of these values reached levels of statistical significance.

Finally, of note were both the differences and similarities that existed between demographic groups, primarily centered around the respondent's indicated gender. In testing, there was not a single instance in which gender had a statistically significant impact overall on a respondent's ability to recall the information they had been presented with, regardless of whether it was primary information or secondary information. Similarly, gender also did not have any discernible impact on the evaluation of the number of advertisements the respondent had been presented with or the number of companies that had advertised across both platforms, nor did it have any impact on how well the respondent believed they had been able to remember the contents of either the print magazine or the simulated social media feed.

Where differences in gender did come into play, however, were in regards to metrics evaluating the ways in which testing subjects interact with or utilize social media platforms. In these particular questions, statistical significance was nearly-universal. This includes "How many hours a day, on average, do you spend browsing social media?" (F

= 15.1,  $p = 0.000$ ), along with Likert scale questions meant to evaluate how much the respondent agrees with the statements "Whenever I'm using social media, I frequently make new posts on my own page" ( $F = 16.16$ ,  $p = 0.000$ ) and "Whenever I'm using social media, I am constantly liking, commenting, sharing, reacting, etc. on others' posts." ( $F = 28.93$ ,  $p = 0.000$ ). Each of these questions, on average, showed significant differences in the values that female respondents provided ( $M_{Female} = 3.54, 3.19, 4.82$ ) and those that male respondents provided ( $M_{Male} = 3.05, 2.46, 3.67$ ), which reflect what we statistically know to be true across a number of social media platforms today.

However, in that regard, it is then the lack of statistically significant results in similar categories of questions that stand out. For example, questions meant to further evaluate social media platform behavior using additional Likert scale questions did not show significant differences between male and female participants. These questions include prompts to evaluate how much the respondent agrees with the statements of "When I start watching a 5-10 second video in my news feed on social media, I always watch it all the way through," ( $F = 0.06$ ,  $p = 0.814$ ) "When I start watching a 15-30 second video in my news feed on social media, I always watch it all the way through," ( $F = 0.47$ ,  $p = 0.495$ ) and "When I start watching a 30+ second video in my news feed on social media, I always watch it all the way through" ( $F = 1.43$ ,  $p = 0.233$ ). This would suggest that even despite the differences in interaction and engagement with social media on the whole as indicated in earlier metrics, there is no statistically significant difference in how men and women believe they interact or engage with video content in particular. Additionally, there was no statistical difference found in regards to how often

respondents indicated they made online purchases based on gender among the testing groups ( $F = 0.17, 0.677$ ), presenting another metric in which men and women in the evaluated testing group followed similar indications of behavior in regards to their interaction with online market platforms.

## Summary and Results

The evaluation of the null hypotheses of this study is illustrated in Table 5.

TABLE 5

Null Hypotheses Test Summary

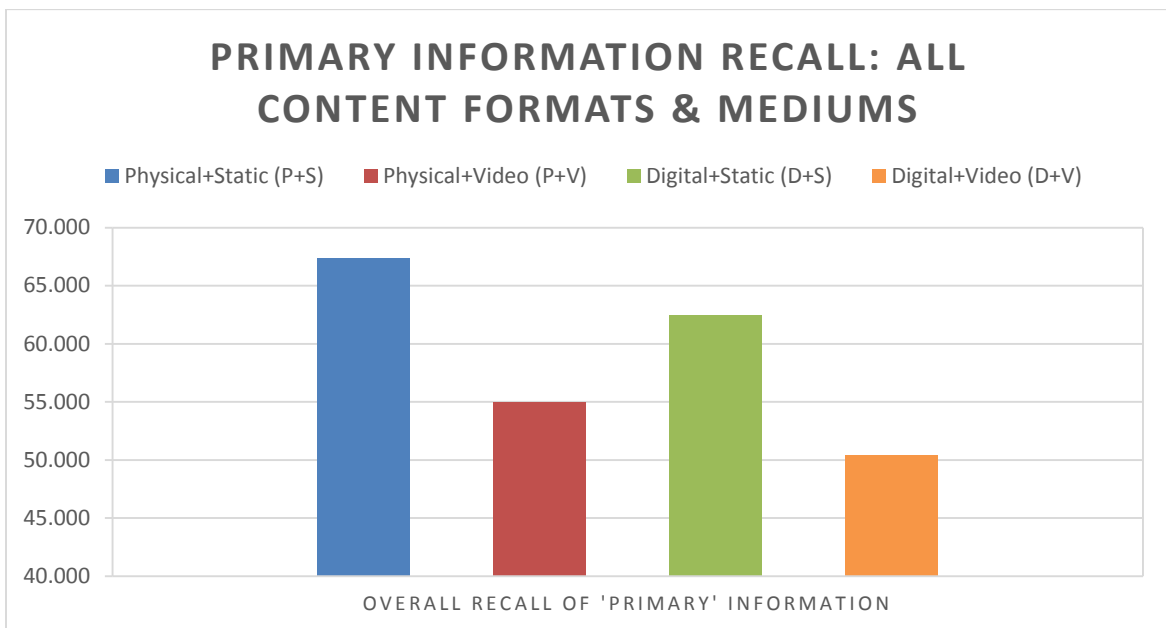
Null Hypothesis		Results
H <sub>0</sub> 1(a)	There is no significant difference in the subject's ability to recall primary content information when presented with motion multimedia content as compared to static content	Disproved
H <sub>0</sub> 1(b)	There is no significant difference in the subject's ability to recall secondary content information when presented with motion multimedia content as compared to static content	Failed to disprove
H <sub>0</sub> 2(a)	There is no significant difference in the subject's ability to recall primary content information when presented with a combination of tangible print and digital mediums as compared to digital-only mediums	Failed to disprove*
H <sub>0</sub> 2(b)	There is no significant difference in the subject's ability to recall secondary content information when presented with a combination of tangible print and digital mediums as compared to digital-only mediums	Failed to disprove*
H <sub>0</sub> 3(a)	There is no significant interaction between the format of content and medium in which content is presented in regards to ability to recall primary content information	Failed to disprove
H <sub>0</sub> 3(b)	There is no significant interaction between the format of content and medium in which content is presented in regards to ability to recall secondary content information	Disproved

*\* indicates notable exceptions in the statistical significance of individual question responses for this metric compared to overall metric*



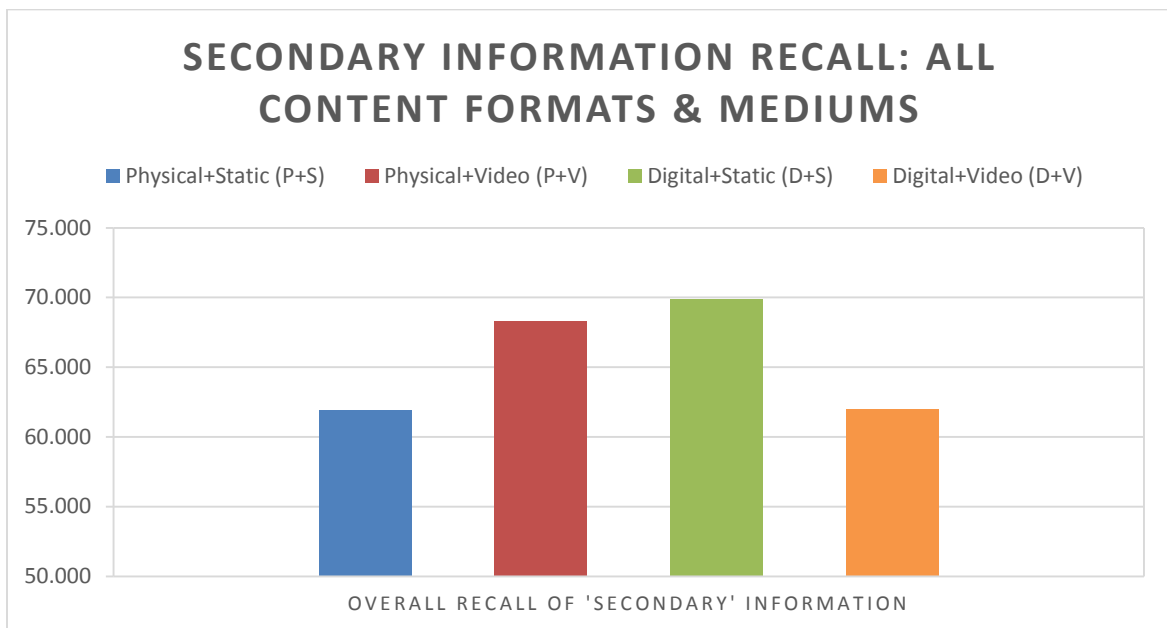
In regards to the recall of primary content information, the data collected in this study demonstrates a clear correlation with the form of content that is presented in the context of a social media environment (between multimedia motion content and static content), but does not demonstrate a correlation with the format mediums in which content is presented (between mixed physical print materials and digital content and digital-only materials). Testing subjects who were presented with static digital content were, on the whole, shown to have significantly higher rates of recall for primary information than those who were presented with multimedia motion content; this also held true for a majority of individual questions meant to evaluate primary information. Subsequently, participants who were presented with multimedia motion content were shown to have significantly lower rates of primary information recall.

Figure 24



When looking at the recall of secondary content information, the data from this study did not demonstrate a clear correlation with either the form of content that is presented in the context of a social media environment or the mediums in which content was presented. However, for both evaluative categories of secondary information, there were individual questions that did show differences of statistical significance, even as the category on the whole did not. Regardless, these individual measures of secondary information recall do not reflect a greater trend of statistical significance between these categories.

Figure 25



Finally, analysis of data regarding the interaction of the two independent variables in the ability to recall primary or secondary information showed that while there is no relationship tied to primary content information recall, there is a demonstrable relationship between the form of content that is presented in the context of a social media

environment and the format mediums in which content is presented. More specifically, the pairing of physical print materials with multimedia motion content and the pairing of strictly-digital materials with static content results in significantly higher levels of overall recall of secondary information. Conversely, the pairing of physical print materials with static content and the pairing of strictly-digital materials with multimedia motion content results in significantly lower levels of overall secondary information recall.

## CONCLUSIONS

### **Discussion**

Based on the findings of this study, there are a number of potential takeaways that might speak to different industries and applications. When accounting for the observable differences between content performance based on format and medium, there is immense value in being able to speak to the communicative effectiveness of these materials within a common real-world context. This holds especially true as companies, businesses, and organizations attempt to make important decisions regarding the resources that they should devote or divert towards particular forms of communication and advertising materials. These kinds of decisions can influence everything from individual decision-making to wider overall campaigns to hiring decisions and salary allocation. Therefore, being able to quantify the value that varying forms of content and mediums can provide is an essential goal.

The purpose of this thesis was to be able to better quantify data and information on the performance of these forms of content when placed into contexts beyond educational environments or isolated testing situations, and instead to be able to evaluate their effectiveness in competitive environments in which various pieces of content and information are vying for the viewer's attention. Considering that it is nearly impossible to find a context in the current day in which one is encountering marketing or advertising or informative content in a setting completely isolated from any and all other materials, it was vital that this study focus on the contexts in which one may commonly find these forms of content day-to-day.

To that end, on a strictly content-based level, there would be reason to suggest that static graphic content as a tool to communicate primary information about a product or service may be preferable to multimedia video content based on the results of this study. It is certainly clear that within this particular study, the individuals who viewed static content were more likely to spend additional time in their simulated social media feed as well as remember the primary content information that had been communicated to them through the graphic, regardless of the medium selected for the magazine component of the study. This statistically significant correlation is also supported by the similar conclusions that Sears' study arrived at, in which static graphics outperformed any other category in their ability to produce recall of primary information among testing subjects and overall resulted in the greatest total levels of information recall. In this context, as a single piece of digital content within a social media context, the strengths of static digital graphics as a communicative tool are prominently displayed.

However, it is the relationship between the form of graphic and the broader marketing efforts, communication efforts, and overall campaigns demonstrated through this study that may be of greater real-world value to marketers, corporations, and organizations. A statistically significant relationship between the form of digital content and the combination of mediums in which participants encountered content was demonstrated in the recall of secondary information is something that should both be recognized and accounted for when making decisions for creating and distributing content. That the pairing of multimedia motion graphics with physical print materials and static graphics with exclusively non-physical materials resulted in significantly higher

levels of secondary recall, while multimedia with exclusively non-physical mediums and static graphics with physical print materials resulted in significantly lower levels of secondary recall, suggests that there is potential strength both in contrast and in consistency between marketing materials when it comes to varying mediums. In the case of multimedia and print, the tangible experience of the physical print materials combined with the more kinetic, involved content of the multimedia motion content may have brought about a better path to information recall as the two reinforced and strengthened one another in contrast to other pieces of competing static or motion digital content that did not pair with print materials. In the case of non-physical mediums and static content, the opposite may have been true: the internal consistency between the static graphic content in the digital magazine spread paired with an identical static graphic in the simulated social media feed may have resulted in a strengthened ability to recall secondary information through repetition and consistency. In both of these cases, though, the pairing of specific forms of content and the mediums they were presented in resulted in a clear and marked impact on the recall of secondary information in a way that did not exist when those materials were simply tested and observed alone.

It is these kinds of relationships between forms of content and the mediums in which they are presented that show the true complexity of this question. What may be more effective at communicating information in an isolated setting free of distractors, or in a setting in which the piece of content is meant to stand alone rather than be paired with supplemental content, is not necessarily as effective when content begins to be paired across mediums or platforms. In some instances, a multimedia motion graphic may

be able to better communicate the vital secondary information of a piece of content as it is paired with a supplementary print campaign; in others, a static graphic meant to simply get across the most important point of primary information without pairing with any additional materials or context may be ideal. Regardless, having the flexibility to meet those needs as context shifts or changes is a vital component to effective communication in the environments that are now most common in today's world.

### **Limitations of the Study**

Of course, there were a number of limitations that this study was subject to. First and foremost was in the use of a single set of static and multimedia motion content as it was designed for the purposes of this study. While these pieces of content were evaluated on their communicative effectiveness in displaying the same information and visual elements, it may be possible that simply the selected choice of generic product and company could have had an impact on the level of recall that subjects were able to display between primary and secondary information. Theoretically, a much larger study that evaluated these metrics for an entire set of various forms of content, both advertising-based and non-advertising-based, could potentially allow for a more accurate assessment of information recall based on medium and format.

Another limitation of this study was the population that was available for testing. While the 18 to 24-year-old demographic is prominently active in social media platforms and often a target of communicative efforts by businesses and organizations, it may be possible that results of a study in which this demographic is the most prominent portion of the population will not properly represent the larger population in its entirety. This is

also true for the study's predominantly Caucasian testing population and average education level of participants. Another study may find success in broadening the overall demographics of this study and covering a wider range of people that is more representative of national demographics.

### **Recommendations for Future Research**

Of important note for potential future research were instances in which individual questions of primary or secondary information recall did not match the overall metric for those categories. These specific questions may yield results that speak to greater phenomena or trends that did not fit within the scope of this particular study. Questions that fall under this specific category are the statistically significant correlation between the forms of medium participants viewed content in and their ability to recall the primary branding logo element of the company, the correlation between the forms of medium and the ability to recall the location of the advertised promotion, and the correlation between the forms of medium and the ability to recall the building's pictured physical features, all of which were notable exceptions to their overall larger trends of no greater statistical significance.

There may also be opportunity for future research to include or account for virtual reality, augmented reality, and interactive elements in motion or multimedia content as those technologies continue to progress and become more common across various platforms. While multimedia motion content as it was evaluated in this study consisted of a short video clip with footage, overlaid text, and sound, there may be any number of ways to define this category of content depending on the context and environment in



which it might exist. This may also be true as tech standards for multimedia content continue to evolve and theoretically move towards greater consistency.

Finally, there is opportunity to replicate or expand upon this study by broadening the potential mediums that it encompasses. While this particular study selected a magazine spread as a medium for physical print and/or digital content and a simulated social media feed to evaluate multimedia motion content and static content, there are a multitude of potential mediums and platforms and forms of content that could be evaluated within the scope of real-world communicative efforts.

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## APPENDIX A

### Consent Form (as used in testing)

#### **Study Title: The effectiveness of variable graphics in the context of a simulated content environment**

##### **Description of the Study and Your Part in It**

Dr. Walker and Chris Knox are inviting you to take part in a research study. Dr. Walker is a Graphic Communications professor at Clemson University. Chris Knox is a student at Clemson University, running this study with the help of Dr. Walker. The purpose of this research is to better understand the impact of different kinds of content as communication tools within a simulated real-world environment.

Your part in the study will be to view a mock print piece and social media feed, followed by answering a brief questionnaire. It will take you about five to ten minutes to be in this study.

##### **Risks and Discomforts**

We do not know of any risks or discomforts to you in this research study.

##### **Possible Benefits**

This study will serve to better inform content creators and communicators on the effectiveness of various formats and tools in conveying primary and secondary information, as well as help in the effort to create informative content that is both more content-rich and easier to recollect.

##### **Incentives**

By participating in this study and providing a valid email address, you will be entered for the chance to win a **\$200 Amazon gift card** for personal use. Limit of one entry per person.

##### **Protection of Privacy and Confidentiality**

Any email address collected in this study will not be disclosed or utilized in any way regarding data analysis or survey results. Email addresses will only be used for the sole purpose of contacting a valid participant for the distribution of incentives. The results of this study may be published in scientific journals, professional publications, or educational presentations; however, no individual participant will be identified.

##### **Choosing to Be in the Study**

You may choose not to take part and you may choose to stop taking part at any time. You will not be punished in any way if you decide not to be in the study or to stop taking part in the study.

##### **Contact Information**

If you have any questions or concerns about your rights in this research study, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-0636 or [irb@clemson.edu](mailto:irb@clemson.edu). If you are outside of the Upstate South Carolina area, please use the ORC's toll-free number, 866-297-3071. The Clemson IRB is a group of people who independently review research. The Clemson IRB will not be able to answer some study-specific questions. However, you may contact the Clemson IRB if the research staff cannot be reached or if you wish to speak with someone other than the research staff.

If you have any study related questions or if any problems arise, please contact Chris Knox at Clemson University at [\\_\\_\\_\\_@clemson.edu](mailto:____@clemson.edu).

##### **Consent**

**By participating in the study, you indicate that you have read the information written above, are at least 18 years of age, been allowed to ask any questions, and are voluntarily choosing to take part in this research. You do not give up any legal rights by taking part in this research study.**

**I agree and wish to continue.**